(Hearing transcript on Collision Avoidance)

Docket #
01-10910

PROPOSAL TO REQUIRE TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEMS ON CARGO AIRCRAFT

WEDNESDAY, FEBRUARY 26, 1997

FAA-01-10910-5

U.S. House of Representatives,

Subcommittee on Aviation,

Committee on Transportation and Infrastructure,

Washington, DC.

The subcommittee met, pursuant to notice, at 2:02 p.m. in room 2167, Rayburn House Office Building, Hon. John J. Duncan, Jr. (chairman of the subcommittee) presiding.

Mr. **DUNCAN.** The subcommittee will come to order.

We've got some other Members on their way, but we're going to go ahead and get started here on time.

I would like to first say good afternoon and welcome to today's hearing regarding the issue of whether or not traffic alert and collision avoidance systems or TCAS, as it's commonly called, should be required aboard cargo aircraft. We will also look into the recent close air incidents involving military aircraft that have received so much attention around the country.

While the subcommittee understands that actions have been taken by the military to help prevent any further incidents, it remains an issue that the subcommittee would like to review, although we certainly commend the military for the actions taken thus far.

It is my understanding that these incidents involving military and civilian aircraft have been reported in New Mexico, Texas, Maryland, and also off the coast of New Jersey. So we will hear from representatives from the United States Air Force and the United States Navy in that regard.

Currently, TCAS–II is required on commercial aircraft with a passenger seating configuration of more than 30 seats, and TCAS–I, at a minimum, is required on passenger aircraft with 10 to 30 seats.

The subcommittee is aware that the Independent Pilots Association, representing UPS pilots, has filed a petition for rulemaking with the FAA requesting that TCAS–II be required on cargo aircraft.

The subcommittee would also like to hear from our witnesses regarding a new collision avoidance system based on GPS satellite technology called "automatic dependent surveillance broadcast," commonly referred to as ADS–B, that may be an enhancement or improvement over current TCAS systems.

The subcommittee wants to ensure that practical and reasonable and cost-effective efforts are being made to improve safety in the area of collision avoidance, and we look forward to hearing from our witnesses today on this very important safety issue.

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We have two panels filled with very distinguished witnesses from the Air Force, the Navy, the FAA, the National Transportation Safety Board, and we have a second panel consisting of representatives from the Air Line Pilots Association, the Independent Pilots Association, the Teamsters Airline Division, the Air Freight Association, and the pilot of the Nations Air Express aircraft that had a close encounter with a military plane just a few weeks ago.

I now yield to Mr. Lipinski for any statement that he wishes to make.

Mr. **LIPINSKI.** Thank you, Mr. Chairman.

We have a lot of witnesses, so it could take a long time. I have a magnificent statement that, without objection, I'd like to have included in the record.

I simply want to say I welcome everyone here today. I look forward to their testimony. I turn the microphone back to you.

[The prepared statements of Mr. Lipinski, Mr. Poshard, Mr. Cramer, Mr. Oberstar, Mr. Costello, Mr. Traficant, and Ms. Johnson follow:]

[Insert here.]

Mr. **DUNCAN.** All right. Do any of the other Members wish to make an opening statement at this time? Do you have any statement or—Mr. Pitts, do you have any statement you wish to make?

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Mr. **PITTS.** No thank you, Mr. Chairman.

Mr. **DUNCAN.** All right. Thank you very much. If you wish to later put any statements in the record we can do so.

We'll start now with the witnesses, and on panel one is: Mr. Guy S. Gardner, who is the associate administrator for regulation and certification with the Federal Aviation Administration, and he is accompanied by Mr. David Harrington, acting deputy director for flight standards. Mr. Ronald E. Morgan, director of air traffic with the FAA, also accompanies Mr. Gardner.

We also have Mr. Robert T. Francis, vice chairman of the National Transportation Safety Board, and he is accompanied by Mr. Richard Wentworth, who is the senior air traffic control investigator for the NTSB; and Mr. Greg Feith, who is the senior aviation investigator in charge.

And also we are honored to have Major General Donald L. Peterson, who is the assistant deputy chief of staff, air and space operations, for the United States Air Force; and Rear Admiral Dennis V. McGinn, director of the air warfare division of the United States Navy.

Gentlemen, it's an honor and privilege to have all of you here at this time, and I suppose the easiest way to do this would just be to go in the order.

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I don't have anything to do with the way these names are listed on here, but we'll just go in that order, and that means, Mr. Gardner, we'll start with you, please. You may begin your testimony.

TESTIMONY OF GUY S. GARDNER, ASSOCIATE ADMINISTRATOR FOR REGULATION AND CERTIFICATION, FEDERAL AVIATION ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY DAVID HARRINGTON, ACTING DEPUTY DIRECTOR FOR FLIGHT STANDARDS, AND RONALD E. MORGAN, DIRECTOR OF AIR TRAFFIC; ROBERT T. FRANCIS, VICE CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD, ACCOMPANIED BY RICHARD WENTWORTH, SENIOR AIR TRAFFIC CONTROL INVESTIGATOR, OPERATIONAL FACTORS DIVISION, AND GREG FEITH, SENIOR AVIATION INVESTIGATOR IN CHARGE; MAJOR GENERAL DONALD L. PETERSON, ASSISTANT DEPUTY CHIEF OF STAFF, AIR AND SPACE OPERATIONS, U.S. AIR FORCE; AND REAR ADMIRAL DENNIS V. MCGINN, DIRECTOR AIR WARFARE DIVISION, U.S. NAVY

Mr. **GARDNER.** Thank you, Mr. Chairman.

I'm looking forward to the opportunity of working with this Committee on these aviation issues in the future, as well.

I'd like to summarize, if I may, the written testimony that I've already submitted.

As you've mentioned, we're reviewing a petition for rulemaking filed by the Independent Pilots Association that asks us to mandate the installation of TCAS–II on all transport category aircraft in cargo operations.

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We are interested in hearing today's testimony, as well, and it will be included in the docket that we use to make determination for rulemaking.

You've asked me to comment today on two systems, TCAS and ADS–B, and I'd like to focus my summary on a description of those items for those Members who may not be that familiar with it.

TCAS is designed to operate independently from the air traffic control system, and it serves as a backup to the air traffic control system for collision avoidance of aircraft.

It operates by sending and receiving transmissions to nearby aircraft. One aircraft will send a signal out from its transponder to another aircraft, interrogate it and that aircraft will send a message back to the initial aircraft.

With that information, the aircraft with TCAS can determine the relative position of the other aircraft in its neighborhood, and it also receives what altitude that aircraft is at. With that information it can display to the pilot the relative position and relative altitude of those nearby aircraft.

It will also then, through its algorithms, figure out which aircraft are a threat and which are not, and it will display that threat to the pilot of the aircraft.

It will give a warning that an aircraft is nearby, and you need to be concerned about it.

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That is what TCAS–I does.

TCAS–II, in addition to that, will also determine an escape maneuver, if I may call it that, to ensure increased separation between the threat aircraft. It will either be a climb or a descent command

issued to the pilot.

TCAS not only work with other aircraft that have TCAS transponders, but it can also identify aircraft that have the Mode A and the Mode C transponder.

When the other aircraft is also TCAS–II equipped, they will actually talk to each other to ensure that they both do separate maneuvers—that one will go up while the other goes down, rather than both of them going up.

TCAS is obviously proven technology and has proved its success over the years since Congress mandated that it be installed on all passenger-carrying aircraft of 30 seats or more for TCAS–II, and 10 to 30 seats for TCAS–I.

ADS–B technology, on the other hand, is technology that's still in the development phase, and we are still developing standards for that, although some test programs have been conducted with it.

Technology is slightly different from that of TCAS. With ADS–B, the aircraft actually receive signals using the Global Positioning Satellite system to determine its exact position over the earth, and then it transmits that information between aircraft so that each aircraft will know exactly where it is and where the other aircraft is, and then it can use similar algorithms to TCAS to portray relative positions to those aircraft. This will also work with the ground controllers, as well. TCAS is simply an airborne aircraft-to-aircraft system.

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With ADS–B, because of the Global Positioning Satellite technology, you have a little more accuracy than you have with TCAS; however, ADS–B only gives the information for other ADS–B-equipped airplanes.

ADS–B is part of the currently-proposed architecture for the National Airspace System that the FAA is developing; however, the recently-released White House Commission report recommends that we accelerate the modernization of the NAS, of which ADS–B is a part, and is also included as part of the Hawaii-Alaska project.

In summary, the IPA petition and the cargo industry's proposal concerning ADS–B and TCAS raise complex safety and policy issues and we need to consider those carefully, and today's discussion will help us in our determination of whether or not to mandate TCAS–II in the near term for cargo aircraft, and whether or not to encourage the cargo industry to proceed with their ADS–B proposal to help us in that development.

With that, I thank you, Mr. Chairman, and I'm ready to answer any questions when appropriate.

Mr. **DUNCAN.** Well, thank you very much, Mr. Gardner. We have—in addition to Mr. Boswell and Mr. Pitts, who were here with Mr. Lipinski and myself when we started, we've now been joined by several other Members. We have our vice chairman of the subcommittee, Mr. Blunt. We've been joined by Mr. Hutchinson, Mr. Metcalf, Mr. Bass, Dr. Cooksey, and also we're always honored to have the long-time chairman of this subcommittee and now the ranking member of the full committee, Mr. Oberstar.

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Mr. Oberstar, do you have any statements you wish to make at this time?

Mr. **OBERSTAR.** I really don't want to interrupt the flow of testimony at this point, Mr.

Chairman. I will make some remarks later.

I just want to compliment you on holding this hearing.

Mr. **DUNCAN.** Thank you.

Mr. **OBERSTAR.** It's vitally important. It has been a longstanding interest of our committee, which initiated the first legislation in 1987, with subsequent amendment in 1990. The Subcommittee on Investigations and Oversight held hearings that led to the enactment of legislation to require this technology, so it's appropriate that we keep our finger on the pulse and stay vigilant on this issue.

Mr. **DUNCAN.** Well, thank you very much.

For those newer members, Mr. Oberstar not only worked as a staff member of this committee for several years, but has served on this committee for many years and was chairman of this subcommittee for 13—for how many years?

Mr. **OBERSTAR.** Six years—4 years on Investigations and Oversight and 6 years on Aviation.

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Mr. **DUNCAN.** Okay. Ten years as a subcommittee chairman. But Mr. Oberstar has taken a real interest, special interest, I think, in aviation, and we sometimes refer to him as Mr. Aviation in the Congress. He has real expertise.

If anyone else has any statements that they wish to place in the record, they will be allowed to do so and make any comments as soon as we finish with the testimony.

We'll next hear from Mr. Robert T. Francis, who is vice chairman of the National Transportation Safety Board.

Mr. Francis?

Mr. **FRANCIS.** Thank you, Mr. Chairman.

I'm pleased to submit our magnificent testimony to go along the magnificent statement of Mr. Lipinski.

I'm also delighted at the order in which you selected to call on us, because Mr. Gardner's very explicit and excellent technical explanation of both TCAS and ADS leave me free perhaps to talk a little bit more broadly about some public policy issues and the way in which the NTSB and I see this.

This is an issue that the Board has been focused on since the 1960s, and we've made over the years lots of recommendations, and these have led to the system of TCAS and particularly TCAS–II, which I think very many of us find a wonderful and one of the best sort of modern accident prevention systems that we have out there now.

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I would say that the NTSB, when it has made these recommendations over the past, has not made the distinction between large aircraft that carry cargo and large aircraft that carry passengers, and we still do not. We would, I guess, make the assumption that this should be in both cargo and passenger aircraft.

We've done a lot of talk recently and a lot of progress has been made by the entire safety community on one level of safety, and I think that one level of safety is certainly something that very much applies in this context.

When I first took this job—and this is a little more personal on my part—this question of TCAS for cargo aircraft was something that I focused on fairly early, had a number of conversations with then-Administrator Hinson, and he and I have both made a considerable effort, I think, to try to do some jawboning with the industry on this issue in terms of getting them to install this system on their large cargo aircraft.

I think that in the era in which we currently find ourselves of smaller government and smaller budgets and hopefully fewer bureaucrats and less paper, that there is an incumbency, if you don't want to have more regulations, on those who are in the sector potentially regulated, to, as well, do their part and come to bat and go half way. It's something that I have been saying to these carriers.

I think that also some of the carriers in this industry, and particularly UPS—you may have seen this morning that UPS is in compliance with stage III noise regulations 3 years ahead of the due date, and I think this is the kind of thing that one likes to see in the industry. They did this on their own. They did it for the right reasons and it has happened.

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I would hope that we could see the same spirit of volunteerism and non-necessity for regulations in the issue that we're talking about here today.

One of the things that gives me some pause is that I was with the FAA for a number of years and I was overseas when the U.S. first decided to mandate TCAS, and, as you will remember, it was mandated not just for domestic carriers but also for carriers who flew into the U.S.

I spent a good deal of my time and energy fending off the charges of technological imperialism, commercial imperialism, that were levied at the U.S. when we were taking the lead in implementing what I think everyone would agree now is an extraordinarily important system.

We now find ourselves in the situation where, with air cargo operators, these operators are going to be required to equip at least parts of their fleet with TCAS–II because of regulations that are being implemented in Europe and in Asia, so we suddenly, instead of being the leader in this, find ourselves on the back side of the wave in at least part of this safety initiative, and I find that unfortunate.

I'm not going to talk or try to expand on Guy's comments on the ADS–B. I would just say that ADS–B—I think almost everyone would agree—has some enormous potential down the line. One of the problems with it is that there is no universal acceptance as to exactly how it's going to work, how quickly it's going to go, questions of frequency allocations, questions of different groups in the aviation community having problems with different aspects.

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And I think that those who will talk about ADS–B as a collision avoidance system in the near future are being enormously optimistic, and I don't think that we can afford that optimism. I think that the time is such that we have to go forward with a proven technology and get TCAS into these aircraft.

Let me just conclude by saying that, in addition to the safety advantages, there are a number of economic advantages here, and I think when you talk to pilots in the system, particularly, you will find them using TCAS in ways that are very creative and that are providing an approach to airports

and lining up on runways, whatever it is. They are providing economies and benefits to their company, and to not just the safety of the system but also the efficiency of the system, which are enormous. I think that that is going to continue to happen.

The other thing I would say in closing is that those of us who are pilots and others understand that if you want to—that two of the most important of safety considerations for a pilot, and I suspect for an astronaut, are the issues of being able to stay ahead of the airplane and the issue of situational awareness, and TCAS is enormously advantageous to pilots in both of those aspects.

Thank you very much.

Mr. **DUNCAN.** Thank you very much, Mr. Francis.

Our next witness will be Major General Donald L. Peterson.

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General Peterson, you may begin your testimony.

General **PETERSON.** Thank you, Mr. Chairman and members of the committee. I appreciate the opportunity to come before the committee today and discuss the incidents involving the United States Air Force aircraft.

I've provided you earlier with a description of those incidents in the formal statement.

I first want to assure you that our Air Force takes its responsibilities in flying safety very seriously. The men and women flying our United States Air Force aircraft are among some of the most professional aviators in the world.

We recognize the fundamental reason for our existence, and that's the defense of the citizens of this Nation and to ensure their safety. While these incidents didn't constitute an immediate threat to the safety of our passengers, crews, or aircraft involved, they were significant enough to raise concern among our public, and that, in itself, is more than sufficient reason for the Air Force to take immediate action.

Air Force flight operations are safer than they have ever been in our history, fortunately. In the last 2 years, we've set records for performance and safety. Our FAA statistics indicate that there's a welcome decrease in the number of incidents, even in this era of unprecedented growth in the number of aircraft operating in our skies.

Although only 7 percent of these incidents or deviations reported by the FAA in 1996 involve military aircraft, it's our intention to continue to do everything possible to improve the safety and efficiency of our system and reduce that even further.

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Let me now turn to the Air Force's actions in response to the incidents that are described in the statement.

In addition to our participation and cooperation with the FAA, the Navy, and the NTSB investigations, the Air Force directed several major actions in the wake of these incidents. These actions included, first, a stand down of all training missions in the Atlantic and Gulf Coast warning areas. The purpose of this stand down was to allow units to review all their procedures, their regulations, and memorandums of agreement for transiting to and from and operating within these special use areas.

Secondly, we did a comprehensive review of all of our procedures Air Force wide, worldwide, in all of our units in regards to the special use airspace that we train in.

To date, the results of the review have confirmed that the existing procedure for entry, exit, and transit through this special use airspace, when adhered to, are safe and sufficient.

Thirdly, we issued a directive immediately to provide TCAS awareness training to all of our operations personnel, pilots, and our controllers, and the addition of a formal block of instruction in both our primary flying training and our formal continuation training, and we've adjusted our regulations to include instructions on TCAS, as well.

Fourthly, we revised our applicable Air Force instructions directing pilots to immediately terminate training upon discovering an unidentified aircraft in their area and to request air traffic control assistance in ensuring the area is cleared of non-participating aircraft. These changes are aimed at reducing the potential for unintentionally generating TCAS alerts in other aircraft.

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In addition to the actions I just covered, the Air Force joined with the Navy and the FAA to convene a cross-agency review of procedures and agreements pertaining to special use airspace. A review, which began on February 12, focused on all relevant FAA and DOD orders, handbooks, regulations, and instructions, including vocal agreements. The panel consisted of technical experts with extensive experience in our military and civil aviation operations.

While the committee concluded that DOD and FAA roles, responsibilities, and methods for separating aircraft and active warning areas were clear, it did identify several observations for further consideration by the FAA and the services.

The Air Force intends to thoroughly study and work these observations to ensure, along with the FAA and the Navy and our other sister services, that we can employ those lessons learned and observations to improve the system.

In conclusion, I want to restate that the Air Force is committed to maintaining the safest possible environment for all users of the national airspace. We take all instances very seriously, regardless of their nature.

We regret the concern that recent TCAS incidents have caused the American public, and we, along with FAA and the Navy, have taken immediate action, comprehensive action, to address these incidents.

The Air Force record concerning flight safety is an excellent one, and we will work hard to ensure that it continues to be so.

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Thank you, Mr. Chairman.

Mr. **DUNCAN.** Thank you very much, General Peterson.

The next witness is Rear Admiral Dennis V. McGinn.

Admiral McGinn, you may begin your testimony.

Admiral **MCGINN.** Thank you, Mr. Chairman and members of the subcommittee. I welcome the opportunity to appear before you today to discuss the air traffic control coordination between military and civil authorities.

I'd like to echo some of General Peterson's remarks in saying that safety for all of us who use the skies, the increasingly busy skies, is paramount.

Men and women of all of our military services involved in flight operations, from pilots and air crew to military air traffic controllers, are top professionals. We are very proud of them. From their selection through their training and to the performance of their daily duties, they are professionals who pay attention to detail, which is absolutely imperative for the safety of flight.

The incident of February 5th involving the U.S. Air Force F–16 and the Nations Air 727 is of serious concern. We have worked very closely with the NTSB, the Federal Aviation Administration, and the Air Force to look closely into the circumstances of this incident in order to ensure our coordination with all parties, and in particular with the FAA controllers, is effective, and to ensure the safety of all who use those busy skies.

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I'd like to summarize some of the actions that the Navy has taken from an air control standpoint, and I will submit the full statement for the record, Mr. Chairman.

We have taken a number of actions to prevent such incidents in the future.

First, we are incorporating the lessons learned from this incident in the training of controllers at Fleet Area Control and Surveillance Facility, FACSFAC, Virginia Capes, as well as that of all other Navy air traffic control facilities.

Second, all air traffic controllers at FACSFAC conducted a safety stand down on February 10. This stand down assured that all controllers understood and were abiding by all approved procedures and emphasized proper phraseology, current directives, proper airspace recall, and air traffic control responsibility for separation of aircraft.

Third, the commanding officer of FACSFAC, Virginia Capes, has directed that both the radar supervisor and a facility watch supervisor be positioned and manned fully during day- and night-time watches to ensure that there is a free radar supervisor to concentrate on assisting all individual air traffic controllers.

Next, under a new procedure, the radar supervisor is required to monitor every airspace turnover involving FACSFAC VACAPES and the Federal Aviation Administration controllers.

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Next, the February 5th incident is now part of the air traffic controller training syllabus as both a case study and a simulator exercise to illustrate the potential hazards and emphasize proper procedures during airspace sharing procedures.

Finally, we've reminded Naval aviators about TCAS in civilian aircraft, its parameters, and the potential hazards of approaching within TCAS range.

The Navy, Air Force, and FAA have coordinated very closely in reviewing these procedures. The test procedure, which has enabled us to provide real-time coordination of the warning area, is to be formalized in a letter of agreement among all parties.

We unanimously agree that the procedures are safe, appropriate, and will increase the margin of safety for all who use these skies.

That concludes my summary of statement, Mr. Chairman, and I'm ready to answer any questions.

Mr. **DUNCAN.** Admiral, thank you very much.

For some of the later opening statements, we have been joined by Ms. Granger, Mr. Ehlers, Mr. Pease, Mr. Ewing, Ms. Johnson, and Ms. Brown.

I earlier stated that if any of the Members who have just joined us wish to place an opening statement in the record, we certainly will be glad to—that will be appropriate and allowed.

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We'll go ahead and start the questioning of the witnesses at this time.

Mr. Gardner, just let me ask you, first of all, we have a briefing paper in our material that says that the FAA estimates that the cost of installing a TCAS–II system in cargo aircraft would cost about $100,000 per plane, but some of the air cargo operators say that it would cost over $200,000 per plane.

Do you have any idea why there is such a discrepancy in the cost estimates? And has the FAA done any type of cost-benefit analysis for this type of system?

Mr. **GARDNER.** Sir, we have not done a recent cost-benefit analysis for this system. That's one of the things we obviously would do in considering this petition.

The numbers that I have heard, in asking my staff, range from $50,000 up to $150,000. I'm guessing it would be around $100,000. Of course, that depends on the quantity you buy. The large buy that United Airlines recently did would obviously drive down the cost, and I think that's where the $50,000 number came from. But the details I do not have.

We will work on that and get that to you.

Mr. **DUNCAN.** The FAA in the past has been very high or very optimistic about GPS technology, but you seem to be a little cool in your testimony about the ADS–B system. Can you tell us, are you skeptical or what? Do you have questions about that?

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Also, we have a later witness who will testify that he thinks it's going to be possible to install some of this technology by maybe later this year, or certainly by late 1998. Do you have questions about that?

Mr. **GARDNER.** Well, sir, I think all I meant in my hesitation about ADS–B is the caution that it only works between aircraft who are like-equipped. So, for instance, if the cargo carriers are equipped with ADS–B, they would only be able to have situational awareness with respect to each other, not with, for instance, the part 121 passenger-carrying aircraft who have TCAS but not ADS–B.

So until we get the entire system, all the aircraft in the system equipped with ADS–B, which is part of the architecture that we're developing, ADS–B does not provide you the situational awareness with respect to everybody. That's my concern.

The other concern would be the fact it is in a development stage. There actually have been some systems that are operational.

We used ADS–B in a developmental prototype form with all the hovercraft in Atlanta during the Olympics, and it demonstrated itself very well there.

It will also be a part of the Hawaii-Alaska project, for which we're trying to start equipping aircraft 2 years from now.

But there is a challenge for us. We have to yet develop all the standards. As Bob Francis mentioned, there isn't an international acceptance of what the standard is yet, and we're developing that and then we have to work on the certification of the equipment.

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So we have been challenged to try to get there in about 2 years with the equipment, the initial equipment being ready to equip aircraft, but it's a challenge.

Mr. **DUNCAN.** General Peterson, let me ask you, sir, there was a report that your pilot was on the wrong radio frequency. Is that true? And, if so, how did that happen? And also there have been some suggestions that your pilot may have been hot-dogging or even having fun. Have you looked into that? Was he showing off like the pilot in Nashville that crashed last year after he took off at such a straight-up altitude?

General **PETERSON.** Yes, sir. On the first part of the question, the pilot was—the flight was monitoring Guard frequency. The lead pilot in the Smash–1–1, the aircraft that was involved, had bumped his Guard receiver off in a switch error, and so his wing man called him when he was contacted by the Navy controller and passed the word. He didn't realize that. He switched back over and communicated directly.

To the second part of your question, sir, no, sir, the pilot was not hot-dogging, and he was, in fact, making a controlled intercept on what to him was a stranger in the warning area he was not aware of, and it was controlled all the way through. We reviewed the tapes on that, along with the NTSB and the FAA.

That is a normal intercept profile that our pilots are trained to do, so he was not hot-dogging, nothing like the incident you described in Nashville.

The pilots are very disciplined, and I think all services would say this is a serious matter of how we fly our aircraft. We can't operate our aircraft undisciplined and be successful in war, and certainly not in a peacetime environment either.

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So no, there was not any hot-dogging, sir.

Mr. **DUNCAN.** Good.

Admiral, your statement notes that FAA controllers used to be warned several hours in advance that military aircraft would be in the area, but there was a change last November 1, I think you say, to increase efficient use of airspace, and so they don't receive as much advance notice as they used to.

Is this something that has contributed to this recent flurry of reports of close encounters. Is this a change that was a good change, or should there be another look taken at it?

Admiral **MCGINN.** Mr. Chairman, I think it's a very good change. It allows us to share the airspace in a very efficient way, consistent with the safe use of that airspace by all users.

With regards to FAA and military controller coordination, they have hotline communications that they can use to turn over the airspace. In a typical instance of this type, if the airspace were scheduled, the FAA would not be scheduling civil air traffic through the airspace.

For many, many valid reasons—maintenance delays or weather delays, or what have you—the military users of that airspace might be delayed. Rather than just have the airspace fenced off, if you will, from use by anyone, the Navy controllers will then turn over the airspace on a much shorter notice to the FAA controllers for more efficient routing tracks for civil air traffic through there.

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In this particular case that was done, and the F–16 aircraft showed up and were given a traffic advisory; however, the procedures and terms of the coordination between the FAA controller and the Navy as to the activation of the warning area were in accordance with the memorandum of agreement.

Mr. **DUNCAN.** All right. Thank you very much.

We need to move on to other Members. Mr. Oberstar?

Mr. **OBERSTAR.** Thank you, Mr. Chairman.

Mr. Francis, welcome to the committee. Glad to have you testifying. This is your first appearance, I believe, before our committee. We're glad to have you.

All of America took pride in your management of the two tragedies—ValuJet and TWA 800. You reflected great credit on the Nation's most important safety function, the NTSB, and you and your colleagues, your associates at NTSB set a standard for the conduct of public inquiry of such aviation tragedies.

I compliment you on the way you conducted yourself and the great dignity with which that vitally important work was undertaken.

The characteristic of the NTSB, the Board has been out in front on collision avoidance issues going back to 1971, as your written testimony indicates, recommending that studies be undertaken, later that action be undertaken.

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If the Board's insistence had been followed and TCAS installed aboard aircraft in a timely fashion, the mid-air collision over Cerritos, California, would not have occurred, or very likely would not have occurred. We can't say for certain, but it certainly would have given avoidance opportunities.

There are two technologies that have made a dramatic impact on aviation. One is ground proximity warning systems that have taken a class of accidents off the shelf, controlled flight inter-terrain, and traffic collision avoidance systems, which have also virtually taken a class of accidents off the shelf.

When I began my first inquiries into near mid-airs in January 1985, there were over 1,300 such incidents for the previous year. Now they're down to a handful, relative handful.

The question before us today posed by this new technology of ADS–B harks back to the debate that we had over TCAS. There was early technological development of TCAS, and then there was TCAS–I, and then there was TCAS–II, and then the argument was, "Let's not proceed with TCAS–II because TCAS–III is right around the corner."

