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AVIATION SAFETY

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HEARINGS

BEFORE THE

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE HOUSE OF REPRESENTATIVES

AND THE

SUBCOMMITTEE ON TRANSPORTATION AND AERONAUTICS

NINETIETH CONGRESS

FIRST AND SECOND SESSIONS

ON

AVIATION SAFETY

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[1] Appointed Aug. 1, 1967.

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AVIATION SAFETY

MONDAY, JULY 24, 1967

HOUSE OF REPRESENTATIVES,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The committee met at 10 a.m., pursuant to notice, in room 2123, Rayburn House Office Building, Hon. Harley O. Staggers (chairman) presiding.

The CHAIRMAN. The committee will come to order.

This morning we are going to receive testimony on the subject of aviation safety. This certainly is one of the most important matters within the jurisdiction of the Committee on Interstate and Foreign Commerce. I don't believe that a day goes by without some contact being made with me concerning one facet or another of aviation safety.

Before we hear from our first witness, I would like to clarify a few items which have been somewhat distorted and confused in reports on aviation safety and on the unfortunate and most regrettable midair collision on July 19 near Asheville, N.C.

We are not here to investigate nor to attempt to determine the probable cause of that accident. Our interest is legislative in purpose. We want to determine if existing laws are being executed in full accordance with their intent. Beyond that—and I am sure that the witnesses who appear before us today are well aware of this—we are ready to consider any recommendations for legislation which can further enhance aviation safety.

I want to make it clear to all concerned that the committee is neither equipped nor qualified to search out and identify the detailed facts and causes of specific accidents. I am sure that all of us are interested in obtaining as much information as we can on the accident which occurred in North Carolina last week, but we must be sure not to put the witnesses in a position of speculating or theorizing about this accident.

The investigation of this crash is still in its early stages, and here I would like to say something about the investigative processes which are followed in every case where a fatality occurs.

The Bureau of Aviation Safety under the National Transportation Safety Board is staffed by experts who respond to a notification of an accident by immediately proceeding to the scene. Under an investigator in charge they are organized into a number of groups, each of which has a specific task.

The groups are named in an an explanatory manner such as air worthiness, structures, powerplants, operations, witnesses, weather, human factors, and air traffic control.

I am sure that the witnesses will give us further details on how these groups perform their functions.

Earlier this month in response to my request, Chairman O'Connell of the National Transportation Safety Board, summarized his Board's progress as to three accidents which occurred this spring, and set forth the routine which is followed in every case where there is a necessity to determine probable cause. You will find this letter in the July 11 Congressional Record (p. H8463). I believe the clerk of our committee has some copies of this available for distribution.

(The letter referred to follows:)

DEPARTMENT OF TRANSPORTATION,
NATIONAL TRANSPORTATION SAFETY BOARD,
OFFICE OF THE CHAIRMAN,
Washington, D.C., July 7, 1967.

HON. HARLEY O. STAGGERS,
Chairman, Committee on Interstate and Foreign Commerce,
House of Representatives, Washington, D.C.

DEAR MR. CONGRESSMAN: In accordance with your request, the Board is more than happy to bring you up to date on the status of three commercial airline accidents which occurred in the past few months and in which your Committee has expressed a particular interest.

In addition, this letter will serve to review again with you, for your benefit and for the benefit of your Committee, the procedures the Board follows in connection with the investigation and reporting of results in aviation accidents of this type.

1. *Air collision at Urbana, Ohio, involving TWA DC–9 and a Beechcraft Baron B–55, privately owned, March 9, 1967.*—Since our last progress report to you in connection with this case, the detailed field investigation has been completed; an extensive public hearing was held in Dayton, Ohio, on June 6–8, 1967; and we are presently receiving comments and suggestions from interested parties who have, under our rules, thirty days from the date of the hearings in which to submit them.

2. *Delta Airlines training flight crash at New Orleans, Louisiana, March 30, 1967.*—The field investigation has been completed and a public hearing has been scheduled to begin in New Orleans on July 19, 1967. The hearing will be presided over by Member Oscar Laurel of this Board, and at that time all of the known or ascertainable facts will become a matter of public record. It is expected that the hearing will not last more than two days.

3. *Lake Central Airlines, accident near Marseilles, Ohio, March 5, 1967.*—The field investigation in this case has been completed and a public hearing is scheduled to be held in Indianapolis, Indiana, commencing on August 2, 1967. In this case, too, the hearing is expected to reveal all of the known and ascertainable facts and to point the way toward corrective action if such has not already in fact been instituted.

I am sure you are quite familiar with the investigative process of the Board in aircraft accidents of the sort we have been discussing, but it might be well to restate it for the record.

The investigation of civil aircraft accidents is now the responsibility of the National Transportation Safety Board. This responsibility, with a staff of experienced air safety investigators, was recently transferred to us from the Civil Aeronautics Board under the provisions of the Department of Transportation Act, but the function had been exercised by the CAB from 1940 until the recent transfer to us.

The practice has always been to organize a team of experts in the various technical areas that might be involved in any such accident, under the leadership of trained investigators representing the National Transportation Safety Board. After as exhaustive a field investigation as the situation requires and permits, the Board schedules and holds a public hearing at or near the site of the accident. At this stage of the process, all interested parties, such as the airline concerned; the Federal Aviation Administration; air line employees associations; airframe manufacturers; engine manufacturers; and any other possible interested parties, are active participants in adding to and thus developing a complete record of all the known or ascertainable facts.

Our first witness this morning will be Chairman Joseph J. O'Connell, Jr., National Transportation Safety Board, Department of Transportation.

Before there are any questions, we will have all of our panel give their testimony and then question the entire panel.

STATEMENT OF JOSEPH J. O'CONNELL, JR., CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD, DEPARTMENT OF TRANSPORTATION

Mr. O'CONNELL. Mr. Chairman and members of the committee, we are delighted to appear before your committee this morning, and to provide you with whatever information we can that will be helpful to you in the consideration of problems called forcibly to your minds by recent aircraft accidents.

With your permission, Mr. Chairman, I would like first to indicate very generally how we have planned to make our original presentation this morning. If the way we propose to approach the problem does not meet with your approval, we will, of course, accommodate ourselves to your wishes.

It did appear to me, however, that an orderly initial presentation by us would facilitate your work. What I have in mind is to provide you initially with a fairly brief description of the process used by the National Transportation Safety Board in the investigation of aircraft accidents.

In this presentation I will indicate as well as I can the purposes which the process is intended to achieve and, generally, the extent to which we believe such purposes are being achieved. Following that, I will present you with a brief status report on the five commercial airline accidents which are actively under investigation by our board.

In this area, Mr. Chairman, you will recall that I gave you a progress report on three of them on the 7th of July, and what I have to say this morning will bring that report up to date and supplement it by a status report on the BAC–111 Mohawk Airlines accident and the most recent tragic accident near Asheville, N.C., last Wednesday.

Following that, Mr. B. R. Allen, Director of our Bureau of Aviation Safety, is prepared to give you a factual description of a Board field investigation of an aircraft accident as it actually unfolds. He intends to use the Asheville accident as an illustration and I am sure that you will be benefited by what he has to say in this regard.

Then, Mr. Allen will give you a very precise statement of what we now know about the Asheville accident. As you know, we are very actively engaged in investigating that accident as of this moment and I would have only one word of caution in connection with what Mr. Allen is prepared to say. That is, that while we will give you every bit of factual information known to us to be both uncontrovertible and relevant, we will not indulge in any type of speculation, or otherwise go beyond reporting the precise facts as we now understand them. I am sure that you gentlemen will understand the reason for this caveat.

The investigation of civil aircraft accidents is now the responsibility of the National Transportation Safety Board. This responsi-

Subsequent to such public hearing, the Board analyzes the record and other information known to it and issues a formal report as to the probable cause of the accident.

Of course, as you know, the entire chain of process is conducted entirely in the open, and as rapidly as facts are identified as uncontrovertible and relevant, beginning at the accident site, they are immediately made known to the interested parties to the investigation and are at the same time released to the news media and the public. In fact, a major part of the constructive results which flow from accident investigations are the immediate putting to use for corrective purposes of all the information developed during the preliminary stages of the investigation or in the public hearing.

The Board appreciates and understands the continuing interest you and your Committee have with respect to the performance of the accident investigative functions by our Board. Please feel free to call on us at any time for information or report either as to our process generally, or as to the handling of any particular case.

Sincerely,

JOSEPH J. O'CONNELL, JR.,
Chairman.

The CHAIRMAN. Now we will be pleased to hear from Chairman Joseph J. O'Connell, Jr., who I understand is accompanied by Bobbie R. Allen, Director of the Bureau of Aviation Safety. Also present is Administrator William F. McKee, and his Deputy in the Federal Aviation Administration, David D. Thomas.