The perfect became the enemy of the good.

Eventually Congress simply—this committee legislated TCAS to be aboard aircraft on the insistence of our colleague Ron Packard, in whose District Cerritos occurred.

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Later we had to adjust that time frame for compliance because of technological problems.

The NTSB, as the premier entity of the Government, has looked at this issue. Is it the Board's belief that there are still too many uncertainties about ADS–B to proceed with that technology now and let—rather than continue with TCAS until ADS–B is demonstrated to be operationally successful?

Mr. **FRANCIS.** Mr. Oberstar, I don't think that this is a question of either/or so much. I think that most of us would agree that ADS–B is something that is going to come.

I think that the issue here is primarily an issue of timing, and you made a statement about what I referred to as the better mousetrap syndrome.

And I think that we have here, and I think that the Board would take the position that we have a demonstrably effective system for collision avoidance which can currently be installed, particularly in large aircraft, and is enormously effective.

I think that, at the same time, ADS–B some day is going to be the basis of something that will probably bring advantages that are not there with TCAS.

The difficulty is that, as any of us that have followed modernization and aviation safety know, this takes time. There are lots of different interests. There are budgetary considerations. There are priorities within the FAA. There are technological questions. There are frequency allocation issues that are out there. This is not going to happen, I don't believe, and I don't believe the Board thinks, within the next 2 years or 5 years. We're talking about out there.

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And, as Mr. Gardner has pointed out a couple of times, a major, major issue here is that in order to have protection from ADS–B you've got to be equipped with it.

That means that the entire fleet has got to be equipped with ADS–B in order to have that kind of protection, and that's not right around the corner.

So I would say that we feel that TCAS is a reasonable thing to mandate. It's not all that expensive. There can be programs where you put it in where you start taking acceptance of it in new aircraft—it's not that expensive in those—where you don't find cargo carriers taking it out of aircraft that they're buying from passenger airlines. They're going to have to do a certain amount when they have their aircraft going into foreign operations, and then come up with a compliance program for the rest doing it with C-checks or however you do it.

Mr. **OBERSTAR.** Thank you very much.

One of my concerns is that the cost/benefit analysis function that FAA must go through has led to delays in requiring and implementing new technology, and in the case of GPWS for commuter aircraft, if the shorter time frame that our committee recommended, a 2-year time frame for installation aboard commuter aircraft, had been followed, I know at least 19 lives that would have been saved from a crash that occurred in my District because that airliner was not equipped with GPWS and was 6 months before the deadline to comply.

Final question. Mr. Gardner, the equipping of TCAS on cargo aircraft was a top priority in the Secretary of Transportation's zero accident initiative. Why has notice of proposed rulemaking not been issued? Why hasn't this been moved along much more expeditiously?

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Mr. **GARDNER.** Yes, sir. I'm aware that that has been mentioned not only in the Secretary's comments, but in the Safety Summit, and we have been working on many of those initiatives.

It just so happens the mandate for TCAS in cargo has not come to fruition yet, and that is the issue we are addressing today.

I don't have an excuse for why it hasn't happened until now, sir.

Mr. **OBERSTAR.** I have to ask the Secretary or the former Secretary why it wasn't pushed ahead more vigorously.

Mr. **GARDNER.** I don't have a good answer, sir.

Mr. **OBERSTAR.** I didn't think so. I didn't expect you to be able to answer that, but it has to be raised, because if that is their top priority—that is one of their top priorities and a national summit was called on the safety at zero accidents, then this issue should have been pushed along much further.

Mr. **GARDNER.** Yes, sir. And it's there now. That's the good news.

Mr. **OBERSTAR.** I thank you very much for your testimony.

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I have other questions which I hope to ask later.

Mr. **DUNCAN.** Thank you, Mr. Oberstar.

Mr. Gardner, to say that you don't have a good answer is something that we don't often hear, but I think that's a good answer when you don't have a good answer.

Mr. **GARDNER.** Thank you, sir.

Mr. **DUNCAN.** Mr. Blunt?

Mr. **BLUNT.** Thank you, Mr. Chairman.

Mr. Gardner, you mentioned a minute ago, that in the Hawaii-Alaska project, you're encouraging ADS–B as a basis for that project. During the transition, do aircraft have both systems? How does that transition work if everybody has to have ADS–B for it to communicate?

Mr. **GARDNER.** In the Hawaii-Alaska project, we will be actually equipping all of the—I believe it's the commercial aircraft that operate in Alaska. We will not be going down to the general aviation aircraft level.

And you're exactly right. The system doesn't become fully operational until all of the aircraft are equipped. However, it does give you some advantages in the initial part of the program in that aircraft that are equipped have better situational awareness with the ground, which is also equipped, and therefore the ground controllers in a region like Alaska, where the radar does not see in a lot of the areas and down at the lower altitudes, working with an ADS–B type system will give us better coverage and more accurate coverage.

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Let me ask Ron if he's got any other comments.

Mr. **MORGAN.** Not really.

Mr. **GARDNER.** Okay.

Mr. **BLUNT.** So is that what you'd envision happening here, too—everybody that goes with the older system, the TCAS system, then would, in the foreseeable future, be transitioning to the new system ADS–B, all over the country?

Mr. **GARDNER.** Yes, sir. And it would be a similar process as when we first mandated TCAS to be equipped. It was a period of time before everyone was equipped, and therefore a period of time before you reached that higher safety level or less risk level. And the same would be true with ADS–B.

I might point out that the newest version of TCAS–II, Change Seven, which is currently not mandated, does fit in very well with ADS–B. An ADS–B aircraft can see a TCAS–II Change Seven equipped aircraft.

The future is that this will all merge together, this technology, in the out years to where it will be a very robust, redundant system for aircraft safety.

Mr. **BLUNT.** And in Alaska and Hawaii and in that project, are cargo carriers going to be asked to go to TCAS or are we going to ask them to go to ADS–B?

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Mr. **GARDNER.** Let me let Ron Morgan answer that.

Mr. **MORGAN.** The demonstration validation project that we're currently in the process of developing for Alaska and Hawaii has not been solidified to the point of being able to answer that question directly.

It's my belief at this point, since we don't have a total program plan, that we would be asking cargo aircraft to participate, along with all other commercial aircraft, utilizing an ADS–B in addition to whatever is on board at that time.

Mr. **BLUNT.** So if they have nothing on board now, in that project they would be equipped with only ADS–B?

Mr. **MORGAN.** That's correct, sir. If they had TCAS on board at that particular time, we would

also place ADS–B on for the demonstration project in those locations.

Mr. **BLUNT.** And does that new system work better as relates to problems near the ground than TCAS does?

Mr. **MORGAN.** The situation with ADS–B is that it will allow us to eventually eliminate our ground-based surveillance system, which is a very costly infrastructure throughout the country. ADS–B provides surveillance information not only aircraft-to-aircraft, but will provide it aircraft-to-ground, with the air traffic controller.

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Mr. **BLUNT.** Yes.

Mr. **MORGAN.** Since we don't have line-of-sight coverage throughout the country through radar systems, the ADS–B is almost like a flying radar platform as long as we have receivers to receive that information.

Mr. **BLUNT.** Okay. Thank you.

Mr. Francis, one question for you, and I'd like to echo Mr. Oberstar's comments about really what a great job you did representing the American people as you represented your agency and the Government in those two tragedies. I think we were all proud to see you and the way you reflect government service.

My question is, it seems to me I think the studies show that most of the mid-air collisions involve not cargo aircraft but general aviation aircraft, and I wonder if you have any plans to do anything there. It's easier to approach cargo, I know, but that's not really where most of these problems still have occurred, I don't think.

Mr. **FRANCIS.** Certainly there are a lot of accidents that involve general aviation aircraft, and, as well, the major accidents have, for the most part, involved large aircraft with general aviation aircraft.

Mr. **BLUNT.** Right.

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Mr. **FRANCIS.** I guess what I would say is that if you have TCAS–II in the large aircraft—and it's not reasonable to expect that you're going to have TCAS–II in a Cessna 150 or a Baron or something. But if you have TCAS–II in a large cargo aircraft and you have an encoding transponder in the small aircraft, the large aircraft is able to see the small aircraft.

That's not the best protection, but that's significant protection.

But I think that just because there has not been two large air cargo aircraft run into one another, or one run into another smaller aircraft, that that is—I mean, we're trying to be ahead of the game here, not be reactive.

We're talking about 800 aircraft now in the U.S. airspace, large aircraft that are similar aircraft in their operations to—these are 757s, 767s, Airbus A–300–600s. These are big airplanes.

Mr. **BLUNT.** I guess the question I would have in my own mind would be we seem to be rushing these cargo planes into the older technology that may soon be outmoded. The evidence would show that the real problem in this is not going to be solved by requiring cargo planes to do this, though

certainly everybody wants to do everything possible to avoid any kind of tragedy in the air. But I'm not sure we're really addressing the likely problem of where that occurs.

Mr. **FRANCIS.** I guess we would say that with 800 large aircraft out there, we think that that's a significant exposure. And, as I've said before, and I think as Mr. Gardner has alluded, we are not talking about ADS–B being a collision avoidance system that is effective for—I would personally say 10 to 15 years. That's a long time to have exposure with 800 aircraft.

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Mr. **BLUNT.** That's an unacceptable amount of time. I agree with that.

Mr. **FRANCIS.** We're not talking about year after next.

Mr. **BLUNT.** My time is up. Thank you, Mr. Francis.

Mr. **DUNCAN.** Thank you very much, Mr. Blunt.

Mr. Lipinski?

Mr. **LIPINSKI.** Thank you, Mr. Chairman.

I have a question for anybody that can answer it.

Why wasn't the TCAS put on cargo planes when it was put on commercial planes? Does anybody know?

Mr. **GARDNER.** I can take a stab at that, sir. The requirement for TCAS on passenger planes was a Congressional mandate and it did not include cargo planes at the time.

We looked at that in the FAA, and, under our cost/benefit analysis rules that we have been under up until hopefully now with the recommendation from the Gore Commission, it did not warrant mandating their use on cargo airplanes at that time.

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Mr. **LIPINSKI.** But it wasn't spelled out in the law that Congress passed or the mandate that Congress gave you to install it on cargo planes, either, so we were just silent on that?

Mr. **GARDNER.** That's correct, sir.

Mr. **LIPINSKI.** Does it have anything to do with the number of seats on a plane or anything like that, how many passengers might be on those cargo planes?

Mr. **GARDNER.** Let me let Dave Harrington answer that.

Mr. **HARRINGTON.** Yes, sir. The legislation did address aircraft with 30 or more passenger seats for TCAS–II, which is the more advanced TCAS with maneuvering capability. Beyond the legislation, the FAA mandated, in conjunction with some conversations with the NTSB, the lesser capable TCAS–I on 10- to 30-seat aircraft, which are generally referred to as the commuter aircraft fleet.

The legislation was silent on cargo aircraft, and it was not proposed in any of that rulemaking by FAA that TCAS be put on cargo aircraft.

Mr. **LIPINSKI.** So if we had written the legislation that talked about the size of the plane instead of the number of seats, it would be on cargo aircraft probably?

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Mr. **HARRINGTON.** Yes, sir. and I think when the legislation was first proposed I think it was a little different mix in the national airspace system. The Cerritos accident was on everybody's mind. We were talking about passenger-carrying aircraft. That's where the safety problem we were trying to fix was. It was very specific in terms of passenger seats with the legislation, as well as the way the rule was ultimately promulgated. It is based on passenger seats.

Mr. **LIPINSKI.** Mr. Francis, do you have any comments at this time?

Mr. **FRANCIS.** I would—certainly what David has just said is true. I think that it's important to recognize that when this legislation passed the air cargo industry was nothing compared to what it is now in terms of the numbers of large aircraft that are out there.

I don't think that this was an omission of intent in any way. I think that it was just a function of the environment at that time and what was out there.

But I would obviously agree with Captain Babbitt, who is going to say later—he refers in his testimony to revisiting the omission, and we certainly are very much in favor of revisiting the omission because we're in a different environment now than we were in when that legislation was passed.

Mr. **LIPINSKI.** You were saying in your testimony that you think that the ADS–B would be 10 to 15 years before it is fully operational? Did I hear you correctly?

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Mr. **FRANCIS.** You know, that may be unduly pessimistic. That may be one who was 20 years in the FAA seeing systems developed. But I do think that there are considerable complexities and difficulties, whether they're budgetary or policy or technical or frequency allocation, or whatever, that have to be overcome.

And by the time all of that is worked out—we don't even have at the most basic level an ability to get agreement on some of the standards for ADS–B just recently in the RTCA. So to think that this is coming over the horizon very quickly I think is very, very optimistic thinking on the part of people.

And I think that it's extraordinarily unfortunate if we begin viewing TCAS–B [sic] Change Seven as old technology. This is powerful, powerful technology that does some wonderful things for collision avoidance.

Mr. **LIPINSKI.** Mr. Gardner, did I misunderstand what you said? I thought you said that in your opinion the ADS–B could be—I guess something like it could be ready to be installed in aircraft in 2 years.

Mr. **GARDNER.** Sir, that's our challenge for the Hawaii-Alaska project, and that will be a demonstration-type project. We have standards we still need to develop. We need to be working with the manufacturers for the certification of the equipment as they manufacture it, and then the purchase and the installation in the aircraft.

So, as Bob Francis mentioned, the challenge I don't think is in whether the technology is feasible. I believe it is. It's good technology and we have demonstrated it in prototype situations. The challenge

is the time frame for when we can get it installed in aircraft and operational throughout the NAS.

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Mr. **LIPINSKI.** Well, Mr. Francis said 10 to 15 years in response to my question. So, in response to that question—if you wish, I'll repeat it—what's your estimate or guesstimate on when we could have the ADS–B in operation in all aircraft?

Mr. **GARDNER.** I don't have a personal one yet. Let me explain why.

Our current NAS architecture, as Bob mentioned, doesn't have us getting fully operational until out and beyond, I believe, the year 2010. The White House Commission has asked us to come up with a plan to bring that to the point of 2005, along with the demonstration in Alaska in 1999.

They have given us 6 months to develop that plan that will make that feasible. Along with that plan, I might add, it also challenges the Executive Branch to work with the Legislative Branch to work with industry to figure out how we can pay for this kind of rapid development, as well, because that will also be a challenge.

So I'm more optimistic, I think, that we can do it sooner, but I don't have assurances that everything will fall into place that will get us there. That's something I think we'll be smarter on in 6 months.

Mr. **LIPINSKI.** I was in Memphis, Tennessee, recently. There were a number of people there who were attempting to persuade me it could be operational within 4 years. Do you see that it's possible to have it be operational in 4 years?

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Mr. **GARDNER.** I think yes, sir, within the community of the cargo-carrying aircraft, particularly with the major cargo carriers, I think that is definitely feasible.

Mr. **LIPINSKI.** That they could put in the ADS–B system in 4 years?

Mr. **GARDNER.** Yes, sir. I think so.

Mr. **LIPINSKI.** Mr. Francis, what's your opinion?

Mr. **FRANCIS.** I would ask whether this would be with collision avoidance capability, and I guess I would question whether—I mean, if you're talking about ADS–B in all the cargo carriers, that's protecting a cargo guy from another cargo guy.

Mr. **LIPINSKI.** But it would have nothing to do with the commercial carriers and general aviation, right?

Mr. **FRANCIS.** I guess that would be my hesitancy about that. It's fine to protect the 800 against the 800, but there are a couple of other airplanes out in the environment.

Mr. **LIPINSKI.** So the ADS–B we'd have in all the cargo carriers so they could be protected from one another, but——

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Mr. **FRANCIS.** I believe that's what Guy was referring to.

Mr. **GARDNER.** Yes, sir.

Mr. **LIPINSKI.** Okay. But they wouldn't be protected from the commercial airliners?

Mr. **GARDNER.** They would be if the commercial airplanes upgraded to the new TCAS–II Change Seven that Bob referred to a minute ago.

Mr. **LIPINSKI.** And it wouldn't protect us from general aviation either, though, would it?

Mr. **GARDNER.** That's correct, sir. It would not see the Mode A and the Mode C transponders that TCAS–II does see.

Mr. **LIPINSKI.** And if we move the cargo carriers into the TCAS system, which we could do, relatively speaking, immediately, then everybody would be protected from everybody else, correct, except for the military, who don't have it in a lot of planes, correct?

Mr. **GARDNER.** It would put the cargo aircraft in the same position as the larger passenger-carrying aircraft. Since the military also has Mode A or Mode C, the TCAS can see military aircraft just like they can see general aviation.

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Mr. **LIPINSKI.** But there are some planes in the military that still wouldn't be protected from cargo planes or commercial planes, correct?

Mr. **GARDNER.** The——

Mr. **LIPINSKI.** Would you like to have the military personnel answer that one? Go ahead.

Mr. **GARDNER.** Let me give a technical answer, because I assume——

Mr. **LIPINSKI.** I won't understand a technical answer, so give me a plain English answer.

Mr. **GARDNER.** Yes, sir. A TCAS-equipped airplane can interrogate and see any other airplane that has a Mode A, a Mode C, or a Mode S TCAS transponder. And it——

Mr. **LIPINSKI.** So far I follow you.

Mr. **GARDNER.** Okay. Another plane that only has a Mode C or Mode A transponder, such as I believe the DOD aircraft—at least when I was flying with them that was the case—they do not have the collision avoidance warnings from TCAS, but the TCAS planes can see them.

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So our TCAS-equipped aircraft, the passenger-carrying aircraft, can see all of the other airplanes as we head out over the Gulf, as we discussed as part of the earlier talk here today. This is why where the commercial carrier saw the F–16s coming in that recent incident.

Since the F–16s did not have TCAS, they did not have that kind of collision avoidance system. They were using their own military radar system.

And so all of the Mode A and Mode C aircraft can be seen by the TCAS-equipped aircraft but

those aircraft cannot see them.

Mr. **LIPINSKI.** Very good. I compliment you. Even I understood that.

Does anybody else have any comment in regards to this situation?

[No response.]

Mr. **LIPINSKI.** I have a couple other questions which I'll ask quickly, Mr. Chairman, and then you won't have to come back to me. But I'm finished with this unless somebody wants to comment on what we've just been discussing.

It has been mentioned in testimony—I, frankly, don't remember if it was mentioned verbally here today or not—that planes that the cargo carriers are now either purchasing from the manufacturer or purchasing from commercial airlines already have the TCAS system in it and they are being removed. Is that correct?

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Mr. **GARDNER.** Yes.

Mr. **LIPINSKI.** Let Mr. Francis go first this time. You went first——

Mr. **GARDNER.** I think he has a stronger opinion than I do, sir.

Mr. **FRANCIS.** My understanding—the answer to that question is yes, and I specifically know of one company. It is the company that had done a modification on an Airborne Express DC–8, and that aircraft was involved in an accident in Virginia just before Christmas.

One of the questions that I asked at that time was—they had just spent a number of millions of dollars, six or seven million dollars, to convert this aircraft from passenger aircraft into a freight aircraft. They had hush-kitted it, as I recall. They had put a glass cockpit in. It was a major, major overhaul of this airplane.

So we went back and asked the question of the company that had done the overhaul: did they have TCAS in the aircraft? The answer was no. And the company, in addition, told us that when they do these conversions they are told by their customers, who are the cargo carriers—and I don't know which companies or how many companies, but they are told to remove the TCAS.

Mr. **LIPINSKI.** To you.

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Mr. **GARDNER.** Yes, sir. I have heard this same thing.

Since we do not mandate TCAS on these aircraft, we cannot prevent them from taking it out of an aircraft already equipped.

I have reasons I can think of why a company would want to do that. I would be glad to hypothesize; However, I would suggest that the second panel today would be the better audience to answer that question.

Mr. **LIPINSKI.** Okay. My last question is: what would the TCAS cost for the cargo planes per plane to put in? I've read $50,000 per plane. I heard here testimony saying it's between $50,000 and

$150,000. Well, if you have 800 planes we're talking about—if you're talking about $50,000 or $150,000 times 800, it gets to be quite a difference there.

So is it $50,000, or is it between $50,000 and $150,000?

Mr. **GARDNER.** Yes, sir. As I mentioned to the Chairman earlier, I'm not sure of that number. That's the range that I've heard, and that's part of our analysis that we need yet to do to determine what that price would be. Obviously, the bigger the buy the lower the unit cost is on that.

And, as Bob Francis pointed out, cargo aircraft buying new airplanes that are already from the manufacturer—they can either put it in or not—would be a cheaper installation cost for new aircraft.

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Mr. **LIPINSKI.** Do we know how much cheaper it would be if you get it without?

Mr. **GARDNER.** No, sir, I don't.

Mr. **FRANCIS.** Maybe, again, it would be a good question to ask this afternoon.

I understand that if you buy a new 767–F freighter from the Boeing Company that TCAS is installed and that it is at least possible that it costs you something to not have it in there.

I would not swear to that, but I think that that's a possibility.

As Mr. Gardner says, there are some rationales from the cargo operator's point of view in terms of—particularly in terms of training and standardization, that you not have a split fleet for long periods of time.

Everybody faces that, as did the initial implementation of this. United Airlines had to go through a stage where they had some airplanes that had TCAS and some that didn't. That's a price that you pay. And obviously there are maintenance costs involved, as well.

Mr. **LIPINSKI.** Thank you, Mr. Chairman. Thank you for your patience.

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Mr. **DUNCAN.** Thank you, Mr. Lipinski.

Mr. Ehlers?

Mr. **EHLERS.** Thank you, Mr. Chairman.

I have a number of questions for Mr. Gardner first, and more in a technical vein. I apologize. I didn't hear your testimony, so I hope I'm not asking you to repeat anything.

First of all, as I understand, ADS–B is not responding to interrogations from radar; it's simply transmitting all the time the information regarding the altitude, the track of the plane?

Mr. **GARDNER.** Yes, sir. That's correct.

Mr. **EHLERS.** And so it has no correlation whatsoever with radar?

Mr. **GARDNER.** Yes, sir.

Mr. **EHLERS.** So it means the only way the system would work with ADS–B is for both planes to have it——

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Mr. **GARDNER.** Right.

Mr. **EHLERS.**——if you're going to depend on the ADS–B?

Mr. **GARDNER.** That's correct.

Mr. **EHLERS.** So if we simply put it only in cargo planes, it doesn't do much except, as Mr. Francis mentioned, prevents cargo planes from running into cargo planes. But it doesn't have any impact on the passenger. They will not be able to see passenger planes.

Mr. **GARDNER.** That's right, sir.

Mr. **EHLERS.** Okay. Secondly, the comment was made—I think you or one of your assistants made it—that it's basically the same as having a traveling radar with a plane, and the intimation was that we would be able to phase out the radar. Did I misunderstand that? I think it was your assistant on your left.

Mr. **GARDNER.** Yes. Let me let Ron Morgan——

Mr. **EHLERS.** Mr. Morgan?

Mr. **MORGAN.** Yes, sir. That was correct.

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Mr. **EHLERS.** But would you really want to do that? There are a lot of planes out there without any TCAS—general aviation planes, the smaller planes, and so forth. You certainly will still want to keep track of them, don't you?

Mr. **MORGAN.** Certainly until we're through a demonstration and a validation of ADS–B we would not want to do that. Within the enroute environment where we use long-range radars throughout the country, we've required transponders on all aircraft above 10,000 feet. The type of radar that we would want to phase out would be the primary radar, the skin paint radar. We probably would want to keep secondary for a while.

And our architecture plan that we're in the process of developing has not identified a total phase-out of radar, but that's possible, some time well into the future.

Mr. **EHLERS.** I guess I could get esoteric and ask about balloonists, but we won't worry about that right now.

The cargo planes, what mode of transponder do the cargo planes have at this point? Are there requirements for them? Are they required to have the most-advanced mode transponder, or is it just whatever they want?

Mr. **GARDNER.** They're required to have Mode C transponder, which is the most advanced except for the Mode S transponder that TCAS uses.

Mr. **EHLERS.** So when a passenger plane sees a cargo plane, are they able to tell whether they should ascend or descend?

Mr. **GARDNER.** Yes, sir. The passenger plane will get information through the antenna of the relative position of the cargo plane, and also, by interrogating its Mode C transponder, actually gets the cargo plane's altitude and presents that to the air crew in a display that has relative bearing and relative altitude, plus 400 feet, plus 1,000 feet, or whatever.

If there's an alert, TCAS–II will actually tell the pilot whether to climb or descend.

Mr. **EHLERS.** All right. So the present system then depends upon the passenger airplane's crew taking evasive action, while the cargo plane just goes merrily on its way?

Mr. **GARDNER.** That's correct, sir.

Mr. **EHLERS.** All right. And the same is true of military planes then, as well, correct?

Mr. **GARDNER.** Yes, sir.

Mr. **EHLERS.** All right. Thank you very much. I think I understand the system.

Mr. **DUNCAN.** All right. Thank you very much, Mr. Ehlers.

Mr. DeFazio?

Mr. **DEFAZIO.** Thank you, Mr. Chairman. I'll be in and out of the hearing, not out of a lack of interest, but I have a lot of conflicting obligations.

I guess, just back to the testimony of Mr. Gardner and Mr. Francis on some of the speculation, I guess, Mr. Gardner, we heard about the consistency of the flight deck and the instrumentation. You mentioned that as one reason for removing TCAS.

Is the other reason or one of the potential reasons that if one had a TCAS system on board, had the capability of using a TCAS system but the policy of the company was they didn't want to use it and they weren't using it, is liability one of the issues here? I mean, is that one of the other things you were hypothesizing about?

Mr. **GARDNER.** I hadn't even thought about the liability issue, sir.

Mr. **DEFAZIO.** I mean, if you have an instrument that could prevent a collision but your policy is you don't want to use it because it could confuse people or something, and then you have a collision and it could have been prevented, it seems to be problematic.

When we talk about the alternatives, I think I'm curious about the time lines here. We're going to hear later from the freight association, and they're going to have a very optimistic time line about the adoption of this new technology and the thus-far unprecedented application to collision avoidance.

What would you give us as a potential time line for the approval of that system and its widespread installation and use? I mean, do you think 2001 is more than a bit optimistic?

Mr. **GARDNER.** For the widespread installation, the equipage of all the aircraft within the national airspace system, yes, sir, I think 2001 is optimistic.

Mr. **DEFAZIO.** Do you anticipate that if freight were going to go this route and it was proven to be successful technology, that then you would immediately mandate or the FAA would consider immediately mandating that the much larger fleet of commercial passenger aircraft throw out their TCAS and adopt this system?

Mr. **GARDNER.** First, I don't want anybody throwing out TCAS ever.

Mr. **DEFAZIO.** Right.

Mr. **GARDNER.** I think it's a great system, and even when we go to a full NAS architecture of ADS–B, TCAS will be able to serve as a redundant collision avoidance system.

What I'm not sure has been made clear is that ADS–B, in its initial stages, certainly, simply gives you positional information. It does not give you the additional thing TCAS–II gives you, the actual escape maneuver, if I can use that term.

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Mr. **DEFAZIO.** Yes.

Mr. **GARDNER.** That could be developed in the software of ADS–B, but that certainly is well out into the future.

Mr. **DEFAZIO.** So then actually, if planes had TCAS now, it may—as you said, TCAS could be either redundant or it could be complementary and work with the other system, the other system being a locator system or the TCAS system having the software for the maneuvers and the collision avoidance and the communication between the planes.

Mr. **GARDNER.** Yes, sir.