Gentlemen, you may proceed.

First, however, I would like to say that this is not a witch hunt. We are not trying to pin the blame on anyone. We are interested in the procedures which are followed, and we want to determine if there is anything that the Congress can do to assure ourselves and the people of this country that everything is being done to promote aviation safety.

Mr. DEVINE. Mr. Chairman?

The CHAIRMAN. Mr. Devine.

Mr. DEVINE. I think it is excellent that you have made the statement that you have and pointed out to the public and the press, particularly, that this is not an investigation by the Congress of the North Carolina crash. This situation merely triggered the problems of air safety that are of concern to all of us.

I know that many of us receive a great deal of mail from the public concerning the public interest, and situations arising out of air safety. I know the general aviation community is upset thinking that they are being blamed every time there is a midair collision. Other people suggest that extra airports should be made available.

I think, however, that the situation that did develop in North Carolina, and which did indeed cause this hearing to be set, points up the need that we should have rather extensive public hearings perhaps by the Subcommittee on Transportation and Aeronautics of this committee.

The CHAIRMAN. I might say to the gentleman that this will be done if it is warranted. That is the reason we are having these public hearings this morning, to determine whether we are remiss in what we should be doing as the Congress and as representatives of the people, and what the experts' ideas and thoughts are as to what can be done to further promote air safety.

I am sure they will do their very best to do just that.

bility, with a staff of experienced air safety investigators, was recently transferred to us from the Civil Aeronautics Board under the provisions of the Department of Transportation Act, but the function had been exercised by the CAB from 1940 until the recent transfer to us.

The practice has always been to organize a team of experts in the various technical areas that might be involved in any such major accident, under the leadership of trained investigators representing the National Transportation Safety Board. After as exhaustive a field investigation as the situation requires and permits, the Board schedules and holds a public hearing usually at or near the site of the accident.

At this stage of the process, all interested parties, such as the airline or airlines concerned; the Federal Aviation Administration; airline employees associations; airframe manufacturers; engine manufacturers; and any other possible interested parties, are active participants in adding to and thus developing a complete record of all the known or ascertainable facts.

Subsequent to such public hearing, the Board analyzes the record and other information known to it and issues a formal report as to the probable cause of the accident. Of course, as you know, this process is conducted entirely in the open, and as rapidly as facts are identified as uncontrovertible and relevant, beginning at the accident site, they are immediately made known to the interested parties to the investigation and are at the same time released to the news media and the public.

In fact, a major part of the constructive results which flow from accident investigations is the immediate putting to use for corrective purposes of all the information developed during the preliminary stages of the investigation or in the public hearing.

In connection with the point I have been making about the desirability of having an even and consistent flow of factual information available to all interested parties as rapidly as such facts have been clearly ascertained, the Board has recently adopted a change in its procedures to supplement this aspect of our operation.

We now plan to issue a summary statement of the facts as they have been developed in the hearing in each accident investigation in which a formal hearing is held, within 10 days after the hearing has been concluded. We initiated this revised procedure in the Lexington, Ky., air-taxi accident, and we intend to follow it in all subsequent cases.

Just a word as to our purpose in this regard. Although, as has been pointed out and as Mr. Allen will elaborate, our field investigations are held entirely in the open and with a large number of interested people privy to and contributing to the investigation, and even though, as I have said, some attempt has been made to release to the news media and the public—even from the scene of the accident—revelant facts as they become clear, the first time the general public has an opportunity to get a reasonably coherent picture of the accident is through the vehicle of the public hearing, which is normally held a month or two after the accident itself.

We have come to believe that while the public hearing affords those in the public interested enough to follow it an opportunity to learn the detail of the facts developed, such familiarity is for the most part

confined to parties having a sufficient interest in the specific accident to participate in the hearing or, in any event, to follow it closely.

Having that in mind, and realizing that for good and sufficient reasons there is usually a substantial interval of time between the public hearing and the final Board formal determination of the probable cause of the accident, we have decided that the issuance of a summary statement of the facts developed at such a hearing would be of benefit to the public and to the situation generally and, therefore, we propose to do that from here on.

As to the status of the National Transportation Safety Board's current investigations of major air accidents, I would at this point like to give you a report as to each of such investigations:

1. Air collision at Urbana, Ohio, involoving TWA DC–9 and a Beechcraft Baron B–55, privately owned, March 9, 1967. The detailed field investigation has been completed; an extensive public hearing was held in Dayton, Ohio, on June 6–8, 1967; and we are now receiving comments and suggestions from interested parties.

Our staff will then analyze all of the data which have been accumulated and, under the supervision of Board member McAdams, who presided over the hearing, will begin to prepare a draft of a report on the probable cause of the accident.

2. Delta Airlines training flight crash at New Orleans, La., March 30, 1967. The field investigation has been completed and a public hearing was held in New Orleans on July 19 and 20, 1967. The hearing was presided over by member Laurel of this Board, and all of the known or ascertainable facts were made part of the public record at that time. Within 10 days we will issue a summary of the facts as developed in the hearing and will then proceed to the preparation of a formal report of the Board determining probable cause.

3. Lake Central Airlines accident near Marseilles, Ohio, March 5, 1967. The field investigation in this case has been completed and a public hearing is scheduled to be held in Indianapolis, Ind., commencing on August 2, 1967, at which hearing Admiral Thayer of this Board will preside.

4. Mohawk Airlines, BAC–111, near Blossburg, Pa., June 23, 1967. The field investigation in this case is still underway and as soon as it has been completed we will schedule a public hearing. The process from here on in this case will be the same as in others which I have already described.

5. Air collision near Asheville, N.C., involving a Piedmont Airlines Boeing 727 and a privately owned Cessna 310, July 19, 1967. The field investigation in this case is actively underway and no additional comment is necessary from me in connection with it since, as was earlier stated, Mr. Allen will address himself to the investigative process and to the facts as we now understand them in this case.

With your permission, Mr. Chairman, I would now turn our presentation over to Mr. Allen.

STATEMENT OF BOBBIE R. ALLEN, DIRECTOR, BUREAU OF SAFETY, NATIONAL TRANSPORTATION SAFETY BOARD, DEPARTMENT OF TRANSPORTATION

Mr. ALLEN. Mr. Chairman, it is vital to the effective operation of a centralized team concept of accident investigation that a "go team" be on standby alert at all times. This team must be prepared to depart for the scene of a major air carrier accident on short notice. The National Transportation Safety Board has four such teams.

However, personnel shortages in various specialist fields make it impossible for the Bureau to staff more than two complete teams at the present time. In these critical shortage areas, the specialists involved are required to serve double and triple duty from team to team.

One of these four teams was on the alert and was launched when notification of the Hendersonville accident was received on July 19. Notification of the Piedmont accident was first received about 12:30 p.m. on July 19 from a Government agency press officer who in turn had obtained it from news sources.

Immediate calls by our office to the FAA Communications Center and the airline concerned quickly established the approximate scope of the tragedy and it was abundantly clear that a major team investigation was required. Action was taken to notify the investigation team members.

Following the notification a Government aircraft with a major portion of the team aboard departed Washington National Airport for the accident site. The team was accompanied by National Transportation Safety Board member Gov. John H. Reed, and Mr. Marion F. Roscoe, Deputy Director of the Bureau of Aviation Safety. Mr. Thomas R. Saunders was the investigator in charge of the team.

During the same period that our team members were being notified of the accident, action was also taken to alert representatives of interested organizations such as the FAA, airline, airframe, powerplant and equipment manufacturers, pilots, flight engineers, dispatchers, and air traffic controllers associations.

In view of the fact that the Hendersonville accident involved a mid-air collision between an air carrier aircraft and a private aircraft we also notified the Air Transport Association, the National Business Aircraft Association, and the Aircraft Owners and Pilots Association.

In every case we invited their participation and they responded magnificently by assigning qualified aeronautical experts to assist in the investigation.

During the first few hours following an accident, the many people who are to participate in the investigation are converging on the site from widely dispersed areas of the country. For example, Boeing Aircraft Co., personnel came from Seattle, Wash.; Cessna Aircraft Co., personnel came from Wichita, Kans.

The working procedures of the Bureau are so well established, and known through the industry, however, that it is not uncommon for the investigation to be organized and in full operation within a few hours after the accident occurs. In this case, the first organizational meeting at the accident site took place during the early evening hours following the noontime accident.

When our team arrived in Hendersonville they found that the local and State authorities had done an excellent job of establishing security over the wreckage considering the difficulties which confronted them. They had procedures in hand for the identification and removal of the victims. The Federal Bureau of Investigation had responded promptly as usual in the dispatching of an identification team to assist in the investigation.