Mr. **DEFAZIO.** So then we might say that if we were to require this to be put onto freight aircraft, that we know in the short run it's not a waste of money because it works. And even in the long run, if this other technology develops it potentially could be integrated into that system and still be a worthwhile piece of equipment on the plane.

Mr. **GARDNER.** Yes, sir. I'd like to point out that at FAA we don't disagree with the NTSB. We are all supportive of these enhanced safety systems. Our debate currently is on how quickly and to whom. To what level in the airspace system do we mandate the higher levels of technology to enhance that safety?

Mr. **DEFAZIO.** Let me ask one other question on this. If in today's air configuration we have a jetliner with TCAS–II and we have a cargo plane with nothing, as I understand TCAS–II there's actually communication between the devices.

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Mr. **GARDNER.** Yes, sir.

Mr. **DEFAZIO.** To coordinate the maneuvers so one doesn't say pull up and the other one says pull up. So I'm in the jetliner. My pilot hears an alert, "Pull up, pull up." Okay. What does the pilot of

the cargo plane hear?

Mr. **GARDNER.** The pilot of the cargo plane won't hear or get any kind of recognition of where the passenger plane is. He will just cruise along.

Mr. **DEFAZIO.** Say if they just happen to see it or if they got a communication from air traffic control, I mean, is there some possibility that we might have an incompatible maneuver, that is both planes pull up?

Mr. **GARDNER.** Certainly, if the cargo plane sees the passenger plane and determines by himself an evasive maneuver, he does not have the advantage of the TCAS-to-TCAS coordination to make sure he's not doing the same thing that the TCAS——

Mr. **DEFAZIO.** Okay. How about cargo-to-cargo today in the air?

Mr. **GARDNER.** They do not have equipment on board to see each other.

Mr. **DEFAZIO.** Okay. So that's the greatest potential.

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Mr. **GARDNER.** Yes, sir.

Mr. **DEFAZIO.** I'm just curious about the differences between the NTSB and the FAA on this. The NTSB—I'm sorry, again, that I wasn't here at the beginning. I'm vitally interested in this, but I have a number of meetings today. It is your position at the NTSB that we should move ahead with dispatch with the installation of TCAS–II in freight aircraft?

Mr. **FRANCIS.** Yes.

Mr. **DEFAZIO.** Okay. And the FAA doesn't or has not made a determination yet?

Mr. **GARDNER.** Yes, sir. Correct.

Mr. **DEFAZIO.** What's the time line for determination?

Mr. **GARDNER.** We are developing the time line right now.

We have been challenged by the Gore Commission to, in 6 months from now, come up with our accelerated NAS architecture, and there will be a lot of deliberations on how quickly we can get all of these systems in place that we're talking about, and that issue is part of the timeline development.

Mr. **DEFAZIO.** Okay. My time has expired. Thank you, Mr. Chairman. I'll be back later.

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Mr. **DUNCAN.** Thank you.

Mr. **FRANCIS.** Could I make just a—could I go back to a point that I made in my opening statement——

Mr. **DUNCAN.** Yes.

Mr. **FRANCIS.**——about volunteerism here and not having to be hammered with a regulation. I mean, I just—we at the NTSB are obviously in a different position than the FAA. They are a

regulatory authority. They have processes that they have to go through. They mandate the actions that have to be taken and then they regulate it.

I just think, again, that this is a fairly classic case of where something, at least to me, is called for, and I would love to see the industry figuring out a way that they could come up with a reasonable compliance program—not that it all has to be done tomorrow—that would involve new aircraft and taking it in that and not taking it out of aircraft, and then doing it with C-checks or whatever it is, and not require the FAA to do a rulemaking on it.

It takes a lot of time. It takes a lot of effort. And probably the result that comes out is going to be less friendly to those industry folks than if they come up with their own which would be acceptable to the FAA.

Mr. **DUNCAN.** All right. Thank you very much.

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Mr. Bass?

Mr. **BASS.** Thank you very much, Mr. Chairman.

Mr. Gardner, I just want to affirm that there is no traffic collision avoidance system that would provide any protection at all against a collision with a non-transponder-equipped aircraft or primary target.

Mr. **GARDNER.** That's correct, sir.

Mr. **BASS.** When and where—maybe Mr. Francis or Mr. Gardner—are mid-air collisions most likely to occur?

Mr. **GARDNER.** My understanding—I can let Bob back me up here—is most of the mid-air collisions that we have in the system in the past several years occurred with light aircraft in the traffic pattern area.

Mr. **BASS.** So mid-airs are most likely to occur in heavily-congested areas in positive control airspace where at least one of the aircraft is in radar contact and so forth?

Mr. **GARDNER.** I'm not sure I understood. Most of them are, I believe, at uncontrolled airports.

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Mr. **BASS.** Most mid-airs occur at non-controlled airports?

Mr. **GARDNER.** Let me let Dave amplify, if I may, sir.

Mr. **BASS.** Thank you.

Mr. **HARRINGTON.** I think your distinction is between controlled and uncontrolled, and many of the mid-airs—in fact, I don't think there has been a mid-air since Cerritos involving a large transporter or one of the larger carrier aircraft.

The mid-airs have been between general aviation aircraft, for the most part, and those, as far as I understand the statistics, are in uncontrolled airspace for the most part, involving two small airplanes.

Mr. **BASS.** The mid-airs between—the potential for mid-air collisions between larger aircraft or near-misses, let's say—better statistics—more likely to occur in a congested air where aircraft are landing and taking off, class one airspace, and so forth, but not out in the middle of nowhere or at high altitudes and so forth; is that right?

Mr. **GARDNER.** That's my gut reaction, but there are a lot of things that go into that in terms of the amount of control and oversight in the heavily-congested areas.

Mr. **BASS.** I guess, in looking into the issue, then, have you spent any time trying to figure out where the problem is? What do you need to correct? What problem are you trying to correct? Where and when, and between who?

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I'm trying to be looking at the big picture here. You have a problem. You occasionally have near-misses and very occasionally you have a mid-air collision which occurs.

Obviously, if you're trying to develop a solution you're going to try to figure out where it happens, when, between who, and you want to start with a worst-case situation, correct that problem.

You certainly don't want to get yourself into a situation where you're correcting a problem at a great cost that may never really be a problem in the first place. That's my observation.

Mr. **GARDNER.** Yes, sir.

Mr. **BASS.** Now, what information do you have that would lead you to believe that putting collision avoidance into just cargo aircraft and no other aircraft at all besides the commercial aircraft over 30 passengers is going to significantly improve the possibility that there won't be more or dramatically more mid-airs?

Mr. **GARDNER.** Yes, sir.

Mr. **BASS.** Or would it reduce it more?

Mr. **GARDNER.** That certainly is an important part of the requirements definition.

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Let me ask Ron Morgan to address that further.

Mr. **MORGAN.** Sir, I was just thumbing through the briefing book that I have related to actual mid-air collisions in the United States, going back to 1965. As I look at these, the ones that are listed are usually between a large aircraft and a small aircraft.

Since 1965, we have instituted regulatory airspace—and we call that class B airspace—around large terminal areas now where we require aircraft, large aircraft, to come in through the top of the regulatory airspace, and within that airspace we protect aircraft in a positive manner against other aircraft.

We also have had a transponder rule in place since 1965 which requires transponders above 10,000 feet for all aircraft.

The large aircraft, passenger-carrying aircraft, are the ones that I'm looking at here related to the small aircraft. They are all required to have TCAS if they are passenger-carrying aircraft above 31

people.

So the action we've taken since this particular date—and the last mid-air that we had was 1986, the Cerritos accident—is placing airspace and regulations in place to protect passenger-carrying aircraft. That's the action that has been taken. That's the problem that we see and the problem that we've been trying to address.

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Mr. **BASS.** I guess it is most likely or the most congested areas are areas where aircraft are in positive radar contact with the controllers and controllers presumably have a line on not only the transponder of the aircraft but also the primary targets, as well.

Let me ask you if you have any idea as to what percentage in a given time or place or whatever of aircraft in a—this is just too general a question. I'm trying to figure out how far are we going to correct the problem through rulemaking if we require collision avoidance on cargo aircraft only when, in fact, cargo aircraft in a given area where near misses are likely to occur might be just a tiny percentage of the total volume of traffic in that area.

Can you comment on that?

Mr. **GARDNER.** Yes, sir. I'll try.

Mr. **BASS.** Okay.

Mr. **GARDNER.** I think the issue is ability to equip. And with the cost of a TCAS–II system, obviously your Cessna 172 owner cannot afford it, although that may be where the greatest risk is.

So we're developing other technologies and trying to bring the cost down of all the technology we develop so that we can attack those high-risk or help out in those high-risk areas.

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Mr. **BASS.** So you're working on efforts to develop lower-cost collision avoidance systems for smaller aircraft, which brings me to my last question, and that is—first, one real quick one. I take it there's a minimum size on the cargo aircraft similar to what you have for commercial air? In other words, 30 or more passengers commercial. What's the down size for cargo aircraft?

Mr. **GARDNER.** It's transport category, I believe, and Dave will have to give us the weight.

Mr. **HARRINGTON.** I think the answer is we don't know what the criteria would be. We haven't really decided on rulemaking.

Mr. **BASS.** There's little chance that a Cessna 172 that happened to be—a bigger one, a Caravan that happened to be carrying cargo——

Mr. **HARRINGTON.** We would certainly address the Caravan as part of the cargo industry and make determinations whether TCAS–II is appropriate, should we decide to follow the rulemaking track to require TCAS.

I have to again emphasize that hasn't been decided yet, as Mr. Gardner said earlier in his testimony.

Mr. **BASS.** Thank you very much, Mr. Chairman.

Mr. **DUNCAN.** Thank you very much, Mr. Bass.

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Dr. Cooksey?

Dr. **COOKSEY.** Mr. Francis, I've been doing my own cost/benefit analysis. If we have 800 cargo aircraft at $100,000 apiece, wouldn't that be about $80 million? I'm not good at math, but I think it is.

Mr. **FRANCIS.** Nor am I.

Dr. **COOKSEY.** Let me ask you, what would an aircraft accident involving a passenger plane cost in total dollars? What about the ones we had this year? It's above $80 million?

Mr. **FRANCIS.** It could be, according to the folks who are here with me, a million dollars a seat.

Dr. **COOKSEY.** The lawyers get $80 million alone, don't they?

Mr. **FRANCIS.** I'm sorry?

Dr. **COOKSEY.** Don't the lawyers get $80 million, alone?

[Laughter.]

Mr. **FRANCIS.** I won't comment on that.

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Dr. **COOKSEY.** My next question, Mr. Gardner, would it be feasible to put a Mode S transponder in small aircraft, like a Baron, or smaller aircraft? And how much would that cost, that unit?

Mr. **HARRINGTON.** It's certainly feasible. In fact, there were some regulatory efforts years ago that I don't think came to fruition.

The Mode S transponder on general aviation aircraft unless you include data link in that package, which is again part of the technology we're talking about down the road—I'm not sure what it gives you. The passenger-carrying aircraft equipped with TCAS now will interrogate and get the necessary information from the general aviation aircraft with a Mode A or Mode C transponder.

Dr. **COOKSEY.** But my question is, Could you put just a Mode S transponder in the smaller general aviation aircraft? Would it serve any purpose for the other aircraft that do have TCAS to identify them easier?

Mr. **GARDNER.** Yes, sir. Just the Mode S transponder wouldn't, I don't believe, make any difference to the TCAS-equipped aircraft versus the Mode C transponder.

Dr. **COOKSEY.** It wouldn't help identify it?

Mr. **GARDNER.** It wouldn't help it any more than the Mode C.

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Dr. **COOKSEY.** General Peterson, a couple of questions.

Was the F–16—did it have an ADC air defense command mission? Was he supposed to be intercepting incoming aircraft?

General **PETERSON.** He was on a training mission. It is—his unit is an air defense unit.

Dr. **COOKSEY.** When I was in the Air Force, the air defense command was supposed to intercept military aircraft from Russia. Did this pilot know that this aircraft probably had a TCAS system on it?

General **PETERSON.** No, sir, he did not. He was not aware of TCAS.

Dr. **COOKSEY.** Another question. If you can answer this question, you will be able to read the mind of the Congress, and as a freshman I'm still trying to read the mind of the Congress. When will the defense budget permit TCAS–II units to be put in military aircraft?

General **PETERSON.** We are beginning that now. As a result of the T–43 accident we've accelerated that, along with equipping a number of aviation navigation and safety improvements to the aircraft.

We have a T–I trainer, which we've used in our basic pilot training, which is a new aircraft for us we're still acquiring. We'll have approximately 180 of those when we complete the buy. Those have TCAS on them.

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A number of our passenger-carrying aircraft have TCAS at this time. Between now and 01 time frame, we have a program to equip our passenger-carrying airplanes, and we'll spend about $800 million, a little more than $800 million, with not just TCAS, alone, but TCAS global positioning system, cockpit voice recorders, a number of those safety upgrades.

After that our plan is then to begin to upgrade our cargo aircraft who can carry passengers. For example, our c–130s, our c–5s, c–17s. That will be our phase two of the program, which will start after the turn of the century.

Dr. **COOKSEY.** So you do have a plan in place to put this equipment on soon?

General **PETERSON.** The TCAS, yes.

Dr. **COOKSEY.** Good. Thank you, Mr. Chairman.

Mr. **DUNCAN.** Thank you, Dr. Cooksey.

General Peterson, let me go back to you just for a minute.

The "New York Times" had a story last week which said the pilot of an F–16 fighter jet that came too close to a commercial airliner off the New Jersey coast 2 weeks ago had actually identified it as a passenger jet miles in advance but continued to chase the Boeing 727 as an intruder into his airspace. Air Force officials said today at one point the pilot, who was instructing a trainee, told the trainee to stay out of the way "until this bozo gets out of the airspace." That's coming from a transcript of conversations released by the Air Force.

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Is that accurate?

General **PETERSON.** The F–16 pilot was leading a two-ship formation. He left the wing man in the southwest portion of the area. They were going to set up to do intercepts within the area and practice intercept training.

As he proceeded toward the eastern point of the area, that's when he detected the radar contact. He was not aware that there was an airliner in the warning area.

And as a sweep of the area, which is the normal procedure for us, either radar or visually, as he cleared his area he made this contact.

So he then proceeded over to do an intercept to determine what the aircraft was that was in his area and also he did stay with the aircraft, and his intention there was to ensure that the aircraft had cleared the area before he conducted the training.

Mr. **DUNCAN.** So you're saying——

General **PETERSON.** He told his wing man, in response to your earlier question, to stay in their position when he checked in because the wing man was in the—further away from the aircraft, itself, and above the aircraft.

Mr. **DUNCAN.** So you're saying that the story in the "New York Times" that is attributed to Air Force officials is inaccurate or incorrect, that he did not know miles in advance that it was a commercial airliner?

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General **PETERSON.** He knew that it was a 727 because the Navy controller advised him of that about the time that he got a visual contact, and he had had a radar contact for some time.

He completed his conversion or his intercept to follow the aircraft, ensure it was leaving the area.

So he did not know the identification of the aircraft, what it was. He just knew it was a 727 at that time.

Mr. **DUNCAN.** Does he know now not to do something like this again?

General **PETERSON.** Yes, sir, he does. In fact, as I mentioned earlier, we've changed our procedures so that, rather than having that option, the first option, whether you're engaged, whenever you pick up a contact in your area in a sweep for any reason, is to, if you are in the middle of maneuvering, you'll stop maneuvering, first of all, maintain situation awareness in the area, contact the controller at the time, see if you can get the aircraft identified, and we'll stay away from the aircraft until we get an identification or correlation, so as not to set off a TCAS.

Mr. **DUNCAN.** Admiral McGinn, let me go to you. Some of the press reports and some of the NTSB statements suggest that it was really the Navy controller who was to blame for this incident, because they say that he was not sufficiently clear in telling the F–16 pilots that there was a civilian plane in the area. Have you reviewed that? Do you think that the Navy controller was to blame in any way in this situation?

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Admiral **MCGINN.** His procedures and the phraseology that he used over the radio in talking to the F–16 aircraft was not strictly in accordance with accepted procedures. That has been corrected

through training and additional supervision, so I would say yes, that he was not totally professional in—not through any sense of cavalier attitude, but simply the phraseology wasn't strictly in accordance with.

Had it been, I think that it would have been a clearer picture of exactly the situation transpiring in the warning area with the commercial air traffic passing through under FAA control.

Mr. **DUNCAN.** All right.

Gentlemen, thank you very much for your very informative testimony. We appreciate it very much.

We'll now move on to the second panel. Panel number two consists of: Captain Richard J. McCune, who is the chief pilot for Nations Air Express; Captain J. Randolph Babbitt, who is president of the Air Line Pilots Association; Captain Andre Dressler, who is chairman of the Safety Committee for the Independent Pilots Association, accompanied by Captain Fleet K. Smith, who is director of special operations for the Independent Pilots Association; Mr. Donald R. Treichler, who is international representative of the Teamsters Airline Division; Mr. Stephen A. Alterman, who is president of the Air Freight Association, accompanied by Mr. Robert Hilb, who is the advanced flight projects supervisor for UPS, and Mr. Dennis Manibusan, who is senior vice president for maintenance and engineering for Airborne Express.

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Gentlemen, welcome to the hearing this afternoon. We'll go ahead and get right into the testimony. We'll do the same on panel two as we did on the first panel. We'll go simply in the order that you are listed on the witness list, and that means that we'll start with Captain Richard J. McCune, who is the chief pilot for Nations Air Express.

Captain McCune?

TESTIMONY OF CAPTAIN RICHARD J. MCCUNE, CHIEF PILOT, NATIONS AIR EXPRESS, INC.; CAPTAIN J. RANDOLPH BABBITT, PRESIDENT, AIR LINE PILOTS ASSOCIATION; CAPTAIN ANDRE A. DRESSLER, CHAIRMAN, SAFETY COMMITTEE, INDEPENDENT PILOTS ASSOCIATION, ACCOMPANIED BY CAPTAIN FLEET K. SMITH, DIRECTOR, SPECIAL OPERATIONS, INDEPENDENT PILOTS ASSOCIATION; DONALD R. TREICHLER, INTERNATIONAL REPRESENTATIVE, TEAMSTERS AIRLINE DIVISION, INTERNATIONAL BROTHERHOOD OF TEAMSTERS; STEPHEN A. ALTERMAN, PRESIDENT, AIR FREIGHT ASSOCIATION, ACCOMPANIED BY ROBERT HILB, ADVANCED FLIGHT PROJECTS SUPERVISOR, UPS, AND DENNIS MANIBUSAN, SENIOR VICE PRESIDENT, MAINTENANCE AND ENGINEERING, AIRBORNE EXPRESS

Captain **MCCUNE.** Good afternoon, Mr. Chairman.

I was the captain on the flight, Nations Air 70, and when we were cleared from the arrival area through the intermittent restricted area we knew that the route was going to take us through an intermittent restricted area, and because of the clearance that we received we assumed that it was vacated by the military at this time.

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As we were proceeding along, the TCAS gave a target that was coming down fairly rapidly and fairly close in, and it went to what's called a traffic advisory right away and gave a visual and an oral warning.

As it was closing in, I let our air traffic control, New York center, know that it did appear that it was going to go into a resolution area advisory. It was coming in that rapidly.

By the time he replied, it had gone into the resolutionary advisory.

At this point, we were descending about 2,500 feet a minute and the resolutionary advisory had called for a 4,000 foot rate of descent to avoid collision.

We complied and also let air traffic control know that we were going to do that, and just within a few seconds apparently the traffic had gotten below us and gave us a 4,000 foot rate of climb, which was quite a drastic movement.

We went ahead and pushed the power up and complied with it as best we could, also advising ATC.

Not too long after that it called for us to level off and then called for another 4,000 foot rate of climb.

With this last resolutionary advisory, we turned off a little bit towards—actually, we turned away from the warning area, as I started to suspect it could be military traffic at that point.

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The entire time we were in the clouds and we had the seat belt sign on. We were experiencing turbulence at that point. Not before I completed the turn did we break out of the clouds, and then we were visual at the time and got out of the turbulence.

Right about that time also the traffic had departed and went to a TA again, downgraded, and then departed completely off of our instrument.

While this was happening, we had two flight attendants that were thrown to the ground and one woman who was returning from the lavatory, which is permissible while the seat belt sign is on, who fell to the ground.

We inquired if there were any injuries, and they said there were no apparent injuries at that time.

We had no problem landing at JFK, and once we let the passengers leave, turned the seat belt sign off, we apologized for the rough flight, didn't hear any other comments, and I proceeded right away to call air traffic control to find out who was out there and what was happening.

Mr. **DUNCAN.** All right. Thank you very much. We'll have some questions in just a few minutes.

The next witness is a man who has been here many times before, Captain J. Randolph Babbitt, president of the Air Line Pilots Association.

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Captain Babbitt, it's an honor to have you back with us again. Thank you very much. You may begin your testimony.

Captain **BABBITT.** Thank you, Mr. Chairman. It's a pleasure to be here, and we appreciate the opportunity, on behalf of the 45,000 airline pilots that we represent with 46 different airlines, to come here today and express our views on the collision avoidance system and the requirements for cargo aircraft.

As you can imagine, this is an issue of prime importance to airline pilots, and we suspect that it's an issue of prime importance to the entire aviation community.

From September 1978 to January 1987 there were four different mid-air collisions involving air carriers and general aviation aircraft. These events, unfortunately, resulted in the death of 253 people on board those air carriers, and 22 more people who happened to be in the wrong place at the wrong time on the ground.

Probably the most dramatic of these events was the collision of a Pacific Southwest Boeing 727 that collided with a general aviation aircraft over San Diego in 1978, and I think many people will remember the pictures that were published throughout the country of that airplane with its 144 passengers plunging to the earth.

I think that was a key event that then mandated and triggered the Government's move to mandate collision avoidance systems for air carriers.

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Unfortunately, it was not until 1981 that then-FAA Administrator Lynn Helms selected the traffic alert and collision avoidance system, TCAS, as we know it today, as the one that the FAA would certify, and it took until December 1987, 6 additional years, before legislation was signed by the President that required the equipage of all passenger-carrying aircraft having a seating capacity of more than 30 passengers to have TCAS–II.

Unfortunately, neither this legislation nor the FAA's final rule included large cargo aircraft in the group required to have TCAS–II. The omission of TCAS–II is somewhat understandable as the public and the Government were primarily focused on passenger safety. And I would also assume the cost was an issue.

In order to reduce the cost, a decision was made to exempt small transport category aircraft from this requirement, and therefore the legislative mandate for 30 passengers became the cut-off for TCAS equipage, and therefore this legislative mandate and the associated regulatory language left a rather large loophole for cargo aircraft.

Well, things have dramatically changed since that point in time, and I think there is sound rationale to revisit the omission—what I consider an omission—of cargo aircraft from the requirement to be equipped with TCAS–II.

I would offer for consideration the following:

First, this cargo industry is growing very rapidly. Its operating philosophy has changed significantly. They operate round the clock now and have vastly increased international operations.

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Second, the Federal air regulations now require cargo aircraft to be equipped with virtually all of the safety-related systems that are required onboard passenger-carrying counterparts. For example, weather radar, cockpit voice recorders, flight data recorders, altitude alerters, wind sheer detection equipment, ground proximity warnings—those are all required on both types of equipment.

But the single safety-related system that seems to be missing is TCAS–II. That's not common to both. It appears that for some reason we've gone to great lengths to protect cargo aircraft from colliding with mountains or the ground, but for some reasons there's an obvious omission to help them avoid or detect or be warned of collisions with other aircraft.

This rationale to us does not make sense, and we would suggest that equipage for both types should be identical.

Finally, air traffic, in general, has increased significantly in our national airspace system, and the old see-and-avoid concept of separation simply won't work in this environment.

The November 19, 1996, mid-air collision of a Saudi Boeing 747 and an Air Kazakhstan Ilyushin-76 over New Delhi again proves that even highly-experienced airline pilots cannot consistently detect and avoid traffic threats just using a line of sight and looking out the windows.

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A U.S. air cargo could have very well been involved in this event, and TCAS–II could have prevented it.

I'm sure that I can speak for the entire airline pilot community when I say the Administration's adoption of a single level of safety goal should include the upgrading of cargo aircraft equipage to the same configuration as passenger-carrying counterparts, at least from a safety standpoint.

One of the top priority issues in Secretary Pena's zero accident program spawned his safety review, and that was the equipage of cargo aircraft with TCAS–II, and ALPA was, again, a prime advocate of this initiative.

I think it's very clear from the record also that the policy endorsements for this initiative have been made by senior DOT and FAA officials, as well as the NTSB and the entire aviation community.

We are aware that the cargo industry has proposed an alternative plan for equipping their aircraft with an alternative type of collision avoidance protection, and while the end product of this concept, a GPS-enhanced collision avoidance system, certainly has merit, I have to question both the time line and the interim steps that would be required.

We certainly wouldn't want to exclude an equivalent or perhaps even more effective collision avoidance system for the cargo fleet. We strongly believe that a time deadline must be imposed on the equipage of these aircraft with some type of a collision avoidance system.

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As of this date, we are not aware of any FAA-approved plan or program for an alternative system. More importantly, nor is there any funding to see it through to its completion at this point.

As this issue is debated, we must remember that TCAS–II is a proven system. It has gained FAA acceptance by the management. It has gained acceptance by airline pilots, air traffic controllers, international civil aviation authorities. All accept TCAS–II as a modern and constantly-updated standard of collision avoidance. It needs no additional development. There are no technical or operational reasons to prohibit or delay the installation of this type of a system on cargo aircraft.

As the world globalizes and harmonizes its operating rules, we should note that cargo carriers planning to operate in both Europe and Japan after the year 2000 are going to be required to have TCAS–II on board.

Additionally—and I would note in closing—the White House Commission on Aviation Safety and Security, in one of its recommendations, very appropriately noted, "Cost considerations and mathematical formulas, however, should never be dispositive in making policy determinations regarding aviation safety, as they are but one input for decisionmaking. Further, non-quantifiable safety and security benefits should be included in the analysis of proposals."

Mr. Chairman, the time I believe has come to equalize the level of safety between the cargo fleet and the passenger-carrying counterparts of our world by requiring the equipage on board of a certified, effective collision avoidance system in those aircraft by no later than the end of 1998.

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This could very easily be accomplished if Congress would simply strongly encourage the FAA to publish a proposed rule or notice of rulemaking that's before them in the form of a petition by the IPA. This action would be consistent with the aviation safety action plan published by the FAA in February 1996.

I thank you very much for your consideration of our comments. Additionally, I would like to submit for the record a resolution from the Transportation Trades Department of the AFL–CIO.

Thank you, sir.

Mr. **DUNCAN.** All right. Thank you very much. That petition will be placed in the record upon your request.

Captain **BABBITT.** Thank you, sir.

Mr. **DUNCAN.** And the petition that was filed that led to this hearing was filed by the Independent Pilots Association, and the next witness will be Captain Andre Dressler, who is a member of the Safety Committee for that association.

Captain Dressler, thank you for being with us.

Captain **DRESSLER.** Mr. Chairman, distinguished members of the subcommittee, thank you very much for allowing me to speak to you today on this.

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Talking here on behalf of the Independent Pilots Association, we are about 2,100 flight crew members, professional men and women that pilot the aircraft of the United Parcel Service.

I have a prepared summary statement, written statement that you have. However, so much of that has been covered by previous distinguished speakers here that I will try to kind of digress from it and bring out some other points.

Mr. Francis spoke on panel one. He seemed to be very supportive of our position. He urged, though, the cargo industry to maybe do this on a voluntary basis. I'm afraid that I cannot go along with that one particular point.