I would add at this time that in the Hendersonville, N.C., accident 81 positive identifications have been made. The 82d and final identification, of necessity at this time, was accomplished through the process of elimination.

The organizational meeting, which I referred to a moment ago, is the first order of business upon arrival at the accident site. The investigator in charge at this time explains the Board's functions under the law and defines the rules of the road insofar as the conduct of the investigation is concerned.

Once these indoctrination steps were completed, Mr. Saunders proceeded with the formation and assignment of personnel to the various working groups essential to the conduct of the Hendersonville investigation. The groups assigned at the Hendersonville investigation were as follows: structures, system, powerplants, flight recorder, maintenance records, operations, air traffic control, weather, witnesses, human factors.

It should be emphasized that the field investigation phase of an accident investigation is for the purpose of documenting observed facts. It is not the task of these specialized groups to analyze the facts and arrive at a determination of probable cause. I shall endeavor at this time to summarize briefly the functions assigned to the various groups and describe how these activities are progressing in the Hendersonville collision case.

At the outset, I should like to state that both the flight data recorder and the cockpit voice recorder carried on Piedmont flight 22 were removed in good condition and these instruments were flown back to our Washington headquarters for a readout by our specialists early on the morning following the accident.

A brief résumé of the findings are as follows: The flight recorder showed that all parameters, altitude, air speed, heading, vertical acceleration, were functioning in a normal manner. The readout showed that the collision occurred at approximately 2 minutes 37 seconds after liftoff of the Boeing 727 at a mean-sea-level altitude of approximately 6,132 feet, at an indicated air speed of 228 knots, and indicated magnetic heading of 100°.

The flight recorder further revealed that the aircraft had been in a stabilized——

Mr. FRIEDEL. Mr. Allen, I have your prepared statement but I can't follow it. Are you jumping from one page to another or is your testimony different than the prepared statement?

Mr. ALLEN. Mr. Friedel, I apologize. The information I have here was not available at the time I prepared my written statement.

Mr. FRIEDEL. Would you notify us when you depart from your prepared statement?

Mr. ALLEN. Yes, sir; I certainly will.

The flight record further reveals that the Boeing 727 was established in a stabilized climbing turn altitude for approximately 20 seconds prior to collision impact.

The operations group is responsible for developing all facts concerning the history of the flight and flightcrew activity in the final phases of the flight, before and as the accident occurred. This includes flight planning, dispatching, weight and balance, radio communications, navigation facilities, en route stops, refueling, and aeronautical experience, flight checks, and general information concerning the flightcrew.

The medical history of the crew, including any recent illnesses, psychological factors, crew rest periods, and activities during the 24 hours prior to the accident is determined. This latter aspect of the investigation is coordinated with the human factors group to insure that all information assembled is utilized to full advantage.

The operations group also develops information on the flightpath just prior to the accident. In this effort, coordination with the air traffic control and witness groups is essential. An approximate flightpath of the two aircraft involved is being prepared in the Hendersonville investigation. Work is proceeding in the documentation of cockpit instrumentation, crew history, flight planning, dispatching, and operational procedures employed.

The weather group is responsible for the collection and compilation of all factual meteorological data pertinent to the accident, including both surface and upper air reports of actual conditions, pilot reports, recorded meteorological data, as well as forecasts of anticipated conditions prepared and issued by the responsible agencies. Of necessity, close coordination must be maintained with other groups, particularly the operations, air traffic control, and witness groups.

In the instant case, we are particularly interested in ascertaining the sky conditions, cloud coverage, and visibility in the area before and subsequent to the time of the accident. This phase of the investigation is virtually completed.

The air traffic control group is responsible for the review of the original records of the air traffic service units whose activities or services may have been involved in the accident.

Examine where available all radar screen recordings; monitor all original voice recording, and verify that written transcripts of voice communications are consistent with the rerecordings. Provide a reconstruction of the history of the flight based on ATC information. Determine the operating status of pertinent navigation aids, communications equipment, radar, transponder equipment, and so forth, and provides technical data on all such equipment and its operation, ascertain if the equipment is capable of operating to prescribed standards in the geographical area where it is installed. The chairman of this group is responsible for the cockpit voice recorder readout and coordinates this activity with the operations group chairman.

In a midair collision, it is axiomatic that a substantial portion of the investigative activity will be concentrated in the air traffic control area. This has been the case in this accident investigation just as it was in the earlier midair collision near Urbana, Ohio, and in all preceding midair collisions.

We have interviewed at length the controllers involved in the case; have listened to all relevant tapes of control instructions; have inspected facilities and reviewed procedures employed.

In conjunction with the operations, witness, and flight recorder groups, an approximation of the flightpaths involved is being prepared and control instructions are being related to specific points along these flightpaths.

The witness group is responsible for contacting and interrogating all persons who may have seen or heard some portion of the flight or who may have knowledge concerning the flight or of the weather conditions at the time of the accident. They obtain signed statements from witnesses. The extent of the group's activity can range from questioning a relatively few witnesses to a door-to-door activity covering great distances along the flightpath in which hundreds of possible witnesses are interviewed. Information concerning observed positions, altitudes, sounds, aircraft behavior, and airborne disintegration is developed in this manner. The location of witnesses at the time of the accident is plotted on a suitable map of the area.

Close coordination is maintained with the operations group in developing the probable flightpath from the witnesses' statements and with the human factors group in the interrogation of witnesses. During the interview of the witnesses to last week's midair collision, particular attention is being devoted to the development of as much information as possible relative to cloud and visibility conditions surrounding the accident site and to the description of the attitudes and maneuvering of the two aircraft involved.

The human factors group is responsible for the aeromedical and crash-injury aspects of the investigation. It is concerned with the possibility of crew incapacitation, the general physical and psychological conditions of the crew members, and the environmental factors which might have affected the crew.

It is also concerned with the possibility of psychological factors among passengers that might have been contributory to the accident. It covers matters involving autopsies of crew and passengers as appropriate. Although not involved in this specific accident, this group also investigates the survival aspects and design factors which may have contributed to the injury or death of aircraft occupants; the circumstances of evacuation; search and rescue; and the performance of ground firefighting services. This includes an examination of the respective equipment and the manner in which it was used. All of these activities must be closely coordinated with the operations, witness, and structures groups.

Since the most recent midair collision was not a survivable accident, the work of this group is focusing upon the crew member aeromedical aspects and identification problems.

The structures group is responsible for investigating the airframe and flight controls. If the wreckage is scattered, the group's first concern is to locate and identify as many sections, components, and parts as possible and plot their exact positions on a wreckage distribution chart. They give priority to location and recovery of recorders (flight and cockpit voice) installed on the aircraft.

A reconstruction of the structure may be desirable and this could vary from laying out various pieces of wreckage on a flat area to

the more complicated reassembly of all available pieces in position on a framework.

This procedure is most often used in collision, structural failure, in-flight fire or explosion-type accidents. Its purpose is to identify the point of original failure and to establish progression of the breakup pattern. A three-dimensional mockup is being carried out in the Hendersonville case to assist in determining the respective positions of the two aircraft at impact.

The powerplants group is responsible for investigation of the engines, including fuel and oil systems, propellers, engine, and powerplant controls. The initial work of this group is carried out in conjunction with that of the structures group in the locating and plotting of wreckage.

This group is responsible for determining the existence of any pre-accident malfunction or distress of the powerplants or their component systems. These functions must be coordinated with the structures group.

There is no evidence to date in this investigation that powerplant problems were being encountered. It is anticipated that the work of this group will proceed quite rapidly.

The systems group is responsible for detailed examination of all systems and components such as hydraulics, electrical and electronics, radio communication and navigation equipment, fire extinguishing units, oxygen, and so forth.

The examination includes determination of the condition and or operational capabilities of the components. The examination includes determination of the positions of associated controls and switches. The latter examination will be coordinated with the operations group.

Special attention is being devoted in the instant case to the determination of the position of controls and switches which would have an effect upon the maneuvering of the aircraft.

I would add at this time that the findings of the systems group in the Hendersonville case confirms and verifies the aircraft heading that we find on the flight recorder readout. I have already briefly explained and given a résumé of a flight recorder readout so I will not give you the prepared text for that particular group.

The maintenance records group is responsible for reviewing all maintenance records to ascertain the maintenance history of the aircraft in respect to adequacy of inspection, malfunctions that might be related to the occurrence, time on the aircraft engines and components, and time since overhaul. There is nothing to sugges at the present time that a maintenance problem was involved in the accident.

On July 20 it was decided to conduct a special cockpit visibilities study. This study will evaluate the cockpit configurations of the type aircraft involved in this midair collision and determine what obstructions to vision exist with respect to aircraft structure. Of necessity this study cannot be completed until the flight path reconstruction has been completed.

It is anticipated that the activity of certain of the groups at the site of the accident will not be concluded for another week to 10 days.

Following the field phase of the investigation, the group chairmen will return to the Washington office (or to the field office) and each will prepare a factual report of the findings of his group. The group

chairman's report is submitted to their respective group members for coordination and comment.

The factual reports, together with photographs, charts, drawings, witness statements, laboratory reports and other documentary products of the investigation are introduced into the public docket and are universally available upon request.

Mr. Chairman, I have some additional information that was not available at the time of my prepared statement being prepared. At this time I would give you some information concerning the flight involved in the accident, the two aircraft involved in the accident.

The accident involved applied air collision between a Boening 727, N68650, Piedmont flight 22, and a Cessna 310, N1213 Sierra, owned and operated by Lanseair, Inc., Springfield, Mo.

The accident occurred near Hendersonville, N.C., at approximately 12:01, eastern daylight time, on July 19, 1967. There were a total of 79 passengers abroad the Boeing; 74 passengers, three flight deck crew members and two stewardesses aboard the 727. The Sessna 310 had two pilots aboard and a passenger. Total fatalities in the accident were 82.

The crew history of the Boeing 727 crew: Captain, Raymond Frank Schulte, age 49. He held an ATR rating with a type rating in Boeing 727. The date of his last physical examination was July 1967. His total flight time was 17,116 hours. Total flight time in Boeing 727 equipment was 151 hours.

The first officer was Thomas Calvin Conrad, age 30. He held a commercial pilot certificate. His last physical was in March 1967. His total flight time was 1,839 hours, with 134 hours in the Boeing 727 equipment.

The flight engineer was Lawrence Carey Wilson, age 37. He held an ATR rating, a flight instructor, and flight engineer certificates. His total flight time was 7,754 hours, with 280 hours in Boeing 727 equipment.

The pilot of the Cessna 310, Mr. John David Addision, age 48. He held commercial pilot license with both instrument and flight instructor ratings. He held a current second-class medical certificate with the limitation that pilot shall raise corrective lenses and have a second pair abroad the aircraft. His total flight time as he reported it in August 1966 was 10,000 hours, with 100 hours in the previous 6 months.

The second pilot on the Cessna 310 was Robert Eugene Anderson. He held a private pilot's certificate, aircraft single engine, land. He held a current second-class medical with no limitations. His total flight time was reported at 473 hours.

The passenger abroad the Cessna 310 had no record of pilot's license ever being issued to him.

Mr. Chairman, I also have with me here today the transcripts of the air traffic control transmission. At this time I will read the transcript from the Atlanta Center and give you a verbatim transcript of the communications that were conducted on that flight.

The Atlanta Center was handling the Cessna 310. At the time of this tape, the benchmark is at these times that I will give you, in Greenwich mean time.

At 1537 hours and 25 seconds Atlanta Center made the transmission of "West."

The Charlotte radio approach control responded, "Cessna three one three correction three one two one Sierra 11 miles west primary target out of four thousand five hundred climbing to six."

Atlanta Center responded, "Radar contact."

Charlotte approach control position responded with "GD" at 1537:30.

The next transmission was from the Cessna 310, November 3121 Sierra. The transmission read as follows: "Atlanta Center three one two one Sierra at 6,000 now."

The center responded "Twin Cessna three one two one Sierra Atlanta Center Roger radar contact climb and maintain 8,000. Report reaching."

Cessna responded, "Roger" at 1538:40.

The next transmission was from 3121 Sierra, as follows:

"Atlanta Center three one two one Sierra is at 8,000 now."

That transmission occurred at 1541 and 30 seconds.

The center responded "Cessna three one two one Sierra level eight, is that right?"

Response by Cessna—I beg your pardon. There was no response to that transmission and the center came back a few seconds later and said, "Cessna two one Sierra, are you level eight now?"

Cessna 3121 Sierra responded, "Affirmative level at 8,000."

The center rogered for that at 1541 and 50 seconds.

Shortly thereafter, Atlanta Center instructed November 3121 Sierra "Contact Atlanta Center one two five point five."

310 responded "Roger one two five point five."

That occurred at 1547 and 20 seconds.

We now switch to the recorder No. 2, Channel 15 position, R9. This the Spartanburg radio position.

The first transmission is from November 3121 Sierra. "Atlanta Center three one two one Sierra at 8,000 feet."

This time is 1547 hours 55 seconds.

Atlanta Center responded, "Other aircraft calling center say again, please."

"Three one two one Sierra is at 8,000."

Center, "November one three two one Sierra Roger Asheville altimeter is three zero two one correction on that the altimeter is three zero two seven at Asheville."

The center followed this with another transmission, 1 minute and 45 seconds later, at 1515 and 45 seconds.

"November one three two one Sierra traffic 12 o'clock four miles westbound slow."

3121 Sierra responded "Negative contact."

Atlanta Center came back and said, "Cessna one correction three one two one Sierra is that your correct identification three one two one Sierra."

No response.

The center came back "Cessna three one two one Sierra Atlanta."

The Cessna 310 responded "Three one two one Sierra."

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The center came back with "Cessna two one Sierra is cleared to the Asheville VOR descend and maintain 7,000 expect ILS approach at Asheville."

November 3121 Sierra reported "Leaving eight at this time."

The time was 1551 hours, 45 seconds.

Atlanta Center responded with "Cessna two one Sierra your transmissions are hard to read say you are leaving 8,000 now."

Cessna 31 responded "I left 8,000 for seven."

The time was 1552 and 20 seconds.

Atlanta Center "Roger."

Atlanta Center subsequently came in with the transmission of "The traffic for two one Sierra is now at your 12 o'clock position about 3 miles north westbound."

3121 Sierra responded, "Negative contact. We're in the clouds."

The time was 1552 and 30 seconds.

Subsequently, November 3121 Sierra transmitted "Atlanta Center two one Sierra is this transmitter any better."

Atlanta Center responded "Two one Sierra its a little bit better radar service terminated now contact Asheville approach one two five point three."

The time was 1553 hours.

The first part of the next transmission was unintelligible but it says "Point three." This occurred at 1553 hours and two seconds.

The next transcription that we have is on Recorder 2, Channel 13, Position A9, which is the Spartanburg interphone position.

Atlanta Center transmits, "Atlanta."

Asheville tower responds, "Asheville request clearance Piedmont twenty-two."

The time is 1553 hours and 5 seconds.

Atlanta Center responded "All right call you back H.O."

Asheville tower responded "OK and do you know where the Cessna two one sugar is right now disregard he's coming."

Atlanta Center responded "You got him."

The Asheville tower responded "Yeah."

The Asheville tower responded "OK."

The time is 1553 and 15 seconds.

We now switch to the transcript of Recorder 2, Channel 16, Position D9, which is the Spartanburg interphone position. The time is 1538 and 15 seconds.

Asheville Approach Control, "Go ahead with your inbound."

Altanta Center said, "OK first one is November three one two one Sierra Cessna three ten Asheville VOR estimates one five five four descending to 7,000 Charlotte direct Asheville cleared to Asheville VOR be your control crossing the Spartanburg three five seven radial next one Piedmont ten twenty-two Martin four zero four slant Alpha Broad River estimate one six zero three descending to seven thousand Atlanta direct Asheville cleared to Broad River your control, crossing Victor fifty four and I've got one more."

Asheville tower approach control responded, "Go ahead."

Atlanta Center then transmitted "Air Evac two five seven niner niner C one thirty one slant Bravo Asheville VOR estimate one six one seven be descending to seven thousand from over Holston Mountain Victor thirty-five Asheville cleared to Asheville VOR your control Mitchell JD."

Asheville Approach Control then gave the initials "JD" and the time was 1539:30.

Atlanta Center responded "Asheville tower clearance" at 1553:55 and the Asheville tower responded with "Asheville."

The center gave the following: "Clear Piedmont twenty-two slant Alpha to Roanoke Airport via direct Valdese J fifty three flight plan route maintain two one zero JZ."

The tower responded "JC" at 1554:05 and the Atlanta Center responded "Atlanta."

The Asheville tower came in "Asheville Piedmont ten twenty-two is out of seven and put two one sugar three one two one sugar out of seven and Piedmont twenty-two be off at five nine."

The time is 1558 and 30 seconds.

The Atlanta Center responded with the initials "JZ."

And Asheville tower responded with the initials "JC."

This is 1558:35.

The tower responded "Asheville" and the Atlanta Center said "Piedmont twenty-two can you switch him to me yet?"