We have been trying to talk to our company for over 4 years on this. We had a high-level meeting with top management where this was brought out. We even brought Mr. Williamson, who is the head of the FAA TCAS office, in to talk to them and us and enlighten us.

We were at that time told there is better technology on the horizon. That's 4 years ago. Nothing has happened in the meantime.

We filed a petition for that reason, because we didn't get any action. We filed a petition in September. Little did we know that just in November our worst fears would corne true, not in this country but outside New Delhi, where a non-TCAS-equipped Russian freighter crashed into a non-

TCAS-equipped Saudi 747 passenger aircraft.

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The reason why the Saudi 747 did not have TCAS was it was not flying to the United States and therefore was not required to carry that equipment.

Right after that accident happened, the media reported widely that this could never happen in our country because TCAS is required on our passenger-carrying aircraft—on all our aircraft. And then had to backtrack to say, "no, wait a second, it is not required on cargo aircraft."

The thing is, this could happen here just as easily, and it could have happened between one of our freighters and one of our passenger aircraft in positive controlled airspace, because the FAA allows, under the minimum equipment list, aircraft to be dispatched with non-functioning TCAS up to 3 days.

That means both airplanes will be just like the little Beech Baron or Cessna 150 in positive controlled airspace. It will have absolutely no protection against each other.

When I came into Washington, I came in on a commercial airliner, a 737 passenger aircraft. I asked the pilots, "Do you ever fly with a deferred TCAS?" The captain said, "No, actually the equipment is very reliable, it's very good, and we haven't had any problems." The first officer said, "Yes, I flew a series of flights and I felt like I was flying naked." Those were his exact words.

So we do have the potential for collision.

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As was pointed out before, if we have a freighter aircraft, a cargo aircraft, and a passenger aircraft on a collision course, the freighter might inadvertently make a correction on his course if he visually acquires the TCAS-equipped aircraft and still collide with that aircraft. We don't want that to happen here.

The cost of TCAS–II for freighters has been often quoted, and we have numbers from United Airlines that said that they equipped 600 aircraft at a cost of $50,000 each.

On our airplanes that we are taking delivery on now from Boeing are already pre-wired Boeing 767s at a cost of $87 million, $50,000 is less than 0.07 percent of their cost and very, very cheap insurance.

The air cargo industry has had explosive growth. We now have over 800 to 900 aircraft congregating in hub cities like Louisville, Memphis, Dayton, Cincinnati during the day, at night, without any protection to fly over your homes, hospitals, schools, and everything.

If you think that it is a non-significant loss of life because there are only two or four people on these aircrafts, I can assure you one of these cargo aircraft, if it impacts in a populated area, can bring about tremendous amount of carnage. We've seen that, unfortunately, within the last 4 years in two places—an El Al 747 that crashed due to mechanical malfunction in Amsterdam into an apartment building and took out 80 people on the ground there, and also in Kinshasa in Africa a Russian freighter took off, crashed into a marketplace, and killed 340 people on the ground. We don't need that in this country.

TCAS–II is not outmoded. They will be coming up with a new version, version 7.0. We are not against new technology. We do want ADS–B to be incorporated into TCAS–II if and when it becomes available.

Captain Smith here, on my left, who was involved with the Gore Commission and White House Commission on Aviation Safety and Security, got from Dr. Russell Schaefer a timeline for when ADS–B might be available, and I would like to remind everybody here about the MLS where we spent hundreds of millions of dollars for a system that never came about.

Anyway, he said that first testing would happen in 1999, full implementation not until 2015, partial implementation by 2008.

In conclusion—I see the red light here—I'd like to mention one more thing. I have also right here in the audience Captain Gary Stephen from UPS who came within two seconds of having a major mid-air collision over downtown Newark a couple of years ago between two cargo airplanes. If you care to talk to him or listen to his remarks, he will be free to give them.

Thank you very much for listening to me, and I hope that you will do everything in your power to avoid a tragedy in this country that we can avoid now.

Thank you.

Mr. **DUNCAN.** Thank you very much, Captain Dressler.

The next witness will be Mr. Donald Treichler, who is the international representative for the Teamsters Airline Division.

Mr. Treichler, thank you for being with us today.

Mr. **TREICHLER.** First, Mr. Chairman and committee members, I want to thank you for the opportunity to testify today.

Our particular union represents over 4,500 pilots flying both TCAS and non-TCAS-equipped aircraft, and we believe that the lack of TCAS–II equipment on cargo aircraft poses a safety risk for the operating crew members and the public, as well.

In addition to my oral comments today, I have submitted other supporting documentation for the record, including a TCAS information sheet, comments on TCAS, and enclosures that were jointly submitted to the Gore Commission by all the pilot unions, including the one seated at this table, and comments of the safety chairman from Airborne Express, Mr. Chuck McCabe, who is here today in attendance, and also the president of the local that represents the Airborne pilots, Captain Rick Zebarth.

As to the purpose of TCAS requirements, as you know, TCAS was developed to function on the air traffic control system as a backup method that enhanced the capabilities of pilots to see and avoid other aircraft. There exist numerous validated reports of collision avoidance as a result of TCAS, and several of these are set forth in attached documents I have submitted for your information.

Because of the increased level of safety derived from TCAS during the past few years, no one would even consider proposing the removal of TCAS systems from passenger aircraft.

As for opposition to TCAS–II opposition on all cargo aircraft, it was recently quoted that the Air Freight Association and cargo carriers have expressed a preference to not install TCAS on all cargo aircraft, and instead wait for the development of a superior system.

The only true competing system to TCAS–II is the automatic dependent surveillance broadcast, or ADS–B system that you, yourself, outlined at the beginning, Mr. Chairman. That's based on enhanced global positioning system, satellites, and digital communications interface.

Proponents claim that the ADS–B system is superior to TCAS–II in operational capability and is cheaper to install.

The ADS–B system development is still in its prototype stage. System testing is just underway, and the system has yet to begin its certification stage.

Launch of the first enhanced United States GPS satellite resulted in its destruction.

The ADS–B program is yet to receive funding, and harmonization between international bodies is yet to occur.

Even should these hurdles be overcome, current estimates of full operational implementation in 2 to 5 years appear overly optimistic, and I think I would agree with Mr. Francis as to probably a time line that is more realistic.

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As for alternative actions, the IBT does not object to competing systems to TCAS. In fact, we welcome them. The inescapable fact, however, is that TCAS–II is the only system currently operational and certified. It has been approved through international harmonization and it has a publicly-demonstrated collision avoidance capability.

The petition for rulemaking by the Independent Pilots Association is supported by over 70,000 pilots from all the United States' major unions. The underlying issue of TCAS–II is the safety compromise imposed while operating all-cargo aircraft without the devices, a decision that we believe does not serve the interest of the public.

TCAS–II is the only system now available and certified with demonstrated capability that directly addresses collision avoidance. ADS–B is a promising concept, but it's unproven, unfunded, not harmonized internationally, and not available now nor in the immediate future.

The IBT would urge your committee to give consideration to establishing a requirement for TCAS–II on air transport all-cargo aircraft in accordance with the recommendation contained in the petition for rulemaking, and requiring that future development of anti-collision systems incorporate compatibility with TCAS–II and future TCAS evolutions.

Again, thank you very much, Mr. Chairman.

Mr. **DUNCAN.** Thank you very much.

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The last witness on this panel is Mr. Stephen A. Alterman, who is the president of the Air Freight Association.

Mr. Alterman, thank you very much for being with us. You may begin your testimony.

Mr. **ALTERMAN.** Thank you, Mr. Chairman. We're delighted to be here.

With me today are Bob Hilb—Bob is the advanced flight projects supervisor and a 767 captain for UPS—and Dennis Manibusan. Dennis is the senior vice president, maintenance and engineering, for Airborne Express. They'll be able to answer any technical questions that the panel might have.

On behalf of all the members of the Air Freight Association, we appreciate the opportunity to testify today on the issue of collision avoidance systems on all-cargo aircraft.

Our members, which include most of the major all-cargo operators, have been studying this issue for several years and are ready to implement our design for collision avoidance technology of the future. Therefore at the outset I think it is absolutely important to note that our industry is fully supportive of deploying collision avoidance systems in our aircraft.

This decision has been reached with absolutely no Federal mandate to do so. Indeed, on our own the all-cargo air carrier industry has, for the past 2 years, been developing a new generation of collision avoidance systems based on GPS and ADS–B technology. The system will be a significant improvement over the existing TCAS system.

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You've heard a lot today and the question has to be raised: why not simply install TCAS systems in our airplanes?

The simple answer is that TCAS has some limitations which can be overcome by new generation technology, and these limitations can be summarized as follows:

TCAS is a reactive rather than a proactive system. Pilots only learn of the potential problem when they are warned of an impending collision. The new system will enable pilots to ever avoid being placed in this position.

TCAS also has a limited range which decreases in the high-density airspace where it is needed the most.

TCAS is not effective on the ground or below 1,000 feet, where the majority of collisions have occurred.

And it has a higher than desirable false alarm rate, causing pilots sometimes to mistrust the alarms. Indeed, an ALPA publication, itself, has reported that its pilots simply ignore TCAS about 50 percent of the time.

This should not be construed as a knock on TCAS. TCAS is a system which was developed in the late 1980s and certified in the 1980s and has worked. The issue is whether we simply go with the existing system or try to make it better, and I don't think we should settle for second best.

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The collision avoidance system being developed by the all-cargo industry is based on GPS and ADS–B technology. It provides pilots with both more data upon which to base decisions and more-accurate data than is now being provided.

In addition, the new system will work on the ground, as well as in the air, and it will be a cost-effective safety measure for most general aviation aircraft.

The basic technology necessary for the development and implementation of the all-cargo system is not merely in the mind of some mad scientist. It is technology that is available today and simply needs to be applied to the system envisioned.

The drafting of standards for the ADS–B are well underway, and successful flight demonstrations have been completed both in Boston and at the recent Atlantic Olympic games.

In addition, successful ADS–B simulations have been completed by both NASA Langley and NASA Ames.

In Europe, the technology to be employed is already being flight tested in Sweden, and I urge you to look at the attached article to our testimony on that in a publication called "Flight International," which describes that program.

Most recently, the FAA has announced its so-called "Halaska '99 project," a program which will incorporate both ADS–B and TIS technology in operational demonstration with aircraft operating in Alaska and Hawaii during 1999. This is the exact same technology which forms the basis of our industry's new collision avoidance system.

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Faced with these facts, the industry has developed a three-phase approach for the future of collision avoidance. We feel strongly that this approach is responsible and provides a unique opportunity for government, industry, and labor to work together to create a higher level of safety for the entire aviation community.

Indeed, we invite all parties to this debate to work with us to develop the best collision avoidance system possible in the shortest amount of time.

Phase one is a phase that seems to have been overlooked by everybody else to this debate this afternoon. It's the installation of a program called "traffic information system." And that will be done in conjunction with ADS–B.

Traffic information system or TIS, which has not been mentioned by anyone else, is a new system of data transmission based upon a relatively slight software modification of existing FAA ground-based radar sites. This modification will provide an up-link of proximate traffic by a Mode S transponder, and would include a visual warning of any threatening traffic.

This system is currently operating as a prototype at Dulles International Airport, and nationwide deployment is scheduled by the FAA for the fourth quarter of 1997.

The FAA has informed us that this system is fully funded, approved, and on schedule.

This step will enable all-cargo aircraft to see anyone equipped with a transponder and to evaluate any traffic for potential threats.

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A cockpit display of traffic information will give the pilot an array of data necessary to make informed decisions on collision avoidance, and we believe that this equipment can begin to be installed in the first quarter of 1998 in conjunction with the FAA nationwide deployment of the system.

In addition, the installation of ADS–B at approximately the same time will provide both safety and

operational benefits. Aircraft equipped with ADS–B will be able to share information more detailed and accurate than TIS, alone, which, in turn, permits more-informed pilot safety judgments.

Once this ADS–B/TIS equipment is installed within the next year, cargo aircraft will, for the first time, be able to see each other.

And it should be noted, as people have said before, that all-cargo aircraft, which do not have TCAS, are not invisible to the passenger aircraft equipped with TCAS. Rather, the TCAS-equipped aircraft can see cargo aircraft and take whatever action is necessary to avoid collisions.

Only after this first step do we go to phases two and three, which is the ADS–B addition of conflict detection and resolution, and then finally, around the turn of the century, a full GPS-enhanced collision avoidance system.

In a speech delivered to a Conference of Aviation Safety and Security Experts on January 15, 1997, Vice President Gore stated, "Success in this new age of governing means shifting to a regulatory model in which Government sets and enforces goals but doesn't dictate the way to achieve them."

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We have seen that this new approach works. The Vice President went on to note, "When given flexibility, industry can and will do more than the minimum required by law and regulation."

We agree with that. We are working toward that. And we hope that everyone will work with us toward a more-effective collision avoidance system.

Thank you very much.

Mr. **DUNCAN.** I thank you very much, Mr. Alterman.

I'm going to go first for questions to Mr. DeFazio.

Mr. **DEFAZIO.** Thank you, Mr. Chairman.

Mr. Alterman, just to sort of clarify the record, I'm certain you didn't mean to imply that there are technical problems with TCAS–II, and when you were talking about false alarms you're talking about known situations of intersections of the TCAS, bubbles around the planes that a pilot would ignore because he knows that that other plane is there.

Mr. **ALTERMAN.** Yes. That terminology was not ours. It was done from a Mitre report, which is attached to our testimony. It was not meant to imply that the system doesn't work and the technology doesn't work. It's a function of things that are happening that maybe don't need to happen because, as you described, the bubbles around the aircraft.

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Mr. Hilb has another comment on that, if he may.

Mr. **HILB.** It's very significant that TCAS does not work below 1,000 feet or on the ground. In fact, when you look over the number of collisions that have occurred, most of the collisions that have occurred with passenger aircraft have been on the ground with runway incursions. In fact, since the Tenerife accident, which was the worst accident ever, there have been 722 people killed with runway incursion accidents—much more than any mid-air collision accidents.

And TCAS does nothing to protect those, where our ADS–B system will do that.

Mr. **DEFAZIO.** But in the case of cargo aircraft, there would be loss of life with an on-the-ground collision, and that would be certainly of concern to the pilots and the crews, but what we're talking about here is also the possibility of accidents that take place above 1,000 feet where people are killed on the ground.

I don't think it's irrelevant. Well, you can go like that.

But the question is: what do you offer us for the next 3, 4, or 5 years?

If you could just—I mean, I thought there was some very provocative testimony from the NTSB, and I'd like you to address it. They said that actually, in spending hundreds of thousands, millions of dollars on upgrading planes to cargo or changing them to cargo, TCAS are actually being removed. You're purchasing new planes at the cost of tens of millions of dollars that are wired for TCAS, and the incremental cost of TCAS would be less than one-tenth of 1 percent of the cost of the plane.

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The question would be—and also the NTSB went on to say, "Wouldn't it be good if we saw a new attitude here which isn't a hard line, "We're not going to do this until we're forced to do it," and get forced to do something you don't want to do. What if you just said, "We can live with the incompatibility. Other airlines did during the transition period, and where TCAS is in the plane we won't have it removed, and where TCAS can be installed with a brand new plane that we're paying $70 million dollars for, for another $50,000 we'll go ahead and do it?"

And so if 40 percent or 50 percent of your fleet in this interim period had TCAS, even without retrofitting other planes, and we prevented one mid-air collision, wouldn't it be worth it

Mr. **ALTERMAN.** I'm not prepared to answer that question.

Mr. **DEFAZIO.** So what is the price you put on a mid-air collision? I mean, do you have—does your association—how is your association insured, generally? How are some of your—UPS, FedEx, do they buy insurance or are they self-insured?

Mr. **ALTERMAN.** I'd like to turn that over to a company, because the Association certainly doesn't buy insurance for the companies.

Mr. **DEFAZIO.** No, but I'm just curious. You must know how your clients are insured. It seems to me that—I'm curious. I just thought that when the NTSB stated that you're actually removing operable TCAS systems, that that's pretty—is that true? Is it true?

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Mr. **ALTERMAN.** I'm not sure. I'd like Mr. Manibusan——

Mr. **DEFAZIO.** No. Is it true? Yes or no or you don't know?

Mr. **ALTERMAN.** I don't know.

Mr. **MANIBUSAN.** Mr. Francis alluded to Airborne Express as a result of a recent accident, and I can assure you, Mr. DeFazio, that of all the airplanes that we have taken possession of and acquired, that none of those airplanes were equipped with TCAS. Even the one that Mr. Francis was

mentioning was not equipped with TCAS.

Mr. **DEFAZIO.** Okay. So then Mr. Francis has mislead the committee, and I'll certainly ask Mr. Francis to document his statement, because I'm disturbed that he would mislead the committee to say you're actually removing it, which causes me some real concern.

Mr. **MANIBUSAN.** None of the airplanes that Airborne Express operates today or has acquired to this day had TCAS installed in the aircraft where we basically have asked to remove the TCAS equipment on the aircraft.

Mr. **DEFAZIO.** Okay. Well——

Mr. **MANIBUSAN.** The airplanes that we have acquired have been predominantly airplanes that have been operated outside the United States where TCAS is not a requirement. We've also had a number of airplanes that we have acquired prior to the requirement for TCAS to be installed in the airplanes, and the most recent airplane that Mr. Francis was alluding to was actually acquired from another air cargo carrier in the United States, and that aircraft did not come with TCAS installed in the aircraft.

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Mr. **DEFAZIO.** I'm pleased to hear that, because I thought his statement was very provocative, and we'll ask him to document his statement, and we may ask you to respond further to his documentation of his statement, because I would find it extraordinary if a safety system were being removed when planes were being converted to cargo use.

Let's then go to the other issue he raised, which is the new cost of a 767 for cargo $60 million to $70 million? I don't know. What is it?

Mr. **ALTERMAN.** Somewhere in that range, sir.

Mr. **DEFAZIO.** Right. And the incremental cost of installing a TCAS for a plane that is already wired for it would be?

Mr. **HILB.** Somewhere between $50,000 and $100,000.

Mr. **DEFAZIO.** Okay. But the objection to doing that and using it would be the cockpit incompatibility issue?

Mr. **HILB.** Sir, I think our alternative that we're proposing—I think that was missed on all the previous testimony—is a system that will detect other aircraft, all other aircraft that have transponders in the United States when it's first installed a year from now, and that is the traffic information system that Steve talked about.

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That system will, in fact, detect all transponder-equipped aircraft and display them—or any threatening transponder-equipped aircraft, and display those to the cargo carrier pilots.

So we feel that that system is the alternative, and that system has the growth by adding ADS–B to get to the system we all want to have.

I think everyone here has said that the ADS–B system is the system that we want to have in the future. We in the cargo industry say that we can do that, we can expedite that process. We would rather invest our money into doing that rather than buying old technology and stop the process of

moving forward.

Again, I think it is significant that there are the limitations that Steve talked about of the current TCAS system that are fixed by ADS–B, and particularly one where the ground accidents occurred. All those accidents, those collisions on the runway, can be prevented with an ADS–B-based system. That's where the accidents are——

Mr. **DEFAZIO.** So then the time line again that we heard earlier is that you will have a system—you could have a system within 1 year which will provide a display which will show all potentially-conflicting aircraft?

Mr. **HILB.** Yes.

Mr. **DEFAZIO.** Within 1 year?

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Mr. **HILB.** That's correct.

Mr. **DEFAZIO.** Including below 1,000 feet and on the ground, or is that later?

Mr. **HILB.** That is the addition that ADS–B adds to the process. ADS–B aircraft—we'll only be able to see that between cargo aircraft until other people start equipping with ADS–B; however, as has been pointed out previously, change seven to TCAS does enable that functionality on all passenger aircraft.

We can, indeed, detect the passenger aircraft, where the passenger aircraft will not be able to detect each other, nor cargo aircraft on the ground until they go ahead and put the ADS–B——

Mr. **DEFAZIO.** So essentially what you would have a year from now would be something that was functionally equivalent, although different, to TCAS–I?

Mr. **ALTERMAN.** That's correct, Mr. DeFazio.

Mr. **DEFAZIO.** Thank you. Mr. Chairman, I see my time has expired. I may ask for a second round.

Mr. **DUNCAN.** All right. Thank you very much, Mr. DeFazio.

Mr. Blunt?

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Mr. **BLUNT.** I want to follow up a little bit on this question on TIS. Really I have a couple of questions.

First, Mr. Hilb, on the change seven software, is that available now?

Mr. **ALTERMAN.** No. That is being developed. I don't know what the time line is on that. My understanding is the time line on change seven is probably around the turn of the century, but I wouldn't want to presume to talk or respond for the FAA.

Mr. **BLUNT.** I thought Mr. Hilb just said that within a year the change seven software would make it possible for this system, this TIS/TCAS/ASB system to work.

Mr. **HILB.** The change seven is not required for us to have TIS, nor for us to have an ADS–B where we can see each other. Change seven is required so that the cargo aircraft can see the passenger aircraft a lot better, to be able to take advantage of all the ADS–B advantages that we pointed out in our testimony.

That will occur starting a year from now, assuming that the FAA does mandate that change, which they're talking about a year from now. That will be on all passenger aircraft probably in 3 years because they'll usually give everyone 2 years to do the changeover.

So I guess I think I'm, just from your expression, losing you a little bit here.

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The TIS and ADS–B that we're putting on is functional when we first put it on. The TIS gives coverage for all transponder-equipped aircraft to the cargo aircraft. When we start putting ADS–B on, if we're the first ones to put it on, that will strictly be between our own aircraft. All the advantages that everybody talks about for the future will be available between cargo aircraft.

When change seven to TCAS goes on, those advantages will be extended to the passenger aircraft or the cargo aircraft to take advantage of, but the passenger aircraft will have to put the ADS–B software to take advantage of those enhancements, also.

Mr. **BLUNT.** Okay. And on the TIS system, is there full coverage on that system, or are there holes in the flying area because of the radar?

Mr. **HILB.** It's wherever there is a Mode S radar, and basically for cargo aircraft it's virtually complete coverage because we don't fly into any of these uncontrolled airports that don't have the Mode S radar coverage.

You're right. The coverage is only within radar coverage, so therefore it's within the United States.

Mr. **BLUNT.** I guess I'd like Captain Babbitt to comment on that, and maybe Mr. Gardner, if you want to come back to the table in a minute if there's a follow-up on this, and then that will be my last—I want to hear the answer to that.

Captain **BABBITT.** Well, let me address a couple of issues.

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First off, TIS would have to be installed at all radar facilities, it has been pointed out, and obviously that takes money. And to my knowledge the FAA currently doesn't have the appropriations to follow forward.

There were a couple of things that have been stated for the record that I would like to clarify.

Number one, we continue to say that TCAS is a reactive system. I think, by virtue of all of these systems, they're all intended to be reactive. I hope nobody is scheduling and plotting two airplanes to have a collision. So, by definition, they are reactive.

We also, when we talk about having these alternative systems, the ADS–B system installed and it will have traffic information, that's absolutely correct. What's missing is the evasive direction. If there is no scheduled—no instruction, no information to the pilot as to what evasive action to take, then you're right back in the same situation. And there's nobody who hasn't walked down a crowded hallway and decided to pass on the left side of someone only to find out they decided to pass to the right.

That's what's missing in these traffic information systems.

Finally, the statement—there is a misconception that we should clear up for the record that TCAS doesn't work below 1,000 feet. TCAS doesn't give evasive maneuver direction below 1,000 feet. It works all the way to the gate.

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And there have been situations—we had a recent incident of the TransWorld Airlines sitting in position in Paris, cleared for take-off, began to get an alert.

Obviously, he was standing still, so he wasn't going to be instructed to climb or dive while sitting still on the runway, but he called the tower and said, "I'm receiving an alert. Is there an airplane behind me?"

The tower instructed the airplane, who had been cleared to land on his aircraft, to go around.

So TCAS does, in fact, avoid things on the ground and there are options, but clearly you can't give climb or dive or left and right maneuvers—actually, I'm going beyond the capabilities of TCAS–II even when I talk about climb and dive, but the maneuvers that are available certainly depict traffic information.

Mr. **BLUNT.** Mr. Gardner, how would FAA react to this implementing of the upgrading of the TIS system?

Mr. **GARDNER.** Yes, sir. I would like to offer to supplement testimony with more-detailed information.

The basic concept of TIS is that the ground radar is up-linking to the ADS–B-equipped airplane, the aircraft that it sees. That is where the ADS–B airplane isn't seeing the other aircraft directly, but it is getting the transponder Mode C or Mode A equipped aircraft that the ground controller sees up-linked to his aircraft through the ground radar.

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I would like to offer the—I'm not up on the technical capabilities and limitations of the TIS system. I'd like to propose I——

Mr. **BLUNT.** And TIS wouldn't work anywhere where there wasn't radar coverage?

Captain **BABBITT.** That's correct. It would not.

Mr. **BLUNT.** One last thing. Do you want to say anything about the reactive nature of the system, while we're clearing up the record here?

Mr. **ALTERMAN.** I think the point was not—maybe the words were inelegantly used. I don't disagree with anything Captain Babbitt said.

The point is that the new system, the ADS–B system, gives such a more-detailed and accurate array of information that pilots will be able, with that data, to take whatever steps are necessary to avoid ever being placed in the situation they might otherwise be in.

That was the only distinction that we meant to draw there. Perhaps the words were inelegantly used, but I don't disagree with anything that Captain Babbitt said there.

Mr. **BLUNT.** Thank you, Mr. Chairman.

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Mr. **DUNCAN.** All right. Thank you very much.

Mr. Lipinski?

Mr. **LIPINSKI.** Thank you, Mr. Chairman.

I'd like to get back to having the TCAS systems removed from planes when they get to the cargo carrier.

Is it possible that there are planes that are purchased by cargo carriers that have TCAS system in them, they are sent through a retrofitter who converts it from passenger plane to cargo plane, removes the TCAS, and then delivers it to one of the companies that you represent?

Mr. **ALTERMAN.** Mr. Lipinski, I simply don't know the answer to that question.

If any one of my colleagues here——

Mr. **ALTERMAN.** That would not be done deliberately. I can tell you that planes are delivered with the wiring for TCAS and the extra steps are not taken to install and use TCAS. That much I do know.

Mr. **LIPINSKI.** No. You say the planes are delivered with the wiring system?

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Mr. **ALTERMAN.** But not TCAS, itself. There are certain things you can do to aircraft—and maybe Bob is better able to describe this than I am. But when the planes are delivered you can have certain portions of it done—in other words, certain wiring systems—but the hardware not installed. Those are extra things.

I believe that we do take planes with the wiring systems but simply don't order the TCAS with them, but, again, I don't speak for any individual company.

Maybe Dennis or Bob has a comment.

Mr. **MANIBUSAN.** Yes. I can speak to that from the technical side of the house.

There are certainly, on any equipment that you have on aircraft, there is either partial provisions or complete provisions or full installation of the system on the aircraft. Partial provision can basically say you have the wiring in the aircraft and basically that's as far as you go. Complete provisions can be everything with the exception of the actual components, the actual black boxes, and the actual instrumentation on the aircraft to a full-blown installation which includes everything.

In terms of the aircraft—and I can only speak for Airborne Express—in terms of the aircraft we have purchased, the airplanes that we have purchased are actually airplanes, for the most part, operated outside the United States where TCAS is not a requirement, so we don't even have in those aircraft any provisions or——

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Mr. **LIPINSKI.** These aircraft that you have purchased, have they gone through a retrofitter, or have you, yourself, converted them to cargo planes?