The Asheville tower said "Afraid I can't right now he is unreported and this three ten that was inbound was cleared over to Asheville beacon and he's also unreported and we have a public report of a crash down around Hendersonville."

Mr. Chairman, since this time, since the accident has occurred on this transcript, I will switch over to the transcript that came out of the Asheville tower.

I think it will give you a little more information as to the actions concerning the 727 flight.

This would be the flight data position, approach control in the Asheville tower. The time is at 1550 hours.

At 1550 hours and 25 second, "Asheville Approach Piedmont ten twenty-two."

Asheville approach control responded "Piedmont ten twenty two Asheville approach."

Piedmont 1022, "We are at thirty-five west at 7,000."

The response from the approach control was "You are thirty-five DME from Asheville you mean?"

Piedmont 1022 responded, "Yeah, we're southwest. We're level at seven."

Approach control, "Ten twenty-two Roger. Maintain seven. Wind light and variable, altimeter is three oh two six."

At 1551:03 Piedmont 1022 transmitted "Thirty twenty-six Roger."

1551:25, approach control transmitted: "Eight three Zulu Asheville approach."

Then there is a ring on the interphone line that comes in at this time.

This is the Atlanta Center calling the Approach Control.

The transmission "Atlanta", 1553:08.

Approach control responded "Asheville, request clearance Piedmont twenty-two."

The center responded "All right, I'll call you back. HO."

Approach control, "OK, and do you know where this Cessna two one sugar is right now——?"

Then at 1553:08, 3121 Sierra transmitted: "Asheville approach Cessna three one two one Sierra is out of seven—at seven."

Approach control then transmitted "Disregard he's coming—" and the center said "You have got him?"

That coincides with the transmission we had a few moments ago.

The approach control said "Yes."

ARTC said "OK."

At 1553:11 seconds, Approach Control made the following transmission: "Three one two one sugar, Roger. What radial are you passing now off of Spartanburg?"

At 1553 hours and 21 seconds, 3121 Sierra responded with "Stand by one——"

At 1553:42 seconds, the 301 responded "We're on three four zero."

Approach Control said "Three four zero?"

3121 Sierra replied "Affirmative."

Approach control responded "OK."

At 1553 and 55 seconds Approach Control transmitted "Asheville tower."

The ARTC came in with—this is the Atlanta ARTC—came in with "Clear Piedmont Flight twenty two slant Alpha to Roanoke Airport, via direct Valdese, J five three, flight plan route, maintain two one zero JD."

At 1554 and four seconds approach control responded "OK," with the initials "JC."

1554 and 29 seconds, Approach Control transmitted "Piedmont ten twenty-two descend to 6,000, cleared for an ILS approach, plan to circle runway one six."

Piedmont 1022 responded, "Ten twenty two."

Approach control then transmitted "Asheville."

Atlanta Center came back with "Reference AIREVAC two five seven niner niner again."

Approach control responded "OK" and the center transmitted "Revise the estimate—the radio beacon estimate to one six one one."

The initials "JD".

Approach control responded with the initials "JC" at 1555 and two seconds, "Piedmont ten twenty two reported leaving seven."

Piedmont 1022—I beg your pardon, Mr. Chairman. That last transmission that I read came from the Approach Control and was instructions to Piedmont 1022, leaving seven.

And Piedmont 1022 acknowledged with the following transmission: "Ten twenty two out of seven."

Approach control then transmitted "Roger, report Broad River inbound to the tower one two one point one."

At 1555 and 20 seconds, Piedmont 1022 responded, "One twenty one point one."

We next have a transmission here from the fire department to the tower and they are asking, "Have you got an inbound on AIREVAC?"

Approach control responded, "Yea, it should be here about 15 after."

The fire department responded "Does he want me to stand by for anything?"

Approach control responded "I imagine he will want the fire truck, Bill."

The fire department responded, "Uh, radio is in the office. I'll go on up to the firehouse."

Approach control responded, "OK we'll land him on one six."

The fire department responded "OK."

Approach control, "—and you can pick him up anywhere you want to."

At 1556 hours and 27 seconds Approach Control gave the following transmission of "Three one two one sugar, cleared over the VOR to Broad River. Correction, make that the Asheville radio beacon—over to the VOR to the Asheville radio beacon. Maintain seven thousand report passing the VOR."

At 1556 hours and 41 seconds, 3121 Sierra responded, "Two one Sierra."

We now hear a ring over the tape and this is the interphone line ringing. The transmission from the Atlanta Center, "Atlanta."

The approach control facility responds, "Asheville, Piedmont ten twenty two is out of seven and—uh—put two one sugar, put three one two one sugar out of seven and Piedmont 22 will be off at 59."

Approach control then gave the initials "JC."

At 1558 and 20 seconds 3121 Sierra transmitted "Two one Sierra just passed over the VOR. We're headed for that—uh—for—uh—Asheville now."

Approach control said, "Two one sugar by the VOR, descend and maintain six thousand."

At 1558 and 41 seconds, 3121 Sierra transmitted "We're leaving seven."

At 1600 approach control transmitted "Asheville."

There is an unidentified transmission at this point and we have not been able to determine who made this transmission.

"What's—uh—have they got some kind of convention up there today?"

Approach control responded, "No, not that I know of."

That is in the unidentified transmission.

"That's the busiest I've seen that airport in a long time."

Approach control said, "It's—uh—one extra Piedmont flight. I think they've got some kind of camp, some camp children (garbled) reservations."

The approach control responded with the initials "JC."

At 1600 hours and two seconds, approach control transmitted "Cessna three one two one sugar, cleared for an ADF two approach to runway one six. Report the Asheville radio beacon inbound."

Approach control then came up with "Tower."

And then there is a transmission from the Piedmont station agent and it is garbled. "This seventy four thirty be starting back out—how close is he?"

Approach control responded, "Seventy four thirty?"

And Piedmont station agent responded, "Well, he's ten twenty."

Approach control responded "Ten twenty—is he going to be seventy four thirty outbound?"

The Piedmont agent responded, "Seventy—seventy four thirty ship number going back."

"OK, he's touching down now."

Mr. Chairman, at this point in time the accident has already occurred.

The next transmission is at 1604:27. All of these transmissions are subsequent to the accident.

Gentlemen, that concludes my presentation. I will try to respond to any questions you may have.

The CHAIRMAN. We will have the rest of the panel before questioning.

Mr. WATSON. Are you referring to the South Carolina Control Center when you say Spartanburg?

Mr. ALLEN. Yes, sir. This was Spartanburg VOR. This is a navigational facility that the Cessna was using.

Mr. WATSON. That is the South Carolina station?

Mr. ALLEN. Yes.

Mr. WATSON. Thank you.

Mr. KUYKENDALL. Mr. Chairman, I have a question on identification.

The CHAIRMAN. Very well.

Mr. KUYKENDALL. Would you identify which of the Piedmont aircraft was the one that was in the crash?

Mr. ALLEN. It is Piedmont Flight 22. Piedmont Flight 1022 was a Martin 404 inbound and landing.

The CHAIRMAN. General McKee.

STATEMENT OF GEN. WILLIAM F. McKEE, ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

General McKEE. Mr. Chairman and members of the committee, we appreciate the opportunity to come before you today to discuss with you further the subject of aircraft safety.

I would like to review with you briefly FAA's functions and what we do, particularly with respect to the operation of the airway and air traffic control system, and the investigation of aircraft accidents.

FAA's basic responsibility in the recently created Department of Transportation continues to be aviation safety. We operate the air traffic control system for both civil and military aircraft and provide a system of air navigation facilities designed to promote the safe and efficient movement of aircraft in air navigation.

We certificate airmen, aircraft, and air carriers in accordance with our safety performance standards, and promulgate rules and assign the use of navigable air space, rules of the road for civil and military pilots, and a broad spectrum of safety rules governing the operation of air carriers and general aviation aircraft.

The investigation of aircraft accidents for the purpose of determining the facts relating to each accident and its probable cause is a function of the National Transportation Safety Board. This is not to say that FAA does not have a vital concern with the investigation of accidents. The Safety Board provides for the appropriate participation of FAA in its investigation—this excludes participation in the determination of probable cause—and on our own initiative we carefully review the facts as they develop to determine what can be done to improve and strengthen our rules, procedures, or systems to prevent the recurrence of accidents and incidents.

If any facts come to light during the course of an accident investigation which clearly indicate a need for a change, such as a modification to an aircraft, pilot standards, or operating rules, FAA does not await the announcement of a probable cause determination but proceeds immediately to effect corrective action.

The aircraft accident record which has been compiled so far this year has been a matter of serious concern to us. We discussed this matter with you earlier this year. The tragic midair collision of two aircraft over North Carolina last Wednesday, taking the lives of 82 persons, has been a loss which has affected us all very, very deeply. We know you share our concern with these accidents.

Now, Mr. Chairman, much has been said in the past few years and particularly of late about the intermix of general aviation and air carrier aviation. The question is frequently asked, "Why don't you segregate the two, not only in the airspace but by airport?"

At this point, with your permission, Mr. Chairman, I would like to ask Mr. Thomas, my Deputy Administrator, who is generally considered by the aviation community as the leading expert in the country in air traffic control, to discuss this rather complex question. I think it will clear up a lot of questions in the minds of members of the committee.

Mr. Thomas?

STATEMENT OF DAVID D. THOMAS, DEPUTY ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

Mr. THOMAS. Mr. Chairman, first, just as a matter of clarification, I believe the "Spartanburg" referred to on the record was the Spartanburg sector of the Atlanta Air Route Traffic Control Center, which was handling en route traffic in that area and that the recording was of that sector.

If the committee would bear with me, I would like to be just a little bit elementary. I know all of you know this, but I think it is necessary for some understanding of our problem; that is, we exercise air traffic control by two methods:

One method is rules, rules of the road, such as those which apply when you drive on the highway. Those rules are used when the visibility is good. They are very effective when the airspeeds are moderate and when the density of the traffic is such that one can deviate from a flightpath to avoid another aircraft without, of course, getting into the flightpath of another, or slowing down traffic.

The other method that we use in traffic control is the issuance of instructions from the ground. We use those whenever the weather conditions do not permit the pilot to see and be seen under adverse visibility conditions, or when the airspeeds, such as at the high altitudes occupied by the jets, simply do not permit the use of this device. We also use it to insure an orderly flow of traffic in the high-density areas.

Under the latter conditions, when we exercise it from the ground, we do get flight plans from aircraft and know what they intend to do. We do give them instructions. We know their position either by radio contact where we do not have radar, or by following them on radar where that is available.

With that very brief and very primary description of our traffic control system, we might look at the problem of segregation of traffic:

First, there is a great deal of natural segregation of air traffic in the United States. One is a natural segregation by altitude. The jets and the turbine-powered airplanes operate most efficiently at the higher

altitudes, and the slower, piston airplanes operate more efficiently at the lower altitudes. We do have a great deal of natural segregation there.

Generally within the United States, over 80 percent of the traffic is under 12,000 feet, and travels distances less than 250 miles. Most of the jets operate between 25,000 to 40,000 feet, and turbines generally at 12,000 to 30,000.

Of course, this runs out, because they all must use the lower airspace. They all must come down to an airport and leave an airport. We get the mixing in the lower airspace.

Another type of segregation is by airport. Less than 10 percent of the traffic at JFK, for example, is general aviation, and most of that 10 percent is air carrier oriented; that is, it is air taxi, bringing passengers to and from the airlines, or corporate aircraft bringing them to and from the airlines. Of course, this changes character as the community size decreases.

For example, at Asheville, 64 percent of the traffic is general aviation, and when you get to a place like Rockford, Ill., 95 percent of it would be general aviation.

This natural segregation isn't absolute nor does it operate when the weather is good, because all the aircraft operate in the lower airspace. Our present policy is to combine the rules of the road with the necessary ground control as appropriate. As a matter of fact, despite the lack of radar in a great many locations served by airlines, about 90 percent of the passengers are served at locations where we do have airport radar available.

There are many reasons that are advanced for seeking some segregation between general aviation and the air carrier operations. These, I think, can be divided between economic reasons and safety reasons. Among the economic reasons that I would cite is that we get complaints that light aircraft should not use the runways and delay airline aircraft filled with passengers. Here, if control is adequate, and it is our attempt to see that it is, the question is one of delay and economics rather than one of safety.

Another economic reason advanced frequently is that these are very expensive runways, long ones for jets, and they perhaps should not be used by small aircraft because they do not need all this runway capacity. But, again, this is economic rather than safety.

When one looks at the safety aspects, I think one would not look at the character of use as to whether it is general aviation, military, or air carrier. One would look to the capability of the aircraft.

For example, a 4-engine Jetstar flown by two ATR pilots would operate at substantially the same speed, use the same runway, and so forth, as a 727. From a safety viewpoint, you simply could not distinguish one from the other. If one also considers that our forecast in the next 10 years is that we foresee about 8,000 turbine aircraft in the general aviation fleet and about 3,500 turbine aircraft in the air carrier fleet, it looks to us like the business fleet will be larger in terms of the number of jet aircraft than will the airlines.

So I think one would look toward equipment, capability, or something other than the character of use.

There are, of course, many solutions to the problem. One solution would be, perhaps, that we would provide more airports which would

have sufficient runway length and equipment around the major metropolitan areas. This is about the only place where it occurs, where there is a congestion problem.

The business aircraft that would use those runways would be attracted to them and thereby would be removed from the long, jet runways at some of the major metropolitan airports.

If you look at the traffic picture in the United States and say we simply will ground all the airplanes which cannot comply with instrument flight rules or general aviation, we might look at the volume of traffic that we have. At the present time we are running about 32,000 daily instrument flights in the United States. We handle about 120,000 daily operations at locations with FAA towers, and we don't know precisely how many operations occur at places where we neither monitor nor measure, but our best estimate is that it is at least double this amount, or 200,000 to 250,000 flights a day.

If we expanded the present IFR system to require everyone who flies to be under the control of the ground, we would have to expand this number of 32,000 up to some 250,000, which is a manifold increase of our capacity. It would cost several billion dollars and take several years to do so, if one thought it was necessary.

If we took another tack and said that we would not permit the airlines to operate at any place where they do not have radar service, for example, we would stop airline service in about 400 cities. Conversely, we would get into a very large radar program in order to equip those cities, or we would simply stop general aviation from operating in and out of those cities and ground a large part of the general aviation operations today.

We think both the air carriers and general aviation are vital to the economy of the United States. The object is not to restrict either, but to provide the facilities and procedures to give maximum safety to both.

There are quite a few things that might be done. There is no single, dramatic solution to the problem. It simply won't be solved by a single action or a single solution as we see it. Obviously, we need more airports and more reliever airports around the large cities. Obviously, we need to expand the radar and instrument landing systems as we are attempting to do.

There are procedural things, and we are working on many of those, such as lowering and expanding the positive control area to provide more protection for the high-speed traffic. We could limit the speeds in the lower airspace so that the aircraft are more compatible with each other.

There is a great deal of work continuing on the expansion of radar services and traffic patterns around airports. This is a never-ending job which we will continue.

On the aircraft, itself, there has been work done over the last 20 years on trying to enhance their conspicuity, such as by better lights, better paints. It hasn't been too productive, but we think more can be done on lighting and perhaps paints. We are working on enhancing radar returns, both from a passive viewpoint so that the aircraft structure itself reflects radar better, and also on the beacon.

As all of you know, there is a great deal of work and now some promise shows on anticollision warning devices, particularly for large aircraft, against large aircraft. But they are some 5 years away.

There is also work that we can do on the airman end, in helping to reduce cockpit workload and particularly to continue education on scanning and keeping a sharp lookout at all times.

In summary, I think that it is going to take a lot of actions, continuous work, all of which will contribute to solving the problem. But as far as we can see, there is no single, dramatic solution to the problem at all.

Thank you very much.

The CHAIRMAN. Does that complete your testimony for the entire group?

General MCKEE. This completes the testimony.

The CHAIRMAN. I want to thank all of you for coming today.

I might repeat for the benefit of those who were not here when we commenced that this is not an investigation of the Asheville accident. This is an investigation into what the procedures are that are used so that Congress can be informed. This is not a witch hunt. We are not trying to pin the blame on anyone. We are not the investigators. These men are the experts. I wanted, as the other Members of Congress did, to have them here to tell the story.

We will observe the 5-minute rule this morning.

I have several questions combined into one. I thought maybe I could give them all at one time, combining them.

Can you tell us briefly about the current work on the collision avoidance system and when improvements in this area might be expected? Also, is it necessary at this time to equip all aircraft with devices which would contribute to a collision avoidance system? Third, what will be the cost? Can you have a collision avoidance system without having equipment on all aircraft?

This all pertains to one subject.

General MCKEE. There has been intensive work going on, Mr. Chairman, by the FAA, by industry, and by the airlines on a collision avoidance system. This has been a subject of deep concern for a number of years.

The latest development by industry, still in the development stage, and which has not been proved out yet, is a rather complex collision avoidance system. There are a number of companies, three, including McDonnell, Collins, and Bendix, who have been working on this with the airlines and with us.