Mr. **MANIBUSAN.** Our requirements are not to install a cargo door on the aircraft, so our requirements are pretty much to beef up the floor structure of the aircraft to allow our container operation to go on the aircraft.

So the modifications and the standardization that we do on the aircraft includes a complete overhaul of the aircraft. We basically standardize the cockpit to the requirement——

Mr. **LIPINSKI.** But does your company do that, itself, or does someone else do that for you?

Mr. **MANIBUSAN.** It depends upon the type of aircraft. On the DC–8 we basically do that outside. We contract with another company. For the DC–9s we do the full-blown modification and standardization in-house.

Mr. **LIPINSKI.** It just seems to me—not only Mr. Francis made mention of the fact that the TCAS are removed when they come to a cargo carrier, but numerous other people have made mention of that to me. I find it hard to believe that all these people would be saying that and that Mr. Francis would be saying it here publicly if there wasn't some truth to it.

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I can understand how you could—and I'm not saying you're doing so, any of you, but I'm just saying I can understand how there could be some confusion and you could say that when you obtain a plane for your cargo operation there is no TCAS systems in them so we don't have to remove them.

Mr. **MANIBUSAN.** That's correct.

Mr. **LIPINSKI.** But we forget that there's a third party who oftentimes does the refurbishing, the modifications, and so forth, and they could be removing the TCAS systems and then delivering them to you.

Mr. **MANIBUSAN.** Actually, those are controlled totally by us, the air carrier. We have total responsibility on what the third party maintenance provider does to the aircraft.

In the end, we have the ultimate responsibility, and anything that is done to that aircraft is done based on our own specifications.

Mr. **LIPINSKI.** That is absolutely true. I agree with you. But, I mean, it still would be possible for someone that is in charge, runs a cargo airline, to say, "When we receive this plane it doesn't have TCAS in it," and it could have been removed by your subcontractor that modified everything for you.

Mr. **ALTERMAN.** Mr. Lipinski, your premise is absolutely correct. There is no requirement for this industry to have TCAS, and if you're asking whether it's possible that when a plane is delivered that a company, Company X, says, "Remove the stuff because it's not required," that is a possibility. I don't know of any such instances, but it is possible. Yes.

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Mr. **LIPINSKI.** I'm just saying that so many people have told me that that was the case—and, as I say, Mr. Francis testified here in public that that is the case—that I wanted to give a possible reason

why there seems to be considerable contradiction between what Mr. Francis said, what I have been told, and what you gentlemen have testified here to.

Mr. Chairman, I don't have any other questions right now for this panel. I appreciate everybody being here. It's a very interesting area of discussion. I think we've gotten some very, very good testimony. We had some excellent participation from committee members today, and I've been very happy to be a part of it, and I thank you all for being here.

Thank you.

Mr. **DUNCAN.** Thank you very much, Mr. Lipinski.

Captain McCune, let me ask you, what was going through your mind? What was it like to be in the cockpit when you were getting those commands from the TCAS system to make these rapid descents or to go up 4,000 feet all of the sudden?

I guess what I'm getting at, there is an article that is attached to some of the testimony from Mr. Alterman from the Air Line Pilot Magazine that says that airline pilots basically disregard about 50 percent of these warnings, these RAs. Is that—do you think that's accurate? And was this unusual or did it scare you or concern you? What went through your mind?

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Captain **MCCUNE.** Mr. Chairman, it definitely concerned me. When we're in the clouds and we get an indication that if we do not comply with the instruments' indications to descend and descend at that rate, or to level off, to disregard all of the commands would have been awfully foolish.

We are also trained that this is what we do. We do comply with whatever resolution advisories are given. We're in the clouds. We have no idea.

I try to make them as smooth as possible because of the consideration of the passengers in the back, but, again, it was a collision threat. That's the indication that I had.

Mr. **DUNCAN.** I know you weren't back in the passenger compartment, but what did you hear later from the flight attendants? Did this scare the passengers, or did you hear shouts or screams or anything of that nature?

Captain **MCCUNE.** No.

Mr. **DUNCAN.** I mean, you said two flight attendants and one passenger were thrown to the floor.

Captain **MCCUNE.** What had happened, sir, was we had the seat belt sign on. We were experiencing some turbulence at that time coming into that arrival area. And the initial descent from 2,500 to 4,000 foot per minute was hardly felt.

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But as far as rotating the airplane back up and pushing the power up to climb at 4,000 feet a minute, I'm sure that pulled a few G's. I think I heard the figure about 1.6, but it was not enough to over-stress the airplane.

We try to do this as smoothly as possible. Again, there is a—you do get a little bit hairy to try to comply with the TCAS, itself.

As far as the passenger comments, I heard no passenger comments. The flight attendants did say it was a rough flight.

Mr. **DUNCAN.** Well, let me ask you this. You heard me ask the Air Force representative, General Peterson—I quoted from the story in the "New York Times," and that story quoted that one of the recordings had this military pilot saying that "This bozo is invading my airspace."

Did you do anything that you feel should be classified in the bozo category?

[Laughter.]

Captain **MCCUNE.** No, but I do have a new nickname right now of Captain Bozo.

[Laughter.]

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Captain **MCCUNE.** My wife gave me that.

I can understand the emotions of the pursuer in something like that, and I hope that he could understand the emotions of the pursued and what I might have said about him or his mother.

[Laughter.]

Mr. **DUNCAN.** All right. Thank you very much.

Mr. Alterman, Mr. Gardner earlier, or in his testimony at least, describes the ADS–B as not a collision avoidance system but as more or less a—he uses the word "a supplement" to a collision avoidance system.

Do you feel that it's a legitimate collision avoidance system, or do you disagree strongly with his portrayal of this as a supplement?

Mr. **ALTERMAN.** One of the problems, Mr. Chairman, is that perhaps we should call this something besides ADS–B.

ADS–B, in its pure form, is being developed with a view towards something called "free flight," where we have planes communicating with each other and not having radar and all that stuff.

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One of the problems and misconceptions is when someone says, "Well, we're not going to get to ADS–B before the year 2015," in most instances we determine they're talking about that utilization of ADS–B.

All we're saying is that technology can be used for something that people haven't traditionally been talking about, and that's collision avoidance.

And, to directly answer your question, the answer is yes, we firmly believe that ADS–B can be used for collision avoidance purposes, with slight software modifications and software developments which are not that costly and which can be developed over the next couple of years.

Every time people start talking about ADS–B in the year 2010 and the year 2015, they're not talking about what we are proposing.

What we are proposing is taking the technology, itself, and modifying it through software massages and everything else to present a collision avoidance system.

Yes, we firmly believe it can be used for primary collision avoidance within the next several years.

Mr. **DUNCAN.** Well, the staff has provided us with a newspaper article from a newspaper in New York City that's no longer in existence—there were many daily newspapers in New York City years ago. The "New York Journal American" reported on April 10, 1958, about the development of collision avoidance systems, and yet it was 35 years later before we really had these all entirely on all these passenger planes.

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We've heard estimates here today—we heard one estimate of 2015 before you would have full implementation of ADS–B.

What do you think? Did you hear that 2015?

Mr. **ALTERMAN.** I've heard it, and I've heard it before, and Bob Francis and I have been debating this issue for many months.

I like Bob, I respect Bob, but I think he's wrong in this case.

I don't believe 2015 is at all realistic.

We firmly believe that we can have our system fully implemented by the year 2001, and that includes the resolution advisories. We firmly believe that by the end of this year our cargo aircraft will be able to see each other. They're already seen by other people in the sky.

We think that, while our timetable is aggressive, it is doable. It's especially doable if we all get together and decide to do it.

If I can digress just momentarily, I think it's important to note the industry you're dealing with here. You're dealing with an industry that is extremely concerned about safety and wants to do the right thing.

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If I can go back to 1990, when the Airport Noise and Capacity Act was passed, we supported that legislation, and after the implementation of that legislation it was Federal Express who did the development, the R&D and the manufacture of the hush kits for 727 aircraft. Airborne took the ball and did the implementation on DC–9s. UPS decided that they weren't going the hush kit route and put Rolls Royce engines in their plane. They are today 100 percent stage three equipped.

It was this industry who, in the security area, was exempt from filing any plans, and asked, in an unprecedented move, for an exemption from the exemption so that they could become part of the process of filing security plans. That is now an option to members of our community.

The only reason for pointing this out is we think we have a demonstrated track record of doing what we say, and we just need people to work with us on this project and it will get there. We'll do it. We're firmly confident of that.

Mr. **DUNCAN.** Captain Babbitt, would you—I understand that what I'm about to say is not everything that you would want, but very few of us ever get everything that we want.

Would you think we were heading in the right direction with a mandate that would require full implementation of a TCAS system or an ADS–B system by the year 2001 or 2002?

Captain **BABBITT.** Well, I would be much more comfortable if it was prefaced with an "and" instead of an "or," if they had to have both at that point in time.

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My concern is in the short period of time. And I guess I should preface this with an understanding that we're not opposed whatsoever to traffic information systems, the ADS–B. We're not opposed to those things. Those should be viewed as progressive enhancements.

But there are a lot of questions that remain, and one of the key ones—and we've heard a constant stream of testimony in support of the system that refers over and over and over again to being seen. But we want to be seen and avoided. That's a key concept in collision avoidance systems.

It's one thing to see and acquire sight on the aircraft. You raised the point that a magazine article said sometimes the advisories are disregarded—typically, only when they've acquired the target visually and they don't find it necessary to make an evasive maneuver.

But when we're actually going to get the system—and I don't say it's impossible we could have that system by 2001. That's fairly optimistic. I think I stated in my testimony the time frame of 7 years between the point in time when the FAA said, "We want to have, in fact, a collision avoidance system," and then when we in fact got one, it was 7 years.

We're being rather optimistic to say we can get it in 4 years.

Who is going to fund this? How much is this going to cost? When is it going to acquire collision avoidance abilities?

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That's a very complicated algorithm that needs to be developed. It took a long time. That was one of the raging debates between TCAS–I, II, and the optimistic III.

The key to all of this, though, is this system.

And, most important, the fourth point I'd make is this only works when everyone has it. If someone else doesn't have it, it doesn't work.

So 2001 the cargo aircraft will be able to avoid and see hopefully other cargo aircraft, but you still have way too many people that won't have the system.

So I'd rather look at it as a system that, if we went to TCAS–II today and you supported direction to the FAA to achieve that, that we'll then be allowed to progress at a very positive rate with full support.

And, again, we support the concept, but let's not wait 4 or 5 years until we get collision avoidance systems on board these aircraft. Let's do it today and then have a great system 5 years from now that will enhance it.

Mr. **DUNCAN.** Captain Dressler, how many planes does UPS have all together?

Captain **DRESSLER.** We operate at this time about 200 large jet aircraft. The smallest is the 727, the largest is the 747, 800,000 pounds of hurling metal.

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Mr. **DUNCAN.** Let me ask you this—and I don't mean this in any—I hope this won't be taken wrong. I don't mean this in any lighthearted, humorous way, but if it—we've got estimates as high as $200,000 or more to install these, but a pretty good figure seems to be $100,000, or a middle figure, anyway.

If it took $100,000 to install these on the 200 or so aircraft, that would be $20 million. Would your pilots prefer that UPS spend $20 million on raises for your pilots or on this installation of this system? Which do you think they would go for?

Captain **DRESSLER.** Well, first of all I would like to say that this is not a labor issue. This is purely a safety issue. We came up with this 5 years ago, or even before, and urged the company to install TCAS.

Mr. **DUNCAN.** They are issues, though, that are tied in, because if you take $20 million or $25 million, if UPS spends $25 million in this way, then that's $25 million that they can't spend to give you raises or more time off or something of that nature. Common sense would tell you that.

Captain **DRESSLER.** It's a tough question, because, number one, I cannot speak for the other 2,000 people. I can only speak for myself. And I'm a stockholder of this company, too. We are employee-owned. We are not a public company. We have been employee owned. I own stock in UPS. I don't want the company to go out and spend money that is not necessary.

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The company has spent half a billion dollars to re-engine aircraft to make them silent. I have no problem with the company spending maybe $20 million that part of it will be spending on ADS–B and TIS and all of these other alphabet soup anyway, to make that silence that they have created by silencing the engine noise not be broken by the noise of ambulances and fire engines going to a crash site.

Mr. **DUNCAN.** Yes.

Captain **DRESSLER.** I really feel very strongly that way, and I think most of my fellow pilots feel the same way.

Mr. **DUNCAN.** All right.

Mr. Oberstar?

Mr. **OBERSTAR.** Thank you, Mr. Chairman.

My thanks to all the members of the panel. I regret having to be in and out of meetings like this when there are so many demands on our time for other purposes, but I assure you aviation is my first love and interest and my first concern is aviation safety.

I'd just like to ask, Captain Babbitt, is there an example other than TCAS of a major safety system or piece of equipment required on passenger aircraft that is not required on cargo aircraft?

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Captain **BABBITT.** No, sir, there is no——

Mr. **OBERSTAR.** Apart from oxygen masks coming down from the——

Captain **BABBITT.** Right. Purely things related to passengers. No. I know of virtually nothing in terms of a major required safety component that isn't required on both categories of aircraft. It's almost consistent down the line.

There are some things that we probably do a little bit to enhance some of the safety where passenger-related—for example, the escape slides. Obviously, they're not required, but they'd be nice to have if you're sitting 45 feet in the air and your choice is to go down an escape slide or crawl down a rope. I know which way I would go.

Mr. **OBERSTAR.** It's not required for the cockpit?

Captain **BABBITT.** No, sir. They have inertia reels in the sophisticated aircraft, but older aircraft generally just have an escape rope, which is required in passenger aircraft, but——

Mr. **OBERSTAR.** It's required there, as well, yes.

Captain **BABBITT.** There typically is an alternative vehicle. But no, sir. In direct answer to your question, I'm not aware of any other safety equipment that is not required on both other than TCAS.

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Mr. **OBERSTAR.** Well, Captain Dressler, when UPS modified its fleet to comply with our noise regulations—and I commend them for moving so expeditiously and vigorously, as did other carriers, but they met the deadline first and they deserve credit for it—they acquired aircraft that had TCAS on board. Did they leave the TCAS on or did they remove the TCAS equipment?

Captain **DRESSLER.** Well, number one, I do agree with you. We are all very proud of the company to be the first one to comply with the stage three noise regulations. We're very proud of our company in many, many ways.

The TCAS on airplanes that we acquired, I honestly do not know about it. What is very funny, in a way, is that UPS is starting passenger operations as we speak. We have airplanes in test flight right now. We are putting TCAS equipment on five 727s that will be used in charter passenger operations because they are mandated.

I do not know if they will be operational when we fly cargo or not, or if they suddenly become not necessary any more.

Mr. **OBERSTAR.** Do they de-activate it when they operate for cargo purposes?

Captain **DRESSLER.** I honestly don't know. I know Captain Gary Stephen, who is here and had a near mid-air collision over Newark, he went to the course because he does fly the 727, and it's a one-hour training course that's a video—it's a floppy disk you put in a computer and you train on TCAS. It's a very simple procedure.

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But they are putting the TCAS on those five airplanes because it's mandated.

Mr. **OBERSTAR.** Mr. Hilb?

Mr. **HILB.** Yes, sir. I'm from UPS, and as far as I know—I'm not in the maintenance department, but I've been told that we have not taken TCAS off of any aircraft that we bought. None of the aircraft that we bought did have TCAS.

I think our plans are to leave the TCAS on the passenger aircraft when they are cargo configuration.

Mr. **OBERSTAR.** And when you operate as a cargo aircraft, do you activate the TCAS?

Mr. **HILB.** No, sir. I don't think we have plans to do that.

Mr. **OBERSTAR.** Well, that's very curious if it's there, if it came as part of the aircraft that you acquired, that you wouldn't operate it.

Mr. **HILB.** No, sir. We did not acquire any aircraft that had TCAS. We did not take it off any aircraft. When we put it on for those passenger aircraft, we are actually modifying our cargo aircraft to put them in a passenger configuration. We are adding TCAS when we do that modification. When that modification is complete, that TCAS will be activated and will be left on during all operations.

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Mr. **OBERSTAR.** To return to my question, which was: was TCAS on board any aircraft that you acquired that was converted to all-cargo purpose?

Mr. **HILB.** Not for UPS, sir. I can't talk to the other carriers, but UPS did not do that.

Mr. **OBERSTAR.** All right. Is UPS' principal argument that it's too costly to put this technology on board the cargo aircraft, and that there is a better technology that may cost less and let us install that in 3 years? It's going to take us 3 years to install TCAS, and in 3 years we'll have ADS–B and we can put that? Is that essentially the UPS position?

Mr. **HILB.** Yes, sir. We believe it's a better technology. It's more cost–effective. It will benefit the entire aviation community because it will make collision avoidance affordable to other segments of the community that can't afford it right now.

However, we feel, mainly because it is better technology, that we would like to go with a future technology rather than put on the old technology and then change over in the future.

We think, from the community's perspective, for us to invest our money into developing this system is better for the entire community, rather than use our money to put TCAS–II on.

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Mr. **OBERSTAR.** I just have to observe, without being critical of your position, that if we had followed that argument in 1987, we would not have TCAS on-board aircraft to the extent that we have today, because we would continually be waiting for the better technology which is always right around the corner.

Mr. **HILB.** Sir, we believe that the system will——

Mr. **OBERSTAR.** I don't question your bona fides. I don't question that you're intent to proceed. But I'm just saying I've been down that road before on TCAS, on ground proximity warning systems, on a whole host of other technology to advance the cause of safety. And, frankly, I am very skeptical

of that argument.

We have an available technology that works. We know it works. We know it's effective. And it's going to save lives and has saved lives.

But you have a point.

The question I have, Mr. Alterman, you said that software development for a full GPS enhanced collision avoidance system could be developed by 2001. If that's the case, then how long after 2001 will it take to have full system to be installed aboard aircraft?

Mr. **HILB.** Well, sir, if you're looking for the entire ADS–B equipage for all aircraft, as Guy Gardner pointed out, the FAA or the Gore Commission asked for the acceleration of that to have it on all aircraft by the year 2005.

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It will be on a significant number of aircraft, we believe, by some time after the turn of the century for operational reasons and other reasons that we put in our testimony.

Mr. **OBERSTAR.** But, supposing, as the FAA says, that new technology needs to be operationally tested, a lot of work has to be done, that it's going to—and, as with so much of this technology, it takes longer than anticipated. Suppose we go beyond 2001? We've got several years of exposure of cargo aircraft not using technology that is available that can save lives.

Mr. **ALTERMAN.** Mr. Oberstar, I think that when you look at the whole picture, that the TIS system, in addition with ADS–B, which is on our aircraft, gives a measures of safety that we don't have now, and that's cargo aircraft being able to see cargo aircraft and take whatever action is necessary.

I also think that—I don't dispute what you said about sometimes things go awry with best intentions. This technology is already here. This is not, again, technology that has to be developed. The only thing that has to be developed is the software to make it a collision avoidance system.

Mr. **OBERSTAR.** More than that, though. It's more than that, Mr. Alterman. The operational testing phase has hardly even begun.

Mr. **ALTERMAN.** No, but we think that that can be done within the time frame. It's aggressive. We admit it's aggressive. But it's a doable thing and one we're committed to do.

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As I said, if you look at the history of this industry, we'll do it.

We sort of look at this glass as half full instead of half empty. We think it's a challenge. It's a challenge we can meet. We're fully confident that we can meet the deadlines we set forth.

Mr. **OBERSTAR.** My position for many years in this very complicated field of aviation has been to tilt to the side of safety. That is what the airline pilots have done in their petition. They've argued for the highest level of safety, for the safety technology that is available now and is proven and can be installed and can be made effective.

I think that it's fine to continue the research, continue studying and developing and testing, but if I were implementing the policy, I would direct the installation of TCAS aboard cargo aircraft and then watch for the development of a better technology and implement it when it's available. That would be

my position. But I'm not making those decisions and you're probably happy that I'm not.

Mr. **ALTERMAN.** At the moment, yes.

Mr. **DUNCAN.** Thank you, Mr. Oberstar.

Mr. **OBERSTAR.** I just don't want to be the one to have to answer when the first incident occurs. I don't want to have to arrive at a crash site, as I did at Hibbing six months before the deadline to install ground proximity warning systems aboard commuter aircraft, and find words of solace for families who lost loved ones in an avoidable accident.

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Mr. **ALTERMAN.** Obviously, Mr. Oberstar, neither do we. We are taking this very seriously. This is not—and I would like——

Mr. **OBERSTAR.** I appreciate that. I appreciate that and I respect the bona fides, as I said, of UPS and others who question moving ahead expeditiously with TCAS. I don't dispute that at all.

Obviously, they're not my dollars to be spent. But in the end we all stand responsible.

Thank you, Mr. Chairman.

Mr. **DUNCAN.** Thank you, Mr. Oberstar.

I have one note that says Captain Stephens, with an "S." I have another report that says Captain Stephen with no "s." But, whichever it is, I understand that Captain Stephens or Captain Stephen wishes to tell us about his near-miss collision, and I would be pleased to allow him to do that at this time.

Sir, if you'd just step forward there and state your full and correct name and go ahead and tell us what happened.

Captain **STEPHEN.** Yes, sir. My name is Gary Stephen, and it's S-T-E-P-H-E-N.

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I'm a 727 captain. On February 18, 1995, at 4:45 in the morning I was making an arrival into the Newark Airport. I had come from the Chicago area—Rockford is one of our hubs.

Under the complete control of New York Center, getting vectors, having traffic pointed out, as we were about 15 miles out from the airport there was a flash of light out my left window and I turned to find a F–27 turbo-prop, another cargo airplane. He was 200 feet below me and about a quarter mile off my wing. He was at least parallel to our course.

I come from a fire fighting background where I have been in very close proximity to airplanes. I felt that, since he was paralleling the course, that this would not be a problem, and I was wrong.

As we slowed down to start putting our flaps out, the other airplane was, in fact, told to follow us.

He over-shot us as we slowed down and turned right across the windshield.

Our miss was maybe 200 feet and maybe 1,000 feet in front of us. At our closure speed that we had on the side of that airplane, we were about two seconds from impact.

The controllers were found to have a problem. The air traffic controller was sent back to school for a few days and returned to his job, and so was the tower controller, because we were in the middle of the changeover from New York approach to the Newark people.

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The problem is that, had I not seen that flash of light, at least TCAS would have told me he was there, I would have got in a climb, and the second incident wouldn't have happened.

The second incident at 4:45 in the morning 15 miles to the south and west of Newark is a relatively densely-populated area. My airplane at that time weight 140,000 pounds and had 15,000 pounds of jet fuel on board. Had I gone down, such as in the San Diego instance of the 727 with the wing bent and the fire coming over the wing, it wouldn't have been during the daylight hours where only seven people lost their lives on the ground. It could have been a lot more tragic. Those people were in bed.

The controllers got the second chance. I'm afraid neither those people on the ground nor myself would have gotten a second chance.

And I agree. Technology is great. We have something on the shelf that can save not only the lives of the pilots, but, as Mr. Oberstar said, we can save the lives of the people on the ground, and we can do it now.

I am part of the Accident Investigation Committee for our union. I have been trained now to assist with one of our airplanes if it crashes, to assist the NTSB in that investigation. I don't ever want to use that knowledge that I've gained. Ever.

Mr. **DUNCAN.** All right. Thank you very much. I appreciate your willingness to come forward and tell us about this experience.

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Mr. Oberstar, do you have any questions?

Mr. **OBERSTAR.** No.

Mr. **DUNCAN.** Well, gentlemen, thank you very much. We'll be looking into this further, but we certainly appreciate your very helpful testimony. Thank you. You've all been outstanding witnesses.

[Whereupon, at 5:05 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

[Insert here.]

38–432CC

1997

PROPOSAL TO REQUIRE TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEMS ON CARGO AIRCRAFT

(105–5)

HEARING

BEFORE THE

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SUBCOMMITTEE ON

AVIATION

OF THE

COMMITTEE ON

TRANSPORTATION AND INFRASTRUCTURE

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTH CONGRESS

FIRST SESSION

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GLENN POSHARD, Illinois
ROBERT E. (BUD) CRAMER, Jr., Alabama
ELEANOR HOLMES NORTON, District of Columbia
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PAT DANNER, Missouri
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CORRINE BROWN, Florida
JAMES A. BARCIA, Michigan
BOB FILNER, California
EDDIE BERNICE JOHNSON, Texas
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EARL BLUMENAUER, Oregon
MAX SANDLIN, Texas
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Mr. Chairman and Members of the Subcommittee:

Mr. Chairman, if I may, I would like to take a moment before beginning my testimony to introduce myself. I am Guy Gardner, and I am pleased to be serving as FAA's Associate Administrator for Regulation and Certification. I look forward to working with you and the other distinguished Members of this Subcommittee on the many important and challenging aviation issues that will be facing this Congress.

I welcome the opportunity to appear before you today to discuss the petition concerning installation of the Traffic Alert and Collision Avoidance System, or TCAS II, on cargo carrier aircraft. You have also asked me to discuss new technology currently under development known as Automatic Dependent Surveillance-Broadcast, or ADS-B. Joining me today are David Harrington, FAA's Acting Deputy Director for Flight Standards, and Ronald E. Morgan, FAA's Director of Air Traffic.

As you know, the FAA is reviewing a petition for rulemaking filed by the Independent Pilots Association (IPA) that asks the FAA to mandate installation of TCAS II on transport category aircraft flown in all-cargo operations. I appreciate the Subcommittee's decision to hold a hearing on this issue. The testimony presented today will be included

in the rulemaking docket; therefore, the agency will have the benefit of today's discussions before making its decision on the petition. Although I cannot discuss our ongoing deliberations concerning the petition, this hearing is an opportunity for us to hear your concerns and the concerns of others who will be testifying today. Mr. Harrington and I will be happy to address technical questions you may have concerning operation of these systems.

You have asked me to comment on two particular systems: TCAS and ADS-B. I will briefly discuss TCAS, how it works, and the success we have had with the system. I will also explain how ADS-B is intended to work and the additional benefits ADS-B could provide. Unlike TCAS, ADS-B is not a collision avoidance system, and it does not have a proven track record.

TCAS was developed to reduce the potential for mid-air collisions. The system was designed to operate independently from the air traffic control (ATC) system and to serve as a back-up to the ATC system. TCAS operates by transmitting interrogations that elicit replies from transponders in nearby aircraft. The system tracks aircraft within certain range and altitude bands to determine whether they have the potential to become a collision threat.

There are two levels of TCAS protection currently in use, known as TCAS I and TCAS II. Passenger aircraft or combination cargo/passenger aircraft with 10 to 30 seats must be

equipped with TCAS I. TCAS II is required for passenger aircraft with more than 30 seats, as Congress directed. These aircraft, as well as aircraft used in all-cargo operations, must also be equipped with transponders, which would indicate their presence to any TCAS-equipped aircraft. If TCAS I perceives the intruder aircraft as a threat, it will provide the pilot with a visual and audible traffic advisory (TA), which gives the intruder aircraft's range, relative altitude, and bearing. TCAS II, in addition to traffic advisories, provides the pilot with a resolution advisory (RA), which suggests a vertical maneuver to avoid the intruder aircraft.

By every indicator, TCAS has been a success. TCAS II is the most common collision avoidance system in use throughout the world today. It has been in operation on various types of aircraft since 1990 worldwide. Today, over 10,000 airline, corporate, and military aircraft are equipped with TCAS II and over 80 million hours of operation have been logged. The number of reported near mid-air collisions in the U.S. has decreased significantly since 1989, during a period when both passenger and cargo air traffic increased substantially. Many foreign countries are mandating the installation of collision avoidance systems and TCAS II is becoming the standard. By the year 2000, the European Community plans to require TCAS II technology on all civil turbine aircraft weighing more than 15,000 kilograms (approximately 33,000 pounds). Australia, Japan, and India have announced similar plans.