The way it looks now in our best estimate, if this proves out to be an effective collision avoidance system, it will be about 5 years before you could get it installed.

It would cost between $30,000 and $40,000 to equip each airplane. The airlines are willing to spend this amount of money if they can get an effective system, but I should point out that this is only effective as between one airline aircraft and another, and would not be effective as between an airline aircraft and a general aviation aircraft.

If you look at the number of general aviation aircraft in the country, about 100,000, it is obviously impractical to equip all of those airplanes with a device that expensive. We recognize this, and FAA has instituted a development program in an effort to get a system much less expensive that could be installed in all general aviation aircraft.

In all honesty, I must say that that is some time away and we have no breakthrough as of this time in this area.

In addition to the $30,000 or $40,000 per commercial aircraft for this system, this will also require a ground system which the FAA would have to put up, which we estimate would cost in the neighborhood of $50 million.

To sum up, this system is sometime away. Intensive efforts are being made to develop the system. I would hope by the end of 5 years at least all of our air carrier airplanes can be so equipped and that we can have at least an effective system in that regard. It will be a lot longer before we can do it with all of the aircraft in the airspace.

The CHAIRMAN. The last two midair collisions have been in comparatively uncongested areas. This is a series of two or three questions again.

Is this merely coincidence? I would like your comments on the comparison of risk between locations such as Urbana, Ohio, and Asheville, N.C., on the one hand, and Chicago, New York, and Washington, D.C. on the other hand.

General MCKEE. It is certainly a coincidence that the last two midair collisions have occurred in areas that are certainly far from being congested.

On the one in North Carolina, as pointed out previously, I can't comment on what caused it. In those areas, we do not have—at least in North Carolina—terminal radar. Whether radar would have helped there or not, I don't know. But I think it is very difficult to say where you are more likely to have an accident, in one place or another.

You would expect these accidents to occur much more frequently in the highly congested areas like Chicago, New York, Los Angeles, than you would in a relatively uncongested area. It is a very difficult question to answer, Mr. Chairman. I wish I could be more specific.

The CHAIRMAN. Mr. Friedel?

Mr. FRIEDEL. Would you elaborate a little more? Would you consider Washington National a very congested area?

General MCKEE. The history of Washington National is long, complex, and difficult, Mr. Friedel, as you are well aware. As you know, as a result of the opening up of Washington National to short-haul jets, the subsequent congestion that occurred, we took some very positive and direct actions, difficult actions, I might add.

But as a result of our actions, the airlines volunteered to reschedule their flights so that we could limit them to 40 scheduled operations in any one hour. We went to all elements of the general aviation community and sought from them a voluntary restriction on the number of general aviation flights into Washington National Airport. They have cooperated very well and so have the airlines.

Sure, we have a lot of flights into Washington National, but I think it is interesting to note that the number of flights into Washington National in and out today are about the same as they were in 1959 and 1960. So there has been no dramatic increase in the number of operations.

To clear the air a little bit, and looking at all that has been said in various segments of the press and other places, I certainly consider Washington National just as safe as JFK, or O'Hare, Los Angeles, or many other places across the country.

I have no hesitation, and apparently a lot of people in the Congress have no hesitation, or concern, about going into Washington National.

Mr. FRIEDEL. I think we might disagree on that. Only last week—

General MCKEE. I agree. I would like to see a lot more people go into Dulles or Friendship.

Mr. FRIEDEL. I would, too. But last week I went to New York and the plane was loaded and stayed on station about 15 minutes. Then we went out to the runway and we were there for another 25 minutes. Six planes took off and we were behind them. Then six or seven more came in. I think it is congested.

General MCKEE. But you can't always blame this, Mr. Friedel, on Washington National. Very frequently planes stand on the ramp at Washington National not because they can't get off of Washington National. It is because they can't get into La Guardia.

There is no use in having a plane take off and go up to New York and sit in a stack for an hour. That is a very expensive operation and people don't like it. If you are going to waste time, you might as well waste it on the ground, rather than boring holes up there.

Mr. FRIEDEL. I came through the same experience last Friday coming back. We had to stay on the ground for a while because of the congestion at Washington National Airport.

General MCKEE. I think the problem of congestion, a major problem throughout the United States, will only be resolved when we are able in this country to provide better airports than we now have, airports with more runways, with more ramp space, with more taxiways for commercial operations, as well as general aviation airports to relieve this congestion that we have at the major complexes.

I think we also have to recognize and realize that the airport is a part of the air traffic control system, just like radar, communications, and all the rest of it. We can't divorce the airport from this problem. I think in the whole air traffic control system, the major bottleneck is the airport.

Mr. FRIEDEL. I understand the Asheville tower did not have radar.

General MCKEE. It did not.

Mr. FRIEDEL. Can you tell us why?

General MCKEE. On that subject, and I am glad you raised it, we have in this country about 527 airports that have some form of commercial operations, a lot of them only one, two, or three operations a day, and a lot of which have mostly general aviation operations.

We had to put up, which we did, and we reevaluate it every year, a criteria on which an airport will qualify for radar. That criteria is a minimum of 100,000 itinerant operations, plus 20,000 instrument operations a year.

You say "Why that criteria? Why isn't it more? Or why isn't it less?"

Well, it is a matter of judgment, and it is the judgment of the best people we have in the air traffic control system, that with operations less than this our present system can reasonably handle the traffic.

You say at Asheville this didn't happen, but I don't know, and I can't say, whether or not at this point in time a radar at Asheville would have prevented this accident. I don't know. But I think this committee should recognize and realize, right or wrong, that we could put radar, we could put instrument landing systems, we could put runway aproach lights on all of these airports now being served by commercial operations, if we are willing to step up the expenditure, the

initial expenditure, of between $800 million and $900 million for the system and a recurring expenditure per year to handle all of this of about $150 million to $200 million a year.

The CHAIRMAN. Mr. Springer?

Mr. SPRINGER. General McKee, the way I figure it, on six accidents this year there were 202 deaths. In figuring this out on the basis of contact with general aviation, this comes out, for the year, if you multiplied it—talking about just general aviation—197.10. That is quite a number.

General MCKEE. Yes, sir; it is.

Mr. SPRINGER. And if I figured it out right, if you included the same number as you applied the rest of the year, that would be 255 altogether, for all kinds. The 197.10 are collisions with general aviation.

Now, if I may come to Washington National Airport, in 1966 there were 85,499 general, there were 6,707 military, there were 226,755 commercial transactions. That is a total of 318,963. That makes an average, each day, 365 days a year, of 876 landings and takeoffs, or one every minute and a half. That is a lot of transactions, isn't it?

General MCKEE. That is true.

Mr. SPRINGER. Your problem at National, as well as O'Hare, Kennedy, La Guardia, or any of the rest of them, is the peak hours.

General MCKEE. That is true.

Mr. SPRINGER. They are coming in faster than every minute and a half, around 4 o'clock, are they not?

General MCKEE. That is true.

Mr. SPRINGER. As I see them line up out there, they are going just as fast as they can take off, aren't they?

General MCKEE. Just as fast as it is safe for them to take off.

Mr. SPRINGER. Well, that might be true. There were 13 I counted lined up the other day.

General MCKEE. The reason they were lined up is for safety purposes, one reason.

Mr. SPRINGER. I wouldn't deny that, General. I am not trying to impinge on that point. But 876 transactions per day is too many, in my opinion, for National Airport.

General MCKEE. At Chicago they run as high as 2,000 a day.

Mr. SPRINGER. Yes, sir, and I can tell you that the truth of it is that O'Hare is the busiest airport in the world, and in the wintertime they have more daily transactions in a 24-hour period than all of Western Europe. That is pretty heavy traffic.

General MCKEE. At O'Hare, as you know, the general aviation operations are generally small.

Mr. SPRINGER. Yes; I know that. You may say they are small, but there are still some.

What would you think, when it could be arranged, that the 24 biggest airports in the country, in those cities where they have more than one airport, to send the general aviation to some other airport? I am talking about as a trial starter, to find out how it works, to put general aviation at some other airport.

General MCKEE. They are doing this, Mr. Springer, in most of the large terminals. They are doing it in Chicago, in Los Angeles. There is a major program underway in New York which is very necessary, to provide general aviation airports around the New York area.

When you look at the Washington area, we have a solution. That is provided in the Chairman's bill, to set up a corporation that would include Washington National and Dulles. In that bill, there is authority for the corporation to plan for general aviation airports around the Washington area, which I think are seriously needed.

Mr. SPRINGER. Let's say until the Chairman's bill can be worked out, can we do anything here, in transferring general aviation to the Bolling-Anacostia area, or to Dulles? That is not doing much business.