In addressing ADS-B, I would like to clear up a misconception that may have arisen. ADS-B, standing alone, is not a collision avoidance system, and is not an alternative to TCAS. ADS-B is a technology that is intended to support surveillance of aircraft while airborne and on the airport surface. This technology uses the global positioning system (or GPS) and a radio frequency link to broadcast information between aircraft as well as between aircraft and ground-based ADS-B receivers. An aircraft equipped with ADS-B would broadcast its aircraft identification, along with position, velocity, and other time-sensitive surveillance information, to other aircraft and it would receive the same information from other aircraft. But ADS-B is not a collision avoidance system, and would need to be supplemented to provide such protection.

Although ADS-B does not have the operational history enjoyed by TCAS, it does have a potential for improving the range, accuracy and reliability of the air-to-air surveillance information that TCAS uses for collision avoidance. These potential benefits derive principally from the fact that TCAS units must actively interrogate transponders in nearby aircraft, while the ADS-B technique obtains surveillance data simply by listening for ADS broadcasts from other aircraft.

Although ADS-B technology may be promising, there are several significant issues that need to be addressed. Many of the technical standards for ADS-B have not been agreed upon, either in the United States or internationally, and several key technical issues regarding applications of ADS-B message sets need to be developed. In addition, ADS-B

must be operationally tested. There are no aircraft equipped with ADS-B in service today, and much work needs to be done before ADS-B can be used to support a collision avoidance system.

Air cargo operators have proposed a phase-in plan that would have the ADS-B system fully operational by the year 2001. Projections that propose full operational capability of ADS-B by the year 2001 would be challenging, given the number of technical hurdles that lie ahead. However, the agency is interested in working with industry to develop and implement this technology. As announced by Vice President Gore in January, and noted in the White House Commission's recommendations for accelerating modernization of the national airspace, we are developing a plan to demonstrate this system.

As I stated earlier, Mr. Chairman, I want to thank you for holding this timely hearing. The IPA petition and the cargo industry's proposal concerning ADS-B raise complex safety and policy issues. We have not yet reached a final determination whether to require cargo carriers to equip with TCAS II, or whether to pursue other alternatives. Many factors need to be balanced, and we will consider these issues very carefully in making our decision on IPA's petition for rulemaking. Today's discussions will help the agency develop a thoughtful and responsible resolution.

Mr. Chairman, that completes my prepared statement. I would be pleased to respond to any questions you and the other Members may have at this time.

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO

THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

SUBCOMMITTEE ON AVIATION

U. S. HOUSE OF REPRESENTATIVES

26 FEBRUARY 1997

SUBJECT: Flying Incidents in East Coast Warning Areas

STATEMENT OF: Major General Donald L. Peterson
Assistant Deputy Chief of Staff, Air and Space Operations
Headquarters, United States Air Force
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BIOGRAPHY
UNITED STATES AIR FORCE
MAJOR GENERAL DONALD L. PETERSON

Major General Donald L. Peterson is assistant deputy chief of staff, air and space operations, Headquarters U.S. Air Force, Washington, D.C. He provides support to the Deputy Chief of Staff, Air and Space Operations and serves in his absence in carrying out his responsibilities to the secretary of the Air Force and the chief of staff for the planning, operations, requirements and force structure necessary to support the warfighter with air and space power. As the Air Force deputy operations deputy to the Joint Chiefs of Staff, he determines operational requirements, concepts, doctrine, strategy, training and the assets necessary to support national security objectives and military strategy.

The general entered the Air Force in 1966 after graduating from Texas A&M University. During his career, he has commanded a tactical fighter squadron, a tactical fighter wing, a flying training wing, and the North American Aerospace Defense Command and U.S. Space Command, Cheyenne Mountain Operations Center. His staff assignments include serving as a fighter operations officer and executive officer in the Air Staff, as chief of USAF operations assignments, as a major command inspector general and as director of plans and operations, Air Education and Training Command. He is a command pilot, having flown more than 4,000 hours, including 597 combat hours.

General Peterson and his wife, Gayle, have a son, Don.

EDUCATION:

1966 Bachelor of business administration in finance, Texas A&M University
1975 Squadron Officer School
1980 Air Command and Staff College
1982 Master's degree in management, Auburn University
1982 Air War College, Maxwell Air Force Base, Ala.
1988 The Executive Development Program, Carnegie-Mellon University Pa.
1995 Program for Senior Executives in National and International Security, Harvard University, Mass.

ASSIGNMENTS:

1. October 1966 - October 1967, student, pilot training, Webb Air Force Base, Texas
2. October 1967 - December 1971, EC/KC-135 aircraft commander, 71st and 913th Air Refueling Squadron; assistant operations officer, 913th Air Refueling Squadron, Barksdale Air Force Base, La.
3. December 1971 - November 1972, student, F-4E transition training, MacDill Air Force Base, Fla.
4. November 1972 - July 1973, F-4E aircraft commander and flight leader, 435th Tactical Fighter Squadron, Ubon Royal Thai Air Force Base, Thailand
5. July 1973 - October 1977, F-4E instructor pilot, 309th Tactical Fighter Squadron; chief, academic instructor pilot; chief, current operations, 31st Tactical Fighter Wing; assistant squadron operations officer, 307th Tactical Fighter Squadron, Homestead Air Force Base, Fla.
6. October 1977 - July 1980, action officer, tactical division, directorate of operations, the Pentagon, Washington, D.C.
7. Jul 1980 - July 1981, assistant executive officer, deputy chief of staff for plans and operations, the Pentagon, Washington, D.C.
8. July 1981 - May 1982, student, Air War College, Maxwell Air Force Base, Ala.
9. May 1982 - June 1985, F-15 operations officer, 22nd Tactical Fighter Squadron; commander, 525th Tactical Fighter Squadron; assistant chief of maintenance, 36th Tactical Fighter Wing, Bitburg Air Base, West Germany

10. June 1985 - July 1987, chief, operations officer assignments division, Air Force Military Personnel Center, Randolph Air Force Base, Texas
11. July 1987 - July 1988, vice commander, 325th Tactical Training Wing, Tyndall Air Force Base, Fla.
12. July 1988 - September 1990, commander, 27th Tactical Fighter Wing, Cannon Air Force Base, N.M.
13. October 1990 - February 1993, assistant deputy chief of staff, technical training, Headquarters Air Training Command; ATC inspector general; commander, 12th Flying Training Wing; installation commander, Randolph Air Force Base, Texas
14. February 1993 - April 1994, command director, NORAD, Cheyenne Mountain Air Station, Colo.
15. April 1994 - May 1995, vice director, NORAD Combat Operations and commander, Cheyenne Mountain Operations Center, Cheyenne Mountain Air Station, Colo.
16. May 1995 - August 1996, director, plans and operations, Headquarters Air Education and Training Command, Randolph Air Force Base, Texas
17. August 1996 - November 96, director of plans, deputy chief of staff, plans and operations, Headquarters U.S. Air Force, Washington, D.C.
18. November 1996 - present, assistant deputy chief of staff, air and space operations, Headquarters U.S. Air Force, Washington, D.C.

FLIGHT INFORMATION:

Rating: Command pilot
Flight hours: More than 4,000
Aircraft flown: T-33, T-37, T-38, KC/EC-135, F-4C/E, F-15A/C and F-111D

MAJOR AWARDS AND DECORATIONS:

Defense Superior Service Medal
Legion of Merit with oak leaf cluster
Distinguished Flying Cross
Meritorious Service Medal with two oak leaf clusters
Air Medal with 10 oak leaf clusters
Air Force Commendation Medal
Vietnam Service Medal with three service stars
Republic of Vietnam Gallantry Cross with Palm
Republic of Vietnam Campaign Medal

EFFECTIVE DATES OF PROMOTION:

Second Lieutenant	Oct 19, 1966
First Lieutenant	Apr 19, 1968
Captain	Oct 19, 1969
Major	Jun 1, 1978
Lieutenant Colonel	Nov 1, 1981
Colonel	Nov 1, 1985
Brigadier General	Aug 1, 1992
Major General	Jul 1, 1995

Introduction/Overview. Good afternoon Mr. Chairman and members of the committee. I appreciate the opportunity you've given me to discuss several recent incidents involving Air Force aircraft operating in Special Use Airspace, including the two incidents in the Atlantic Warning Areas off of the New Jersey coast. I would like to present you with the Air Force's assessment of our flying operations and our use of Special Use Airspace. I will summarize the four incidents that generated my invitation to speak with you today. I would then like to share with you the steps taken by the Air Force as a result of these incidents, and our rationale for taking these steps.

Overall Assessment. Let me begin by stating that, in the Air Force's view, our flight operations are safer than at any previous time in our history. By any measurement one might choose, the Air Force is flying safer and smarter than at any time since the establishment of our service in 1947. FAA statistics indicate a decrease in reported incidents, even in this era of unprecedented growth and crowding in our skies. Similarly, the Air Force believes the system of Special Use Airspace developed by the FAA and the Department of Defense has been, and continues to be, a sound, safe system, as well proven by its long record of safe, efficient management of our airspace resources.

The Special Use Airspace System provides the Department of Defense with training opportunities vital to maintaining a strong, capable military. At the same time, the use of Special Use Airspace minimizes impacts on civil users of the National Airspace System while simultaneously increasing the safety margin for all users. This last thought is the most critical to our purpose today. Special Use Airspace increases safety for users of the National Airspace in three ways: First, it separates those military activities involving rapid changes in altitude or direction of flight, such as air-to-air and air-to-ground training, from the routine, day-to-day civil and military transit use of our airways. Second, Special Use Airspace is clearly defined and publicized--providing all users with an invaluable tool for flight planning. Finally, because Special Use Airspace is a four-dimensional concept, consisting not just of area and altitude, but also of "time," it provides the FAA and other users (primarily commercial and general aviation) with the flexibility that allows maximum use of this vital commodity--our Nation's airspace. With this in mind, let me now turn to the recent incidents involving Air Force aircraft.

Summary of Incidents Between 5 and 7 February. The four incidents involving Air Force aircraft that occurred between February 5th and February 7th,

serve not only as examples of the inherent safety built into the National Airspace System, using a complex system of technical resources and human oversight through redundancy and double checks, but also illustrate an enduring truth for any human-designed system--that there is always a possibility of error in either communication or execution. I do not make this last point for the purpose of down-playing the significance of these incidents; rather to the contrary, I make this point to underscore the importance of learning from these incidents, and searching for ways to improve the system in the future.

These incidents do not illustrate any clear negative trends in either operations, units, or segments of the Services. Although two of the incidents occurred in the same geographic region, the issues involved in each are unrelated. The only common thread, having occurred in two of the four incidents, appears to be the activation of the "TCAS," or Traffic Alert and Collision Avoidance Systems in the other aircraft involved in the incidents. With your permission, I would like to address each of the issues individually.

First Incident (W107, NJANG/Nations Air). On Wednesday, February 5th, at approximately 1:35 p.m., a flight of two unarmed F-16s from the New Jersey Air National Guard's 177th Fighter Wing, based at Atlantic City, NJ,

encountered an unidentified aircraft transiting the training area where they were planning to practice air-to-air training. The unidentified aircraft was subsequently identified as a Nations Air B-727, bound from San Juan, Puerto Rico to Kennedy International Airport. While attempting to identify the aircraft, for the purpose of ensuring it would not be a factor to the flight's planned maneuvers, the lead F-16's closure rate and altitude caused a "TCAS" (Traffic Alert and Collision Avoidance System) "Resolution Advisory" to sound in the B-727. As required by Federal Aviation Regulations, the B-727 pilot was forced to take evasive actions, in response to the Resolution Advisory. Our investigation has revealed that the closest distance between the two aircraft was 400 feet below, and 900 feet behind the civilian airliner, after completing a controlled intercept profile.

A combination of errors in radio discipline between air traffic control and the F-16 appears to have hampered further traffic advisories from the area controllers. When finally advised of the identity of the aircraft, the F-16 turned away from the traffic. The F-16 was exercising judicious airmanship throughout the period, ensuring no training activity would occur in the B-727's vicinity, and also ensuring the aircraft was on a path that would take it clear of the training airspace. As you are aware, the NTSB is completing its own independent review of the incident, and on 18 February provided some preliminary information,

including their conclusion that the Air National Guard's approach to the airliner was a "controlled procedure" and was "accomplished in a methodical manner."

Second Incident (DC ANG/American Eagle). On February 7th, a flight of 4 F-16s from the Washington DC Air National Guard, based at Andrews AFB, had terminated their training and was returning to base. The number four aircraft, having reached a low state of fuel, elected to return to base on his own, under visual flight rules, at a slower speed than the remaining three aircraft, in order to conserve fuel. The other three aircraft, being controlled as a single flight at Flight Level 200, (20,000 feet) were given traffic information on an American Eagle commuter aircraft 1,000 below them, at Flight Level 190 (19,000 feet). This is standard air traffic control separation. Both the American Eagle flight and the flight of three F-16s reported each other in sight. At this time, the fourth F-16, operating visually, passed below the American Eagle aircraft. Because the American Eagle pilot was told his original traffic was four F-16s, he was not prepared to see the single F-16 below him, even though the two aircraft were more than the minimum safe distance apart. Preliminary Air Force investigation has revealed that no near mid-air collision report was filed, and that standard separation criteria was met, or exceeded, throughout the incident. However, the

investigation also noted that additional communication by the F-16 flight could have improved situational awareness of the American Eagle crew.

Third Incident (TXANG/Northwest). A third incident occurred on 7 February, and involved a flight of two Air National Guard F-16s on an instrument flight plan returning to Kelly AFB, Texas from their training area over the Gulf of Mexico. Preliminary review by FAA indicates the flight requested a clearance out of there assigned training area at Flight Level 340 (34,000 feet). Air traffic control assigned an altitude of Flight Level 310 (31,000 feet), which was properly acknowledged by the flight. Following their departure from the training area, the flight climbed to Flight Level 340 (34,000 feet). Air traffic control questioned the flight as to why they were at Flight Level 340, and issued traffic on a commercial air carrier at Flight Level 330 (33,000 feet). The F-16s reported the traffic in sight, were instructed to maintain visual separation, and to descend to Flight Level 310. The flight passed approximately 3.7 miles behind, and 400 feet above the air carrier, maintaining visual separation, while descending to Flight Level 310. While no "TCAS" alarms sounded nor were any evasive actions required in this incident, the minimum FAA enroute separation of five miles was broken, causing

a deviation to be reported by air traffic control. Recommendations for corrective actions are pending completion of the FAA and Air Force investigations.

Fourth Incident (Cannon F-16s/American). The fourth incident, also on 7 February, involved a flight of two active duty F-16s from the 27th fighter Wing at Cannon AFB, NM, participating in a military exercise over New Mexico. The incident occurred when the F-16s exceeded the vertical boundaries of their exercise airspace, known as the Sumner Air Traffic Control Assigned Airspace or "ATCAA." The flight came within 3.5 miles of a commercial carrier transiting the region at Flight Level 280 (28,000 feet), sounding a "TCAS" alert in the air carrier, and causing the air carrier pilot to adjust his altitude by approximately 800 feet. The Air Force investigation revealed both an error in pre-flight briefing for the F-16 mission, and a system deficiency in air traffic control procedures in the region. The underlying cause for this incident has initially been attributed to a failure on the F-16 mission commander's part to clearly ascertain the vertical limits of the exercise airspace he was assigned. The investigation is continuing with a focus on the actual transmissions between air traffic control and the flight, and air traffic control and the AWACS aircraft monitoring the exercise airspace. The investigation thus far has revealed that air traffic control, in this instance

being provided by the FAA's Albuquerque Enroute Center, does not, as a matter of procedure determine the actual vertical limits of airspace until just before commencing the exercise. At a mission planning briefing the day before the incident, the F-16 flight was given the impression the exercise airspace would extend to Flight Level 500 (50,000 feet). In the process of establishing themselves in the training area for the exercise, it is unclear if the air traffic control-assigned placement of a Flight Level 270 (27,000 feet) restriction on the airspace was communicated to the F-16s--communicated in this instance meaning transmitted by air traffic control and acknowledged by the F-16s.

As a result of this incident, the 27th Fighter Wing at Cannon AFB is taking the following actions:

- Make "airspace awareness" a special interest item for pilot evaluations; in addition, the Wing will conduct an immediate, one-time detailed instructional block for all 27th Fighter Wing crews on all local training airspace.
- Schedule exercises during days/times of off-peak air carrier traffic.
- Continue to work with the FAA's Albuquerque Center for pre-coordinated altitudes for exercise airspace, and to develop handling and altitude assignment procedures that will reduce the numerous radio frequency changes and transmissions currently required.

Air Force Actions. Having summarized the nature of the four incidents, let me now focus for a moment on the Air Force's actions in response to these incidents. In addition to our participation and cooperation dealing with investigations of the specific incidents, the Air Force took four independent actions as a result of the incidents: A stand down of all training missions in the Atlantic and Gulf Warning Areas; a complete review of all procedures and policies concerning Air Force operations in Special Use Airspace; a directive to provide immediate "TCAS" awareness training to all operations personnel, and the addition of a formal block of instruction in both primary (initial) flying training and continuation training; the applicable sections of Air Force Instructions have been revised, directing pilots to immediately terminate training upon discovering an unidentified aircraft in their area, and to request air traffic control assistance in ensuring the area is cleared; and finally, the Air Force joined with the Navy and FAA to convene a cross-service, cross agency review of procedures and agreements pertaining to special use airspace.

1. **Atlantic and Gulf Coast Training Areas.** On 7 February, in the wake of the two incidents in the vicinity of the Atlantic coast Warning Areas, the Air Force Chief of Staff directed a stand-down, or cessation of flying in these areas. The

purpose of this stand down was to allow units to review all of their procedures for operating within, or transiting to and from these areas. The fact that these two incidents occurred in the vicinity of Atlantic coast Warning Areas made it seem a worthwhile precaution to fully evaluate our operational procedures within these areas. With the reporting of the third incident off of the Texas coast, this stand down was expanded to include the Gulf coast training areas as well. While confident our current operations and procedures are safe, this review recognizes the benefit of revisiting an issue, with the goal of making it even safer. The Air Force viewed these actions as precautionary in nature, and felt it important to reassure the American people that we take all issues dealing with flying safety very seriously.

2. **World-wide Policy/Procedure Review.** While the stand down of flying operations applied only to the Atlantic and Gulf coast Warning Areas, the directive for review of procedures applied to all Air Force units, worldwide. To date, the results of this review have confirmed that existing procedures for entry, exit, and transit of Special Use Airspace, when adhered to, are safe and sufficient. We have identified one area of clarification dealing with identifying unknown aircraft in training areas, which I will elaborate on in a moment.

3. **TCAS Training/Awareness Actions.** The Air Force feels that these incidents highlight the need for all users of the National Airspace System to increase their awareness of the characteristics and sensitivities of TCAS. Accordingly, the Chief of Staff directed the following steps for all Air Force operations personnel:

- All units will conduct an immediate block of instruction on TCAS awareness for pilots and air controllers, using all available means to expeditiously disseminate the information (Flight Crew Information File Items, Recent Information Files, and Special Interest Items). These tools are designed to communicate vital operations information to the widest audience in the shortest period of time.
- The Air Force Flight Standards Agency is adding TCAS training to the Air Force's Instrument Refresher Course, a formal continuation training course required for all pilots and navigators. They are also preparing a block of instruction for primary (initial) flight training, and including TCAS information in Air Force Manual 11-217, the Air Force's Instrument Procedures Manual.
- Air Force Instruction 11-214, Aircrew and Weapons Director Procedures for Air Operations, provides guidance on identifying unknown aircraft in training areas. It has been changed to require aircrews to immediately cease training

operations upon becoming aware of an unidentified aircraft in a training area, and to ensure the training aircraft maintain a safe distance from the unknown aircraft. Aircrews will then notify air traffic control and request assistance in identifying and clearing the aircraft from the training area before resuming training. This change is aimed at reducing the potential for unintentionally generating "TCAS" alerts in other aircraft.

Joint Service/Joint Agency Review. Following the recent incidents involving civil and military aircraft off of the New Jersey coast, the Air Force, Navy and FAA convened a cross-service, cross agency review of procedures and agreements pertaining to Special Use Airspace. The review, which began February 12th, focused on all relevant FAA and DoD orders, handbooks, regulations, and instructions. Review of pertinent local agreements, such as memoranda of understanding and letters of agreement was also included.

The review panel consisted of technical experts, experienced in military-civil air operations. From their review, we can conclude that while DoD and FAA roles, responsibilities, and methods for separating aircraft in active Warning Areas are clear, pilots and controllers would benefit from having a single, concise source for procedures, as opposed to the several sources in existence today. Other areas

addressed by the panel include clarifying communications and streamlining coordination procedures. The Air Force intends to thoroughly study these observations, and to cooperate fully in implementing changes to enhance the system.

Summary/Concluding Remarks. In conclusion, I want to restate that the Air Force is committed to maintaining the safest possible air operations, over the United States and around the world. We take all errors and deviations very seriously, regardless of their nature. We will continue to investigate any and all incidents in a timely, open and objective fashion. We will continue to take all reasonable steps to provide for the safe conduct of military and civil air operations. The Air Force's record concerning flight safety is a strong one, and we work hard to ensure it continues to be so. The Special Use Airspace System developed by the FAA and Department of Defense is a sound system, and serves the best interests of all users of the National Airspace System, military and civil. Thank you.

DEPARTMENT OF THE NAVY

PRESENTATION TO

THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

SUBCOMMITTEE ON AVIATION

U.S. HOUSE OF REPRESENTATIVES

26 FEBRUARY 1997

SUBJECT: FLYING INCIDENTS IN EAST COAST WARNING AREAS

STATEMENT OF: REAR ADMIRAL DENNIS V. MCGINN, U.S. NAVY
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TRANSPORTATION AND INFRASTRUCTURE
COMMITTEE, AVIATION SUBCOMMITTEE

INTRODUCTION. Good afternoon Mr. Chairman and members of the Subcommittee. I welcome the opportunity to appear before you today to discuss air traffic control coordination between military and civil authorities.

The safety for all who use the skies is paramount. The men and women of our military involved in flight operations... from the pilots and flight crew members in the aircraft, to our military air traffic controllers... are top professionals. We are proud of them. From their selection, through their training and in the performance of their duties, they are professionals who pay attention to detail – vital for the safety of flight.

As noted by the Chairman of the National Transportation Safety Board, Mr. Jim Hall, in his statement on February 18th , over the history of NTSB investigations there have been relatively few instances of dangerous encounters between military and civilian aircraft. This reflects our close and effective coordination with the FAA -- coordination which happens throughout the day, every day.

ASSESSMENT. The incident of February 5th, involving the U.S. Air Force F-16 and the Nation's Air 727 is of serious concern. We have worked closely with the NTSB to look into the circumstances of this

incident to ensure our coordination with the FAA is effective to ensure the safety of all who use the skies.

OVERVIEW. Today, I will give you some background on the Navy air traffic control facility that was involved in the incident and describe what we have learned from the review by our joint Department of Defense and Federal Aviation Administration team. Finally, I will tell you about what the Navy is doing to ensure the safety of military and civilian aircraft.

The Navy facility involved in the incident is called the Fleet Area Control and Surveillance Facility, Virginia Capes... known as FACSFAC VACAPES... located at Virginia Beach, Virginia. As a designated air traffic control facility, it is required to provide air traffic separation consistent with the guidelines used by the FAA's controllers, and provide for the safe, efficient and expeditious flow of air traffic.

In the past, military aircraft operating over international waters off the U.S. East Coast have utilized separate airspace. These designated warning areas have been set aside to ensure that military operations do not conflict with movement of other air traffic moving along airways outside the warning areas.

This arrangement has proven to be effective in maintaining separation between military and civilian aircraft. But, it has also been an inefficient use of the airspace. Under normal procedures, the *schedule* for military use of a warning area determined if and when civilian air traffic may pass through that warning area. When military aircraft are scheduled to use a warning area, civilian aircraft must remain clear – which means they must be routed around the warning area by air traffic controllers.

However, many times... due to legitimate reasons... the military aircraft might be late, and the airspace would remain unused, by any aircraft, wasting the airspace, and creating unnecessary inconvenience for civilian air traffic.

To remedy this inefficiency, the Department of Defense and the FAA developed a test procedure to enable real-time shared use of the warning areas. It went into effect November 1st, last year in the areas under the control of the Navy FACSFAC and the FAA's Washington, New York and Jacksonville Air Route Traffic Control Centers. Under this test procedure... regardless of the schedule for the use of a military warning area... civilian aircraft may use "warning area" airspace, until a military user is *actually enroute* to that area. The effectiveness of this real-time

control of the warning area airspace is dependent upon close coordination between the military and civilian air traffic control facilities.

This test procedure was in use on February 5th, when a flight of two New Jersey Air National Guard F-16s entered warning area "W-107" to conduct air-to-air intercept training. When the FACSFAC controller was notified that the F-16s were enroute to the area, and following the agreed test procedure, he called the FAA's New York Center and requested release of area W-107. The New York Center controller advised the FACSFAC controller that he had traffic within 20 miles of the warning area, and... according to the test procedure... it should be allowed to continue through the warning area. This was approved by the FACSFAC controller. The civilian air traffic was the Nation's Air Boeing 727.

Some minutes later, the F-16s checked into the warning area and the FACSFAC controller advised the F-16s to "maneuver at pilots' discretion," that he was "working traffic." He also provided instructions on a radio frequency to monitor and on notification procedures when the fighters were ready to return to their base. At the time, the F-16s and the 727 were about 90 miles apart.

As the controller observed that one of the F-16s had moved to almost within five miles of the 727, he contacted the F-16 pilot to ensure he was aware of the civilian traffic, identifying it as a 727. The pilot acknowledged radar contact with the civilian aircraft, and while maneuvering to complete a controlled intercept profile inadvertently set off the airliner's Traffic Alert and Collision Avoidance System, known as "TCAS." This system led to the 727 pilot initiating a series of maneuvers required by company procedure. A moment later, the FACSFAC controller directed the F-16 to maneuver his operations 20 miles to the southeast, and the F-16 broke away from the 727.

Our review of the records of this incident, tapes of radar data and voice recordings, has determined that the FACSFAC controller was not adequately clear or directive in his transmissions to the F-16 to ensure the aircraft were properly separated at all times.

CONCLUSION. The Navy has taken a number of actions to prevent such incidents in the future:

- We are incorporating the lessons-learned from this incident in the training of controllers at FACSFAC VACAPES as well as that of all the other Navy FACSFACs.

- All air controllers at FACSFAC conducted a safety standdown on February 10th. This standdown assured that all controllers understood and, were abiding by, approved procedures, and emphasized proper phraseology, current directives, proper airspace recall and air traffic control responsibility for separation of aircraft;

- The commanding officer of FACSFAC VACAPES has directed that both a Radar supervisor and a Facility Watch Supervisor positioned will be manned during day and nighttime watches. This will free up the Radar Supervisor to concentrate on assisting controllers;

- Under a new procedure, the Radar Supervisor is required to monitor every airspace turnover involving FACSFAC VACAPES;

- The February 10 incident is now part of the Air Controller training syllabus, as both a case study and a simulator exercise, to illustrate the potential hazards and emphasize proper procedures during airspace sharing periods;

- We have reminded naval aviators about TCAS in civilian aircraft, its parameters, and the potential hazards of approaching within TCAS range.

The Navy, Air Force and Federal Aviation Administration have coordinated closely in reviewing these procedures. The test procedure which has enabled us to provide real-time coordination of the warning area airspace is to be formalized in a letter of agreement among all parties. We unanimously agree that the procedures are safe, appropriate and will increase the margin of safety for all who use the skies.

STATEMENT OF

CAPTAIN J. RANDOLPH BABBITT, PRESIDENT
AIR LINE PILOTS ASSOCIATION
BEFORE THE
SUBCOMMITTEE ON AVIATION
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
U.S. HOUSE OF REPRESENTATIVES
FEBRUARY 26, 1997

"Should the Traffic Alert and Collision Avoidance System be Required in Cargo Aircraft?"

Good Afternoon Mr. Chairman, I am Captain J. Randolph Babbitt, President of the Air Line Pilots Association (ALPA). ALPA represents the professional interests of 46,000 pilots who fly for 45 airlines in the United States and Canada. We appreciate the opportunity to appear before the subcommittee today and share our thoughts with you about equipping all cargo aircraft with TCAS II Traffic Alert and Collision Avoidance Systems. As you can well imagine, this is an issue of prime importance to line pilots, and should be to the entire aviation community.

I would like to begin by briefly reviewing the history of why TCAS was mandated for the air carrier fleet. We all clearly remember the midair collision involving the Pacific Southwest Airlines Boeing-727 and the general aviation aircraft at San Diego in September of 1978. The pictures of that airliner with its 144 passenger on-board plunging toward the ground were published throughout the country and this was probably the key event that triggered the government's move to mandate a collision avoidance system for air carriers. Following that event, the FAA increased its research and development program for a suitable independent airborne system, and, in June of 1981, FAA Administrator Lynn Helms decided enough R & D had been done and it was time to act. He then announced that he had directed the agency to begin work on the testing and certification of the Traffic Alert and Collision Avoidance System (TCAS).

While we applauded his decision to implement a system, unfortunately, it was too late to prevent subsequent air disasters. In August of 1984, a Wings West commuter collided with a general aviation aircraft over San Luis Obispo, California, claiming 17 lives. Following that event, in August of 1986, a collision between an Aero Mexico DC-9 and a general aviation aircraft over Cerritos, California, resulted in 82 deaths, and again in January of 1987, a Sky West commuter collided with another general aviation aircraft near Salt Lake City, Utah, claiming 10 lives.

The losses during these events were not confined to the aircraft and their passengers. The San Diego collision caused extensive damage on the ground and claimed 7 additional lives. Similarly, the Cerritos event caused 15 deaths on the ground, and again, the extensive destruction of homes located in a residential neighborhood. The non-fatal injuries, property damage, industry and government investigations, and follow-on litigation all resulted in a staggering cost to the American taxpayers. The same type of event involving cargo aircraft could occur tomorrow.

In December of 1987, the President signed the Airport and Airway Safety and Capacity Expansion Act of 1987, which mandated the carriage of TCAS II equipment for air carriers having a seating capacity of over 30 passengers. This same legislation resulted in an FAA rule requiring the carriage of automatic pressure altitude-encoding equipment by all civil aircraft operating in high density airspace. This latter requirement was important for two reasons. First, this altitude reporting equipment was necessary as a cooperating element for TCAS II. Without it, the system will not provide collision avoidance protection. Second, while this requirement did pose a financial burden on general aviation non-TCAS equipped operators, it was offset to some degree with the understanding that they would receive a benefit in the form of collision avoidance protection from large turbojet aircraft. This safety benefit has not been realized. Most general aviation and other non-TCAS equipped operators are unaware large cargo aircraft are not TCAS equipped, and as a result, a midair collision potential with such aircraft does exist even though they have their aircraft equipped with Mode C to help prevent such an event.

While the 1987 Act did not require TCAS equipage for regional air carriers, an FAA NPRM in August 1987 proposed a less capable system known as TCAS I for all turbine powered aircraft having a passenger capacity of 10 to 30 seats. On January 10, 1989, the FAA published its final rule relating to TCAS II and TCAS I equipage for air carriers.

Following publication of the FAA Notice of Proposed Rule Making in 1987 and the 1987 Act signed by the President, the Air Line Pilots Association realized that a significant number of large aircraft sharing our national airspace system were not covered under either the act passed by Congress or the proposed FAA rule for TCAS equipage. As a result, in 1988, the ALPA Executive Board established an Association policy supporting the equipage of <u>all commercial</u> aircraft with a system having at least TCAS II capabilities. However, on January 10, 1989, the FAA issued a TCAS final rule that specifically omitted aircraft from TCAS II equipage unless they had a passenger capacity of more than 30 seats.

The omission of cargo aircraft for TCAS II equipage was understandable. At the onset of the midair collisions beginning with the San Diego event in 1978, emotions ran high, and the fatality rate and dramatic pictures of the PSA aircraft plunging toward the ground caused both the public and government to focus on passenger safety. But cost was also an issue. In order to reduce the costs associated with TCAS equipage a

decision was made to exempt small transport category aircraft from this requirement. Therefore, the legislative mandate for thirty passengers as the cut off point for TCAS equipage was adopted. This legislative mandate and associated regulatory language which specifies a requirement for all aircraft seating thirty or more passengers to be TCAS equipped provides a loop hole for cargo aircraft. Things have dramatically changed since that time, and there is sound rationale to revisit the omission of cargo aircraft from the requirement to equip with TCAS II. Consider the following:

1. The growth of the cargo industry and its operating philosophy have changed significantly. There are now approximately 800 aircraft in the cargo fleet which is still growing at a rate of about 10-15% per year, as confirmed by the number of new aircraft on order by this industry. Further, their operations have been highly scheduled and occur around the clock at the busiest airports, as well as those in less congested airspace. International operations have also increased.

2. Federal Air Regulations now require cargo aircraft to be equipped with virtually all of the safety related systems carried by their passenger carrying counterparts. For example, both air carrier and cargo aircraft are required to be fitted with weather radar, cockpit voice recorders, flight data recorders, altitude alerters, windshear detection equipment, and ground proximity warning systems. The single safety related system that is not common to both is TCAS II. It appears that for some reason, the FAA seems willing to provide warning for a cargo aircraft about to hit a mountain or fly into the ground, but not so for pending collisions with another aircraft. This rationale does not make sense! Equipage for both types of aircraft should be identical.

3. The antiquated see-and-avoid requirement to prevent mid-air collisions has severe limitations caused by human factors, physiological constraints of the eye, cockpit window configurations, and current air traffic control procedures. This was obviously true during the four midair collisions I referred to earlier, and will become more of a factor as air traffic increases in our national airspace system. The number of near-collisions reported in the United States annually, and the number of TCAS II resolution advisories experienced by air carrier pilots are a testimony to the failure of see-and-avoid and the ATC system in general. If the pilots of aircraft involved in these events had seen each other, they would not have been in such close proximity. The November 12, 1996 midair collision of a Saudi B-747 with an Air Kazakhstan IL-76 cargo aircraft near New Delhi again proves that even highly experienced airline pilots cannot consistently visually detect and avoid traffic threats. A U.S. cargo carrier could have been involved in this event, and TCAS II could have prevented it. As a point of interest, the FAA also agreed in the final TCAS rule that see-and-avoid does, in fact, have limitations.

4. Pilots have found the TCAS II traffic display an invaluable tool when operating in foreign airspace with marginal ATC services. U.S. cargo aircraft operate routinely

in such environments. ALPA members and those of the International Federation of Air Line Pilots Associations frequently report encounters with aircraft when operating in limited radio and non-radar environments. During these encounters, TCAS II has provided pilots with the situational awareness needed to alter a flight path prior to experiencing a near-miss or receiving a TCAS resolution advisory. The traffic display feature of TCAS has proven equally important over oceanic airspace to the extent that ICAO regional directives require the continuous operation of the Mode C transponders and TCAS systems when in designated oceanic environments. Further, the traffic display provides operators the tool necessary to participate in the oceanic TCAS in-trail climb and descent program and thus realize the economic benefits from such procedures.

5. I commented earlier on the growth of cargo carriers and a change in their operating philosophy from night operations to around-the-clock service. When this concept is merged with the growth of the commuter industry at many locations, a potentially serious environment is created. Specifically, commuters with 30 seats or less are only required to be equipped with TCAS I. This is an inferior system with operational problems, and does not provide pilots the quick resolution advisory needed to avoid a threat aircraft. Instead, the system provides an alerting service to the crew and expects them to visually acquire the threat aircraft and maneuver accordingly. We have already commented on the ability to consistently visually acquire threat aircraft, yet FAA policy prohibits pilots from maneuvering based on a TCAS I advisory unless a visual sighting is effected. We only hope the crew sights the correct aircraft. It must be noted that human factor limitations compromise a pilot's ability to decipher a multitude of information on the display and formulate a timely action plan. The point of elaborating on the TCAS I issue is that the non-equipped cargo aircraft and commuters equipped with TCAS I are operating with increased frequency in the same airspace, and without adequate collision avoidance protection. The flying public is not aware of this degradation of safety when they buy a ticket that requires a flight segment on a TCAS I equipped aircraft in the same airspace as large unequipped cargo aircraft. Bear in mind TCAS I is <u>not</u> a collision avoidance system as TCAS II is, and it only provides traffic information.

The Administration's adoption of a "One Level of Safety" goal should include the upgrading of cargo aircraft equipage to the same configuration as the passenger carrying counterpart, at least from a safety standpoint. Additionally, one of the top priority issues in former Secretary Peña's "Zero Accident" program that spawned his industry wide Safety Review was the equipage of cargo aircraft with TCAS II, and ALPA was a prime advocate of this initiative. The FAA Aviation Safety Plan dated February 1996, (page 18), captured Secretary Peña's and industry concerns by listing TCAS II equipage for cargo aircraft as one of its highest priority items. Thus, it appears the policy endorsements for this initiative have been made by senior DOT and FAA

officials, and the next step in the process should be the publication of a Notice of Proposed Rule Making.

The United States was the initiator of TCAS technology and a requirement for its carriage on air carrier aircraft. These were positive steps and certainly reinforced our role as the world's leader in aviation safety. Line pilots, however, are in the unique position of being able to see shortfalls in our aviation system. They certainly recognize the fact that allowing large cargo aircraft to operate in our congested airspace without the protection of TCAS is a serious flaw that other nations apparently will not repeat. As you may know, Europe will require large cargo size aircraft to equip with TCAS II by January 1, 2000. Japan has also stated they will do the same and we have been informally advised that, as a result of the India mid-air collision, ICAO is now debating whether or not to recommend TCAS equipage for all large aircraft on a worldwide basis. The United States should continue to exercise its roll as the leader in aviation safety by correcting the oversight that permits cargo aircraft to fly without collision avoidance protection.

Another issue that has surfaced in this debate over TCAS equipage is: Why install TCAS II when there is better technology just around the corner? You may be aware that the cargo industry has proposed an alternate plan for equipping their aircraft with collision avoidance protection. While the end product of this concept, a GPS enhanced collision avoidance system, certainly has merit, the interim steps and timelines are questionable. For example, Phase I of their plan proposes the installation of a Traffic Information Service (TIS) that will reportedly be available for nationwide deployment in the 4th quarter of this year. We doubt that will occur because the Minimum Operating Performance Standards for this equipment has not been supported by the RTCA Technical Management Committee at the request of the National Business Aircraft Association and the Aircraft Owners and Pilots Association, the two general aviation organizations who should benefit most from the system. Further, TIS has serious limitations such as only being available in areas of radar coverage and not providing any collision avoidance capability. Additionally,the ADS-B concept that the cargo industry touts is more of an Air Trafic Management tool than a collision avoidance mechanism. To suggest that the industry rely upon this ATM tool for collision avoidance as well as the development of the inter-aircraft flight path negotiations that are the heart of Freeflight, is a solid step away from the redundancy and enhanced safety that TCAS II provides. This is a step backwards that must be avoided. The remainder of their concept is challenged by timelines that appear very optimistic.

While we do not want to exclude an equivalent or more effective collision avoidance system for the cargo fleet, we strongly believe a time limitation must be imposed on the equipage of those aircraft with such a system. As of this date, we are not aware of any FAA approved program plan for an alternative system, nor the funding to see it through to completion. As this issue is debated, we must remember that TCAS II is a proven system that has gained acceptance by FAA management, line pilots, air traffic

controllers, and international civil aviation authorities. It needs no additional development, and TCAS II vendors can easily provide the systems necessary to equip the cargo fleet. There are no technical or operational reasons to prohibit or delay publication of an NPRM requiring installation of TCAS II on cargo aircraft. Therefore, the issue is reduced to the FAA exercising its mandate to provide the highest possible level of safety to our national airspace system within the quickest possible time.

I would also like to address the issue of the cost-benefit analysis for installing TCAS II in cargo aircraft. Traditionally, you would expect the significant loss of human life associated with an air carrier midair collision to represent the primary cost of such an event. While this is true to an extent, the FAA found in its cost-benefit analysis of TCAS II, published in the TCAS Final Rule on January 10, 1989, that this was not so clear. There were other factors to consider such as:

1. Congress determined that requiring TCAS II in most large aircraft was in the public interest.

2. TCAS systems installed in large transport aircraft would enhance the public confidence in the US air transportation system. The FAA further commented that they had not yet quantified the value of public confidence in air transportation but believed there is a very real cost to the system when public confidence is reduced through media coverage of each major midair collision tragedy. They went on to comment that the fragility of public confidence is difficult to quantify, but the potential benefits in this regard stemming from avoidance of a major midair collision is very real and substantial.

3. Accurately quantifying benefits is difficult because fortunately there have been few actual Part 121 midair collisions. However, they did acknowledge the steadily increasing traffic levels tend to increase the risk.

Each of the above points apply to the equipage of cargo aircraft with TCAS II. In addition, the FAA acknowledged in their TCAS II cost-benefit analysis that there are broad implications involved in air safety. We certainly agree with that and would like to emphasize the following:

1. There is no independent airborne collision avoidance system installed in cargo aircraft that will warn of an event between them and general aviation or military aircraft.

2. There is no independent airborne collision system installed in cargo aircraft that will warn of such an event between them and one of the growing fleet of commuter aircraft seating up to thirty passengers, or between two cargo aircraft.

3. Cargo aircraft often carry irreplaceable items needed to support our system of commerce. Its actual value is equally difficult to determine.

4. The value of lives lost and property damage that occurs on the ground following a collision has proven to be significant considering the ancillary costs to the government.

5. TCAS comes as standard equipment on all new aircraft. If a customer opts for a non-TCAS equipped airplane, there would normally be a charge for a non-standard production line product.

Another consideration in determining the cost for TCAS II equipage of cargo aircraft is that the price of doing business for cargo carriers in Europe and Japan beginning January 1, 2000, will include installing these systems on their international fleet. Further, the engineering standards for installing these systems on each type of aircraft operated by the cargo companies has already been completed, thus eliminating one major expense. Also, there is the expense that some cargo operators are incurring through removing TCAS equipment from older aircraft they purchase and convert to cargo configuration. And finally, a few cargo companies have already either installed TCAS II on some of their fleet or are in the process of doing so. Considering the fact that this industry is enjoying record growth and bottom line figures, this proposal is not damaging to their economic well-being.

Additionally, attached to these remarks is an article on safety in cargo aircraft that was published in the May 1995 edition of our *Air Line Pilot Magazine*. It contains more information relating to today's hearing that I am sure you will find informative and interesting.

It is interesting to note that the White House Commission on Aviation Safety and Security in one of its recommendations noted that "Cost considerations and mathematical formulas, however, should never be dispositive in making policy determinations regarding aviation safety as they are one input for decision making. Further, non-quantifiable safety and security benefits should be included in the analysis of proposals."

Mr. Chairman, the time has come to equalize the level of safety between the cargo fleet and their passenger carrying counterparts by requiring the equipage of a certificated, effective collision avoidance system in these aircraft by the end of 1998. This could be done through either legislation from the Congress or publication of a Final Rule by the FAA. Either would be acceptable to the line pilot community and we ask your help in achieving this end. Thank you for the opportunity to comment on this issue.

The Northwest B-747-200 pilot requested clearance to FL330 but noted that Japanese ATC had cleared him to FL350 instead. Meanwhile, a Cathay Pacific B-747-400 was already flying at the same altitude toward the Northwest flight. About two minutes after the Northwest captain complied with Japanese ATC, the flight received a traffic alert from its TCAS and immediately followed its instruction to "descend." Simultaneously, the Cathay Pacific pilot received a TCAS warning to "climb." Within a few seconds, the two giant passenger airplanes passed each other and avoided a major air collision that would have killed 700 people. The crew and passengers of those flights owe their lives to TCAS technology.

ARINC Research Corporation has acquired hundreds of such reports with similar comments. For example, "'The TCAS aircraft was descending out of 8,000 for 6,000 for landing. A VFR aircraft was eastbound at 7,500 feet,' the controller commented. 'In this instance, TCAS prevented a potential disaster.'"

Most ALPA pilots believe TCAS should be credited with many more saves than the ARINC reports indicate.

Had the B-747s in the opening paragraph been cargo airplanes with freight rather than people, they would not have been required to have TCAS. Then what would have happened? "That's a good question, although I hope we never have to find out," says ALPA's president, Capt. Randolph Babbitt. "But this is very much a matter of One Level of Safety. That freighters should have as much collision protection as passenger aircraft is a given, and as this issue indicates, One Level of Safety is more than simply upgrading FAR Part 135 to FAR Part 121. All of Part 121 needs review and revision."

ALPA's Engineering and Air Safety Department staff recently noted that a number of operating rules not currently applied to supplemental and cargo flights could, if extended to such operations, make hauling freight much safer. Some of these rules are as follows:

- FAR 121.161, Airplane Limitations: Type of routes—This rule defines major carrier ETOPS requirements, including the use of the minimum equipment list for ETOPS operations.
- FAR 121.309(f), Megaphones.
- FAR 121.310, Additional emergency equipment—The fuselage signage on the exterior of passenger aircraft that directs rescue personnel to crew evacuation sites, evacuation slides, etc., for example, is not required for freighters.
- FAR 139, Certification and operations: Land airports serving certain air carriers—This rule, which applies only to airports serving scheduled operations with aircraft with more than 30 seats, establishes airport certification requirements for crash, fire, and res-

MAKING FREIGHTERS SAFER

is a prime goal of ALPA's One Level of Safety campaign.

By Les Blattner

▶ *Les Blattner is a consultant to ALPA's Engineering & Air Safety Department and a frequent contributor to* Air Line Pilot.

rological conditions—including adverse weather—such as clear air turbulence, thunderstorms, and low-altitude wind shear." However, when operating under Part 121 Supplemental rules, a licensed, trained dispatcher is not helping the flight crew. On the contrary, Part 121 Supplemental rules require only a "flight following" service. Flight-following is primarily a record-keeping operation, concerned with time of departure and arrival. It includes none of the services cited in the dispatch regulations of Part 121.

"The company finds a lot of [financial] relief because we're not required to have dispatchers. A number of our 'flight followers' are dispatchers, but without the authority. In a dispatch system, the captain and the dispatcher have to agree that the flight can be accomplished safely with the equipment on board, the aircraft's fuel supply, equipment and condition at the destination and alternate airports, and the route's weather. With our system, the flight-follower has input, but the captain has to plan a safe flight. This is really a problem when you're enroute and weather or flight conditions change and the crew isn't kept up to speed. That's one of the predicaments you run into a lot without a dispatch system," says Capt. Wells.

Stacked deck

That brings us to Part 121 today and the maze facing any effort to untangle these regulations. Part 121.356 says, "Unless authorized by the Administrator, each certificate holder [Flag, Domestic, or Supplemental] operating a large airplane that has a passenger seating configuration of more than 30 seats shall equip its airplanes with TCAS II equipment and the appropriate class of Mode S Transponder." While being specific about passenger airliners, this rule allows air cargo carriers to be excused from TCAS rules because it nowhere states they should be included.

Then Part 121 goes on to qualify operations of both regional airplanes and cargo/passenger aircraft—so-called combi airliners—in Part 121.356 subparagraph [b]. This requires that combis and regionals be equipped with TCAS I. Thus, in one regulation the requirement is for full anticollision protection with TCAS II for passenger airliners, some collision protection with TCAS I for combi and regional airliners, and no collision protection for cargo carriers.

TCAS I does not provide resolution advisories or utilize Mode S as TCAS II does. With TCAS I, the pilot gets a proximity alert, but the system does not automatically communicate with the other aircraft or, more importantly, announce whether to "climb" or "descend" because it doesn't use Mode S. Furthermore, TCAS I was originally designed for air taxi and general aviation pilots, not for regional or combi airliners.

"Our industry is young and rapidly expanding. We have long flight duty periods on the dark side of the schedule, which would be prohibited under the labor contracts of most major carriers. To maintain alertness enroute, our airlines commonly use bright cockpit lighting and (allegedly) controlled flight deck rest. Our arrivals are often to the busiest airports in the middle of their morning launch with runway changes in progress and with an IOE [initial operating experience] captain at the controls who's coming off 13-plus hours of duty. It almost makes you wonder why we weren't the first to get TCAS instead of the last," says Capt. Salty Roark, a former chief pilot and now a line pilot at DHL.

"Why do freighters need TCAS?" asks Capt. Chuck McCabe, Airborne Express's central air safety chairman. "The way things stand, FAA has solved only one side of the conflict-resolution equation. The whole industry is now providing next-day or second-day service, and we're increasingly asked to fly in daylight hours. So how are we any different from passenger airlines? But just let us bump into someone, and we'll hear, 'Why didn't you have TCAS?'"

Bryan Hilliard, a B-727 first officer and DHL Air Safety Committee chairman, echoes that remark but says the reason cargo operators don't have TCAS is FAA/industry politics. "A lot of pilots ask me, as a union safety chairman, 'Why we don't have TCAS? My only answer is that it's all politics. As far as night haulers go, we get the impression that FAA doesn't care whether three pilots and a bunch of cargo get whacked. But we need TCAS more than some passenger aircraft. Flying at night and during the early morning hours as the skies grow more crowded can be difficult.

"So although FAA still clings to the idea that cargo flying is safer because that flying is at night when the skies are less crowded—it is wrong. Given the wrong set of circumstances, even the smallest aircraft can become a deadly air-to-air missile," says F/O Hilliard.

Perhaps the most amazing inconsistency with TCAS comes as FAA enforces Part 121 internationally. The agency uses a TCAS litmus test on foreign airlines seeking to enter U.S. airspace. As the regulatory logs indicate, requests to fly into the United States are denied regularly because many foreign carriers don't have TCAS.

"Every time I see in the regulatory logs different carriers requesting exemptions to fly into the United States without TCAS—and the latest request I saw was by Kuwaiti Airlines to fly a B-767 from Frankfurt, Germany—they are denied. At the least, denying foreign carriers to U.S. markets when they don't have TCAS, but permitting U.S. cargo carriers to fly to every market in the world without TCAS, seems hypocritical," says Capt. Wells.

A number of industry groups have protested FAA's decision to shorten the deadline for installing TCAS I from March 31, 1997, to Dec. 31, 1995. At is-

"The whole industry is now providing next-day or second-day service, and we're increasingly asked to fly in daylight hours. . . . But just let us bump into someone, and we'll hear, 'Why didn't you have TCAS?'"

INDEPENDENT PILOTS ASSOCIATION

PREPARED STATEMENT OF CAPTAIN ANDRE DRESSLER ON BEHALF OF THE INDEPENDENT PILOTS ASSOCIATION BEFORE THE AVIATION SUBCOMMITTEE OF THE HOUSE COMMITTEE ON TRANSPORTATION & INFRASTRUCTURE HEARING ON THE NEED FOR TCAS IN CARGO AIRCRAFT FEBRUARY 26, 1997

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On behalf of the pilots of the Independent Pilots Association (IPA), I appreciate the opportunity to provide the Subcommittee with our perspective on the need for requiring Traffic Alert and Collision Avoidance Systems (TCAS) in cargo aircraft. IPA represents the pilots who fly for United Parcel Service. There are currently over 2,100 pilots who fly the fleet of over 200 UPS aircraft.

The IPA believes there is an extremely serious safety risk of mid-air collisions in the skies today. The Traffic Alert and Collision Avoidance System, or TCAS II, is proven, state-of-the-art technology which greatly reduces that risk and has saved many lives, according to pilots, air carriers, and the FAA. However, it is only mandated in aircraft which carry 10 or more passengers. In September, 1996, IPA filed a formal Petition for Rule Making with the FAA to extend TCAS requirements to cargo aircraft by 1998. Thus far FAA has chosen to take no action on this petition.

1. TCAS is Proven Technology That Works

TCAS has drawn the praise of almost every pilot and airline which has experienced working with the system. TCAS is an onboard computer system which appraises pilots of traffic in nearby airspace and advises what, if any, evasive maneuvers must be taken. The system works by monitoring the vertical and horizontal position of all aircraft using Mode C or Mode S transponders (virtually every aircraft carries a Mode C except for the very smallest; all TCAS-equipped aircraft carry Mode S). There are two different versions of TCAS -- TCAS I and TCAS II. TCAS I is required for aircraft carrying between 10 and 30 passengers. The more sophisticated and effective TCAS II system is required for aircraft equipped to carry 30 or more passengers. If there is danger of a collision, the TCAS II system warns the pilot of traffic in the area and announces a "resolution advisory" (RA) to either climb or descend. TCAS I, as the first generation of TCAS, does not provide resolution advisories, only providing traffic warnings. If both aircraft are using TCAS II, the systems coordinate and advise one plane to climb and the other to descend. It is important to note that TCAS is an autonomous system, not requiring ground-based equipment. TCAS works over non-radar covered areas such as oceans, monitoring and avoiding traffic in these areas where air traffic control installations on the ground cannot see.

2. TCAS is Collision Avoidance Technology for the Present *and* the Future

The air freight industry says that it is a mistake to make the investment in TCAS for cargo aircraft because they want the public to wait for a new technology called Automatic Dependent Surveillance - Broadcast (ADS-B) which they claim is a more advanced system. Mr. Chairman, their advocacy of ADS-B is so flawed in its rationale that we can only conclude that it is nothing but a stall tactic.

TCAS is a collision avoidance system; ADS-B is not. The ADS-B technology which is now being developed is merely an air traffic surveillance system. TCAS is proven technology that has been in use for several years; ADS-B is unproven and will not be ready for deployment until 2015 at the earliest. TCAS is not reliant on any ground installation; ADS-B is ground installation-reliant. TCAS-equipped aircraft can "see" any other aircraft equipped with a Mode S or a Mode C transponder; ADS-B does not recognize these widely-used transponders. This is not a battle of one technology versus another. TCAS and ADS-B simply have different functions.

The air freight industry has also stated its support for Global Positioning System as "better technology" than TCAS. Once again, this contention appears designed to confuse the discussion. FAA and the airline industry are testing GPS to see how best it can be used in air traffic management. However, assuming that GPS produces reliable data about the position of

aircraft that are in close proximity to each other, it can be added to existing TCAS II equipment with only minor modifications. Once again, it is not a replacement for TCAS but a potential supplement. To further muddy the water, the air freight industry has talked about employing the Traffic Information System (TIS). Here, too, TIS is being tested to determine whether it can be useful to pilots and ground controllers. However, TIS is a method of supplementing ground control radar with information about the position of an aircraft. It is not a cockpit-based collision avoidance system. And it will be of no assistance where ground control towers are either out of action or non-existent. Only TCAS II is a self-contained airborne collision avoidance system designed to provide collision avoidance announcements to pilots in the cockpit.

Requiring cargo aircraft to be equipped with TCAS will not impose a mandate for equipment which will soon be obsolete and need to be replaced. Rather, it will provide the safety benefits of TCAS now and the newest software version of TCAS (version 7.0) will be up-gradable to add ADS-B technology if and when it is ready.

3. GPS, ADS-B and TIS are NOT Alternatives to TCAS Technology

The IPA stresses that it is not opposing GPS, ADS-B, nor TIS. Each of these systems may play a role in our national aviation system. They are not, however, alternatives to TCAS II as a cockpit-based collision avoidance system.

By the year 2000, 33 European nations will require all large aircraft using their airspace (including UPS, FedEx, Airborne, and other overnight express package carriers) to have TCAS. India, Australia, Japan, and several other Asian countries are moving toward requiring TCAS in their airspace. It is ludicrous for any industry representative to be talking about using an alternative to TCAS when much of the rest of the aviation world is about to adopt the TCAS standard which the United States has for so many years urged them to do.

Does the industry propose that ADS-B be mandated by FAA only for cargo airplanes? If so, what do they propose to do about the thousands of passenger aircraft with Mode S or Mode C transponders that will be invisible to ADS-B equipped planes? Perhaps the air cargo industry would like FAA to require all passenger aircraft to have ADS-B. Even if we ignore the fact that ADS-B is not a collision avoidance system, how selfish and shortsighted can they be?

Mr. Chairman, if you and I were to walk into the Boeing factory today and order a 757 or 767, we would have to pay extra to have that plane built so that it is not wired for TCAS. Of the United Parcel Service fleet, 37.5 percent are already wired for TCAS. Just over a year ago, United Airlines stated that it had equipped its 600-plane fleet with TCAS for about $50,000 a piece. Most of those aircraft were not even pre-wired for TCAS. There are about 800 planes in the U.S. fleet of all-cargo planes. Is $50,000 per aircraft too much to ask of them to avoid an aviation disaster? Preventing the loss of just one aircraft would make this a worthwhile investment.

4. Congress Must Act to Assure Increased Aviation Safety

Let me be quite clear about the danger of disaster if Congress does not act to require TCAS in cargo planes. TCAS technology was developed in the 1950's. At that time, however, the cost and size of the computer processors it required made it cost-prohibitive. By the 1980's, however, computer technology had developed significantly. Yet, it took two deadly mid-air collisions to get Congress to require FAA to mandate TCAS in aircraft carrying 30 or more passengers. And it took more deaths and the "One Level of Safety" campaign for FAA to extend that mandate to aircraft carrying 10 or more passengers. The question is not whether FAA is waiting for deaths to occur due to a mid-air collision involving a cargo plane and a passenger

aircraft. We have already seen how deadly that can be in the recent New Delhi, India collision in which 349 people perished, just months after IPA's petition with the FAA was filed. Early news accounts said that this type of accident could not happen in the United States because both planes would have been equipped with TCAS. Those reports had to be corrected when the media learned of the loophole for cargo aircraft in TCAS requirements. Many people in the aviation industry and the government were surprised to learn that this was the case. We hope that the FAA is not waiting for a major accident in U.S. airspace before it acts favorably on the Independent Pilots Association petition to require TCAS on cargo planes by 1998.

Regrettably, Mr. Chairman, that has too often been FAA's approach to safety over the years. When the NTSB recommended that cargo bays be equipped with fire detectors in 1988, FAA rejected that recommendation. It took the ValuJet tragedy in 1996 for FAA to swing into action. From the IPA's point of view, it is even more regrettable that FAA takes a very narrow look at the benefits of safety when it comes to cargo aircraft. They see at most three people in the cockpit and a handful of people in the jumpseats. Then they put a dollar value on the lives of those in the jumpseats and compare it to the cost of whatever safety initiative they are considering and conclude that the cost/benefit ratio is insufficient. The White House Commission on Aviation Safety and Security recently has stated that safety decisions should not be made purely on a cost/benefit basis. We have seen this cost/benefit rationale in FAA's refusal to require cargo planes to have escape slides. Crew members and jumpseaters are expected to evacuate by exiting through the cockpit window and descending by rope to the ground. Why do most cargo planes have no escape slides? Because it costs the airlines money to maintain them. It is hard to imagine a healthy adult making it down a rope the equivalent of two to three stories from the ground without losing his or her grip and falling to the ground. Give that adult an injury, and the Rope Exit becomes a No Exit. But the FAA looks at cargo planes and sees "No significant loss of life." Obviously, Mr. Chairman, each of us in the cockpit views our lives as extremely significant. But we also think that the FAA ignores the fact that the aircraft we fly use the same airspace and the same airports as passenger planes. Cargo and passenger planes can do harm to each other while in flight, as well as on take-off and landing. Cargo planes can also collide with each other, raining debris, destruction, and death on populated areas. Within the last couple of years we have seen 340 people on the ground killed in Kinshasa (Congo) and more than 80 in Amsterdam when cargo aircraft crashed. That is why we object to the view that cargo accidents inherently involve no significant loss of life. A catastrophe like the mid-air collision over New Delhi, India could occur here in the United States because over 800 cargo aircraft share the skies with passenger planes and do not carry TCAS collision avoidance technology.

The air cargo industry argues that it is safe enough to have only passenger aircraft equipped with TCAS until ADS-B comes along. They claim that if there were danger of a collision between a passenger and a cargo aircraft, the passenger plane's TCAS would advise the passenger pilot of evasive action in order to avoid the cargo plane. This argument leaves out many potential scenarios. There is the possibility that the cargo plane would attempt evasive maneuvers, without the benefit of TCAS advice, in the same direction that the passenger plane is maneuvering. Large aircraft used in the cargo industries are cumbersome and not especially maneuverable, the same as their passenger counterparts. This potential disaster could arise due to the speed the aircraft are traveling and their relative immobility - despite the presence of TCAS in one of the aircraft.

There are other potentially dangerous situations which could arise due to current

regulations which permit a passenger aircraft which is required to carry TCAS, to be in use for up to three days with an inoperative TCAS. An inoperative TCAS-equipped passenger aircraft approaching an unequipped cargo aircraft could result in another catastrophic situation.

As the air cargo industry is expanding, there is an increasing danger of two cargo aircraft colliding in mid-air. This situation is rarely mentioned because it supposedly does not involve a "significant loss of life." However, it is a fact that the greatest chance of this occurring is around airports near large metropolitan areas. A mid-air collision involving two large cargo aircraft could result in a disastrous situation on the ground below.

The chances of any of these frightening scenarios occurring are getting higher and higher every day. The all-cargo segment of the aviation industry is booming, mostly due to the rapid expansion of overnight express package delivery services. The 800 cargo aircraft in the sky today are often flying at night when visibility is at its lowest and pilot fatigue symptoms are at their greatest. Furthermore, the cargo airlines most often operate out of "hubs", extremely busy airports which serve as focal points for both passenger and air cargo operations. All of these factors create an increasingly dangerous situation - one that can be avoided with the simple extension of TCAS regulations to cargo aircraft.

5. The U.S. Air Cargo Industry Opposes the Relatively Small Cost for TCAS Safety

Mr. Chairman, the fact of the matter is that the air cargo industry does not want to make the investment in safety measures because it hurts their bottom line. They claim that making the investment in TCAS will create a roadblock to the development of the ADS-B system. However, UPS alone spent 1.5 billion dollars between 1987 and 1991(the years in which TCAS was installed on passenger aircraft) on technology improvements such as package tracking systems and the UPS satellite. UPS planned to spend an additional 3.2 billion dollars between 1991 and 1996 on similar technology improvements. When considering these facts as well as the previously mentioned costs of TCAS installation, it is clear that the cost of installing TCAS in the all-cargo fleets, in comparison to the safety benefits, is negligible when considering the potential losses of property and life were there to be a mid-air disaster like New Delhi.

In reference to the recent near-miss situations involving civilian and military aircraft, we commend you, Mr. Chairman, for initiating this hearing before these recent incidents. These near-misses have been testaments to the reliability of TCAS. They also underscore the need for TCAS on cargo aircraft. When two F-16 jets off the coast of New Jersey came as near as 400 feet to a Nations Air civilian airliner, the Nations Air TCAS system provided traffic warnings, then advised the pilot to take evasive maneuvers when the F-16s came very near. Another point to consider is that TCAS recognized the military aircraft because they were using Mode C transponders. Had the passenger aircraft been using ADS-B rather than TCAS, those military aircraft would have been invisible to the passenger aircraft just as they were to the UPS DC-8 which was the second civilian aircraft in the same traffic area..

6. Conclusion

Mr. Chairman, the Independent Pilots Association believes that there is a dangerous omission in aircraft safety regulations which must be corrected by Congress. We urge this Subcommittee to report out legislation requiring TCAS II systems for all large cargo aircraft. While the cargo industry drags its feet, claiming they are holding out for a better technology, the skies are becoming increasingly crowded. It has been 10 years since Congress mandated TCAS for passenger aircraft. We have witnessed too many disastrous aircraft accidents and nearly disastrous incidents recently to have to wait for another crash before moving on this issue. The

mid-air collision over New Delhi should be enough of a warning that collision avoidance systems should be installed in all large aircraft now, before we suffer a similar disaster here in the United States.

I have attached a copy of the IPA's Petition for Rulemaking to my prepared statement. We urge this Subcommittee to both support this petition and, at the same time, prepare legislation requiring TCAS to be installed in all larger cargo aircraft. Thank you, Mr. Chairman, for this opportunity to present the Independent Pilots Association's views on this critical aviation safety issue.

National Transportation Safety Board

Washington, D.C. 20594

Safety Information

Testimony of

Robert T. Francis, Vice Chairman

National Transportation Safety Board

before the

Committee on Transportation and Infrastructure

Subcommittee on Aviation

House of Representatives

Regarding

The Need for TCAS on Cargo Aircraft and Recent F-16 Incidents

February 26, 1997

Good afternoon, Mr. Chairman and Members of the Committee. It is a pleasure for me to represent the National Transportation Safety Board today regarding the need for Traffic Alert and Collision Avoidance systems (TCAS) on cargo aircraft, and recent incidents involving military aircraft.

Mr. Chairman, the Safety Board certainly shares your interest in preventing midair collisions, and commends you and the Members of the Aviation Subcommittee for your initiative in convening this hearing.

Before beginning, I would like to introduce the Safety Board staff with me today. To my right is Mr. Richard Wentworth, a senior air traffic control investigator with the Board's Operational Factors Division, and to my left is Mr. Greg Feith, a senior aviation investigator-in-charge. Both individuals are involved in our investigation of the recent encounters between military jet fighters and airliners.

According to Federal Aviation Administration (FAA) data, the number of pilot reported near midair collisions during the period since the installation of TCAS began dropped from 454 reports in 1990 to an all-time low of 202 in 1996. We believe that TCAS installation played a major role in the improvement shown.

Federal regulations designed specifically to augment the "see and avoid" concept and minimize the midair collision potential were first issued as far back as 1926 by the Secretary of Commerce. Over the years, accident investigation experience

has demonstrated the clear limitations of the "see-and-avoid" concept for maintaining separation of modern aircraft. For those companies delivering overnight packages, "see-and-avoid" is extremely difficult since must of their flying is into high density hubs. With modern airplanes flying faster and carrying more people, the introduction of TCAS was a major step forward in the industry.

The Safety Board has issued numerous safety recommendations on the subject of collision avoidance, and we have supported the development of an airborne collision avoidance system that was independent of the ground-based air traffic control system to provide pilots with an additional source of information on potential conflicts in flight.

The Safety Board's concern over the need for a collision avoidance system goes back to 1969, two years after the Board was created. Following a September 9, 1969, midair collision between an Allegheny Airlines DC-9 and a Piper PA-28, the Board asked that the FAA "support the expeditious development of low-cost collision avoidance systems for all civil aircraft."

The list of Board safety recommendations goes on:

- 1971/encourage expeditious development;
- 1972/develop a total midair collision prevention system;
- 1975/expedite development of a traffic alert and collision avoidance system;
- 1985/require TCAS for 121 and 135 operations;

- 1993/require TCAS training for flightcrews – 1993/provide controller briefings to explain TCAS;
- 1994/use TCAS to provide separation distance during approach.

In all of its safety recommendations advocating TCAS implementation, the Board did not distinguish between passenger-carrying aircraft and cargo-only operations, and sees no reason to do so.

Mr. Chairman, cargo carriers now operate approximately 700 to 800 transport category airplanes and the industry is growing. There have been no all-cargo, large transport midair collisions, but we should move forward where technology exists today to further reduce the potential to preserve that status quo.

The Safety Board was pleased when the FAA committed to TCAS in 1981. We were also supportive of the phased installation program for the TCAS II as finally established by regulation in April 1990. In retrospect, we would have preferred, however, that the regulation include cargo aircraft.

In considering TCAS II on all-cargo aircraft, it is important to note that our National Airspace System (NAS) operating environment has changed substantially since the 1987 TCAS II legislation and the original TCAS II rule. Total traffic volume and complexity have grown steadily and substantially in the years since then, with corresponding increases in the demand for safe, orderly, and expeditious air traffic services.

In the mid 1980s, overnight package delivery was a fledgling industry. Now, it comprises a major segment of commercial aviation. As of last year, the two largest overnight package delivery companies, Federal Express and United Parcel Service, were operating over 250 and 181 transport category airplanes, respectively – more than half of the 700 to 800 national cargo fleet. Several of the overnight cargo carriers have found it necessary to develop hub and spoke systems, similar to passenger hub operations, in which large numbers of flights arrive at and depart from their hubs within a few hours and in close proximity. These types of operations impose heavy and complex workloads on air traffic controllers. Moreover, this growth in cargo operations has brought about an increase in daytime flying for cargo operators; thus, they are increasingly using the same airspace at the same time as passenger carriers. This traffic mix and density increases the challenge of maintaining safe separation among aircraft.

TCAS II works best, of course, when the airplanes that are on a collision course are both equipped with the system, so that two TCAS units can communicate and coordinate evasive maneuvers. Thus, if a passenger airplane equipped with TCAS II, and a cargo plane without TCAS II are headed towards each other, obviously, there can be no such coordination. Independent actions by the flightcrews of the two conflicting aircraft may not reduce -- and actually could increase -- the likelihood of a collision. The Safety Board believes these circumstances constitute a compelling need for on-board collision systems to serve as a safety back-up for the ATC system.

TCAS has a proven track record in reducing the risk of midair collisions. Pilots are encouraged to report the circumstances of near midair collisions (NMACs) to the FAA. The FAA's Program Manager for TCAS has stated that pilots have reported approximately 50 instances in which they concluded that TCAS has helped prevent accidents. Additionally, many other instances have been reported through NASA's Aviation Safety Reporting System (ASRS) or have been recorded by the FAA as ATC operational errors, in which TCAS II helped prevent a disastrous collision. These reported "saves" have occurred both in domestic airspace and on nonradar oceanic routes, and have involved passenger-carrying, as well as all-cargo airplanes. The Safety Board staff is aware of numerous other anecdotal cases in which TCAS II has provided flightcrews with more advanced warning that assisted them in averting a collision.

The Safety Board is aware that the FAA and industry are engaged in joint efforts to develop advanced methods of traffic separation, part of "free flight," that appear to reinforce the need for broader TCAS coverage. Implementation of this concept would allow aircraft to cooperatively plan and execute their optimal flightpaths with minimal interference from ground-based controllers. Although the Safety Board's technical staff has not thoroughly examined the "free flight" concept, we believe that the need for airborne collision avoidance systems in all transport-category airplanes is likely to be heightened in an environment in which there is reduced interaction with ground-based controllers.

The cost of a TCAS installation -- which can range from $50,000 to more than $100,000, depending on the system, equipment display options, and time of installation -- has been a strong industry deterrent to aircraft being universally equipped in our NAS, and has prompted the airlines and industry alike, to request that the FAA foster development of a lower cost collision avoidance system that would use Global Positioning System and Mode S transponders. We understand that, conceptually, such a system is feasible and may be lower in unit cost. The technology to make such a system operational, however, will not be available in the near future.

Mr. Chairman, the United States has led the way in developing and implementing collision avoidance systems through the TCAS program, and the United States is the only nation that currently mandates its use. However, other nations also have recognized its merits and are moving toward a similar mandate. Specifically, the Eurocoutrol Airborne Collision Avoidance System Policy Task Force recently completed a unified policy for the implementation of TCAS in European airspace. This policy specifies that TCAS be implemented in the airspace of 33 European countries, effective January 1, 2000. It would require the implementation of TCAS by all aircraft with 30 passenger seats, or weighing more than 15,500 kilograms (approximately 34,000 pounds).

In addition, the Japanese Government recently decided to mandate TCAS operation within its airspace effective January 1, 2001, for all Japanese-registered aircraft with more than 30 passenger seats or weighing more than 15,000 kilograms (approximately 33,000 pounds). Equipage of other aircraft desiring to fly in Japanese

airspace reportedly would be achieved through "regional agreements." The Australian government also plans to require TCAS by the year 2000.

The Safety Board strongly supports more widespread installation of TCAS II in other NAS user aircraft, including in all-cargo, large transport category aircraft. Since becoming a Member of the National Transportation Safety Board, I have met with many of the cargo carriers or their representatives on this very issue, and I have strongly urged that they voluntarily install TCAS, or not remove the equipment that is usually in the aircraft when they purchase the plane. The Board has always felt that legislative action should be a last resort, and that the transportation industry should take much needed safety action voluntarily.

I would now like to turn to recent close encounters involving F-16 aircraft. As you are aware, in the past two weeks, public concern has been aroused by near midair collisions between military aircraft and civilian passenger airlines.

The first such encounter occurred February 5, 1997, off the coast of New Jersey involving a Nations Air Express Boeing 727 and two Air National Guard F-16s. Then, in rapid succession, three other incidents occurred – one off the Delaware coast and the others over Texas and New Mexico. I have attached to my testimony a synopsis of these incidents.

From our investigation to date, it seems clear that the three latter incidents – off Delaware, and over Texas and New Mexico – are not in the same category as the

incident involving the Nations Air Express aircraft. These three incidents involved a "loss of prescribed separation" between the military and civilian aircraft. They are the type of occurrences that the air traffic control system monitors and manages on a fairly routine basis, and there was no danger to the public in any of these three incidents.

By contrast, in the Nations Air Express incident, coordination between the military and FAA air traffic controllers did not follow established procedures, and there clearly was miscommunication, or a lack of communication, between the military air controller and the flight of F-16s.

Although the investigation of this incident is on-going, preliminary information indicates during maneuvers, the F-16 flight leader detected unknown traffic approximately 22 nautical miles from their position and at an altitude of 23,000 feet. The flight leader made the decision to intercept and identify the traffic and directed the pilot of the second F-16 to hold her position and remain clear of the traffic. The flight leader maneuvered his aircraft close to the Boeing 727 using his on-board radar and visual sighting. The intercept was conducted in a controlled and methodical manner, and typical of a standard military-style intercept.

During the intercept, the military air traffic coordinator advised the flight leader that the unknown traffic was in fact a Boeing 727. The flight leader continued the intercept to a range of approximately 1,000 feet horizontal (in trail) and 400 feet below the altitude of the Boeing 727. It was during this phase of the intercept that the flightcrew of the Nations Air Express flight received a TCAS warning and twice initiated

evasive action based on the Resolution Alert information. The F-16 followed in-trail during the evasive action taken by the Nations Air Express flightcrew.

Thankfully, there were no serious reported injuries in this incident – but the potential for very unfortunate results certainly was there.

The Safety Board's staff has advised that a report, that will likely include safety recommendations, should be presented to the Board for consideration in the near future. I will be happy to share that information with the Committee as soon as it is available.

Mr. Chairman, that concludes my testimony. The staff and I would be happy to respond to any questions you or the Members of the Committee may have.

F-16 Close Encounters

F-16 Close Encounter - Active Air Force Aircraft

- On February 7, 1997, two F-16s from Cannon Air Force Base exceeded their operating boundaries while conducting training in the PECOS and BEAK Military Operating Areas. The F-16s came within 3.5 nautical miles laterally and 300 feet vertically of American Airlines flight 1515, an MD-80. The proximity of the F-16s to flight 1515 did activate the on-board Traffic Advisory and Collision Avoidance TCAS with a Resolution Alert (R/A). The crew immediately responded with a gradual descent from their assigned altitude of FL280 to FL275. The crew visually identified the F-16s and returned to their original altitude of Fl280.

F-16 Close Encounter - Air National Guard Aircraft

- On February 7, 1997, a flight of four F-16s (identified as WILD 1 thru 4) from the District of Columbia Air National Guard, 113th Wing, based at Andrews Air Force Base, had been conducting exercises in the Special Use Airspace known as Warning Area W-108 (located off the Delaware Coast).

  Immediately prior to the completion of the mission, WILD 4 terminated the mission earlier because of low fuel and began the return to Andrews AFB in advance of the remaining three F-16s, in VFR conditions below 18,000 feet. The remainder of the flight received an IFR clearance for departure from W-108 for the return to Andrews AFB at Flight Level (FL) 200 (20,000 feet).

  About the time the F-16s were departing the Special Use Airspace, American Eagle Flight 4832 was passing in close proximity at FL 190. The FAA ARTCC controller provided traffic information to the flightcrew regarding the flight of F-16s. The flightcrew identified the F-16s as one target on radar at approximately 20 miles and visually identified them at approximately 7 to 10 miles.

  At the time of closest passage, WILD 1 and 2 were in close formation at FL 200, approximately 1,000 feet above flight 4832. WILD 3 was in-trail approximately 1, also at FL 200. WILD 4 was ahead of the other F-16s, however, because WILD 4 was VFR, the aircraft passed beneath flight 4832 approximately at 17,500 feet or 1,500 feet below flight 4832. There was no TCAS alert activation aboard flight 4832.

  The altitude separation of 1,000 feet between WILD 1, 2 and 3 and flight 4832 was in accordance with IFR separation criteria. The estimated clearance separation of 1,500 feet between flight 4832 and WILD 4 was within VFR airspace and subject to pilot see-and-avoid criteria.

The crew of Flight 4832 initially observed the two F-16s at FL 200 and questioned the ARTCC controller about the remaining two F-16s. A short time later the crew of Flight 4832 observed WILD 45 pass below their aircraft, however, they did not see WILD 3 who was trailing the remainder of the flight at Fl 200.

The crew of Flight 4832 was concerned that they only observed two of the four F-16s, thus prompting a query of the controller regarding the whereabouts of the other two F-16s. It was determined that WILD 1 did not provide sufficient information to the ARTCC controller of the unusual characteristics of the flight (i.e. one aircraft operating VFR at 17,500 and the staggering of the remaining three).

- On February 7, 1997, the pilots of two F-16s from Kelly Air Force Base returning to base from a Gulf Coast Special Use Airspace believed they had clearance to be at FL 340, based on a clearance provided by the controller handling the aircraft as they departed the training area. The flight was handed off to a second controller in the Houston ARTCC who questioned the altitude and instructed the pilots to descend to FL 310. During the descent (passing through FL 330) the two F-16s came within 4.6 nautical miles of a Northwest Airlines A-320.

  The crew of Northwest flight 1822 stated that they were provided a traffic alert by the Houston ARTCFC controller about the F-16s. The captain stated that he identified the two F-16s on the TCAS and noted that the target indicated 1,100 feet below and behind their aircraft. The TCAS did not activate.

  The investigation revealed that the pilots of the F-16s were initially given an amended clearance to cruise at Fl 310; however, they missed the clearance and complied after contact with the second controller.

- On February 5, 1997, SMASH 11, a flight of two F-16s entered Special Use Airspace known as Warning Area W-107 for an intercept training mission. The training mission was to be performed under fighter control from the military's air traffic coordinator known as GIANTKILLER. The two F-16s were cleared into the W-107 airspace for unlimited maneuvering and terminated air traffic control.

  During maneuvers, the flight leader detected "unknown" traffic in the W-107 airspace approximately 22 nautical miles from their position and at an altitude of 23,000 feet. The flight leader made the decision to intercept and identify the "unknown" traffic and directed the student in the second F-16 to hold her position and remain clear of the traffic. The flight leader maneuvered his aircraft into close proximity of the Boeing 727 using his on-board radar and visual sighting. The intercept was conducted in a controlled and methodical manner, and typical of a standard military-style intercept.

  During the intercept, GIANTKILLER advised the flight leader that the "unknown" traffic was in fact a Boeing 727. The flight leader continued the intercept to a range of approximately 1,000 feet horizontal (in-trail) and 400 feet below the

altitude of the Boeing 727. It was during this phase of the intercept that the flightcrew of the Nations Air Express flight received a TCAS warning and initiated evasive action based on the Resolution Alert information. The captain stated that they were already descending at a rate of 2,500 feet per minute (fpm) when the R/A commanded a 4,000 fpm descent. He increased the descent rate to approximately 4,000 fpm down until commanded by the R/A to climb at 4,000 fpm. The F-16 followed in-trail during the evasive action taken by the Nations Air Express flightcrew.

GIANTKILLER directed SMASH 11 to move their training operation 20 miles to the Southeast because of the Boeing 727 traffic. The directive was acknowledged and SMASH 11 terminated the intercept and departed the area.

The investigation found that the communications between the FAA Air Route Traffic Control Center and GIANTKILLER was timely and in accordance with SOP. However, the communication from GIANTKILLER to SMASH 11 were found to be inadequate regarding information pertaining to the Boeing 727. Although the intercept was conducted in a safe and vigilant manner, and the on-board radar identification precluded a midair collision, the visual intercept was not necessary.

BEFORE THE
AVIATION SUBCOMMITTEE
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
UNITED STATES HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.

SUMMARY OF TESTIMONY

Stephen A. Alterman, President
Air Freight Association

The Air Freight Association submits that collision avoidance equipment **should** be installed on all-cargo aircraft. However, the existing TCAS II system does not contain state-of-the-art technology and collision avoidance can be taken "to the next level" through the introduction of GPS and ADS-B-based equipment. The all-cargo industry has already embarked on this project and the first phase of its system can begin to be installed in the first quarter of 1998.

Given the limitations of TCAS, the all-cargo industry has developed a program which includes:

• The installation of a Traffic Information System (TIS) and ADS-B beginning in the first quarter of 1998. This step will, for the first time, enable cargo aircraft to "see" each other, as well as other transponder-equipped aircraft. As a practical matter, this deployment will be the functional equivalent of TCAS I for cargo aircraft.

• The second phase of the project will be the installation of conflict detection and resolution software in the first quarter of 1999. This phase will eliminate dependence on ground-based radar and will enable pilots to communicate directly with each other to avoid potentially dangerous situations. The FAA will be introducing a similar program (HaLaska 99) in Alaska and Hawaii in the same time frame **and using the exact same technology.** This technology will allow cargo aircraft to surpass TCAS II in terms of overall system safety.

•The third phase of the project will be the introduction of Resolution Advisories by the first quarter of 2001. This system, when implemented, will far surpass any other system now on the drawing boards.

It is significant to note that the all-cargo alternative is a proactive, rather than reactive, system, which puts more and better data in the hands of the pilot-in-command. Moreover, the all-cargo system (unlike TCAS) will be operational below 1000 feet and on the ground and will be cost-effective for the small aircraft not now covered by TCAS. While the existing system has proven safe (cargo aircraft are currently seen by passenger aircraft equipped with TCAS), the new system being developed will provide a better margin of safety as the amount of traffic increases in the years to come.