General MCKEE. I don't have the authority to do it, unless I can show loud and clear that we have a real safety problem. When you look at the problems all over the United States, I can't declare, in all honesty, Washington National as a crisis airport. It isn't.

Mr. SPRINGER. I am glad to hear that, because there are some of us that would differ with you on that. You are certainly a knowledgeable person. I would take your word for almost anything.

General MCKEE. There are a lot of people who would seriously disagree. I would like to see less traffic at Washington National. I get more complaints every day about Washington National than any other thing in FAA. I get it from everyone in Washington, practically.

Anything we can do to relieve Washington National, I am all in favor of.

Mr. SPRINGER. What would be wrong with transferring general aviation to Dulles?

General MCKEE. I don't have the authority to do that.

Mr. SPRINGER. Who does have that authority?

General MCKEE. I don't think anybody does. The way the law is set up, when you read the law, the only time I can step in and demand that is if I can justify it strictly on a safety reason.

Mr. SPRINGER. You say you can or you can't?

General MCKEE. If I can justify it on a safety reason. Right now I can't do that.

Mr. SPRINGER. You think, then, that National as it is, with all these coming in, with these 6,000 military aircraft, that it is safe?

General MCKEE. I consider it as safe as any other airport in the country with a like amount of traffic.

Mr. SPRINGER. That really doesn't tell me much of anything.

General MCKEE. Mr. Springer, and you know this as well as I do, regardless of what we do, we can put in radar at every airport in this country, ILS systems at every airport in the country, it will obviously greatly improve the operations. But even with all of that, and billions of dollars on airports, I couldn't guarantee you a 100 percent safe operation, as long as we have people who make mistakes and as long as we have equipment that goes out.

There is no infallibility in this thing. What we subscribe for is the maximum possible safety we can get.

Mr. SPRINGER. I don't think any one challenges that people make mistakes and that equipment will go out. Those things will happen. But what we are talking about is that the percentages go down, the fewer aircraft come in, don't you think so, with the fewer aircraft using an airport?

General MCKEE. That is right. If you had none, you would have 100 percent.

Mr. SPRINGER. That is very true. But if you reduced this, it comes out to 32 percent of the time National Airport is occupied with private aircraft, 32 percent of the time.

General MCKEE. I would like to lower that figure substantially.

Mr. SPRINGER. Would you agree to that by a transfer to some other airport of general aviation?

General MCKEE. If we had the authority to do it and if there were some means of doing it, yes. That is the reason I think we have to step up to building additional general aviation airports around the Washington area. I don't think Dulles is the permanent solution. If we were sitting here in 1973, this committee would be complaining to the Administrator about the congestion at Dulles.

Mr. SPRINGER. That is only a partial answer. I think you are trying to be fair about this. I do want to pursue it later.

The CHAIRMAN. Mr. Moss.

Mr. Moss. Mr. Allen, in your first paragraph you talk about the difficulty of staffing the four teams because of the scarcity of specialists.

To what do you attribute this scarcity of specialists necessary for the teams?

Mr. ALLEN. Mr. Moss, I think the shortages go directly to the allocation of resources to the Bureau in the acquisition of people.

Mr. Moss. Have you requested more funds from the Congress in order to complete the recruitment of the personnel and been denied them?

Mr. ALLEN. Yes, sir. Over the past several years, the funds approved have been less than the funds requested.

Mr. Moss. Have they been specifically identified as being funds for these purposes?

Mr. ALLEN. I think, sir; we have identified—let's talk in terms of positions. We have identified positions which are related to investigative activities in terms of man-years. These positions have been denied.

Mr. Moss. The import of your statement, General McKee, on Washington National, in response to Mr. Springer's question, was that really it has no more flights today than it had in 1960, some 7 years ago.

General MCKEE. I said about the same. We have the exact figures.

Mr. Moss. Is this a very reliable criteria? Is the type of aircraft, the speed of the aircraft, the size of the aircraft of greater significance than just the total numbers of aircraft?

General MCKEE. I don't think so, Mr. Moss, in terms of air traffic control. But it is very definitely a great deal different in terms of congestion on the ground and in terms of the number of passengers carried. Many more passengers are being carried now.

Mr. Moss. Isn't it also in the air, if a plane is moving with a much greater speed, isn't it in effect shrinking the air space?

General MCKEE. I will let Mr. Thomas, my expert in air traffic control, answer that. He flies into Washington National all the time in jets. He understands it better than I do.

Mr. THOMAS. Mr. Moss, Washington National is one of the few airports that hasn't increased in numbers of operations during the past few years, even with the addition of jets, because the level of traffic has been maintained arbitrarily. The approach speeds for jets

are under 200 knots, usually under 180 knots and down to 125 or less over the fence. The piston airplanes of 10 years ago were approaching at 150 and 120 or so over the fence. There is not that much difference in the speed.

The airplane only occupies the runway for about 40 or 50 seconds and when a runaway is not occupied it is safe for another one to do so. I think the problem here is inconvenience rather than safety.

The parking ramps are congested, and people do wait because there are other airplanes there. But I think the problem is inconvenience to the passenger.

Mr. Moss. I think you can throw in a few others, but I won't bother to take the time to go into that.

General McKee. I could spend a great deal of time on that one.

Mr. Moss. Let's consider the cities where we have no radar. It was indicated that the criteria applied is volume of traffic. Doesn't the criteria also take into consideration some of the characteristics which might occur around those airports: weather, whether or not it is subject to localized fog or haze, whether there is unusual turbulence at certain seasons of the year or certain times of the day? Aren't those items equally important?

There is an abundance of evidence that you can lose many lives at small airports. The instant case is proof of that.

Mr. Thomas. Yes, sir, any criteria we have, obviously, is just a guide and not precise; 100,000 operations are not much different than 99,000. This is why we also put in the instrument operations to take into account the weather. Only 20,000 instrument operations are required.

There are places that do have adverse weather. We obviously do look at other characteristics. But as a general rule in speaking of radar, this gives us a pretty good handle upon the type they should have as well as volume.

Mr. Moss. What is the cost for radar at Hendersonville?

Mr. Thomas. The general price is around $650,000 for the radar, and another $100,000 to $150,000 for the air traffic control facilities that go with it. So for $750,000 we could equip it.

Mr. Moss. What would you estimate the cost of the crash at Hendersonville to be?

Mr. Thomas. Sir, I have not tried to compute that. It is very expensive in terms of life and dollars.

Mr. Moss. Mr. Chairman, I wonder if we could request that.

The Chairman. As soon as they could gather it. I think that is something that should go into the record.

(The following information was subsequently submitted:)

Statement of Federal Aviation Administration on Estimated Cost of Hendersonville (N.C.) Crash

In his testimony before the Committee, the Deputy Administrator said that the cost of the accident is very expensive in terms of life and dollars. At this point, it would be possible to estimate some elements of the cost. For example, the cost of two new aircraft of the type involved in the accident would be about $4.5 million. Of course, the most serious loss in connection with the accident is the lives of the passengers and crews. We are not able to describe that loss of life in terms of cost.

The Chairman. Mr. Devine?

Mr. Devine. Thank you, Mr. Chairman.

I would like to direct my inquiry to Mr. Thomas, if I may.

In sheer numbers or volume on a comparison basis, Mr. Thomas, am I correct in assuming that there are approximately 2,000 commercial aircraft and approximately 100,000, I believe to be the figure that General McKee used, of the general aviation aircraft?

Mr. THOMAS. Yes, sir. I believe the figure for commercial now is about 2,400 or 2,500.

Mr. DEVINE. So for every commercial aircraft there are roughly 50 general aviation aircraft?

Mr. THOMAS. Yes, sir.

Mr. DEVINE. I hope the public recognizes that. They generally think there are more commercials than general aviation aircraft.

Mr. THOMAS. And we might also note that there are another 25,000 military aircraft occupying the same air space.

Mr. DEVINE. In addition?

Mr. THOMAS. In addition.

Mr. DEVINE. I know you are acquainted with Norman Crabtree, the State director of aviation in my State of Ohio.

Mr. THOMAS. Yes, sir.

Mr. DEVINE. He has suggested that a study be made of the desirability of establishing climb and descent corridors for jets departing from and arriving at major airports. I believe at Lockburn, TAC Base, in my district, they have established that in a southwestern direction. The general aviation must stay out of those corridors. Have you pursued that in the past?

Mr. THOMAS. Yes, sir, we have examined that at length. It was one of the solutions that we hoped to apply for the very high performance military aircraft as compared to the performance of the civil jet.

Here we were talking about "afterburner" climbs of very high rates, where the airplane pilot feels like he is on his back. He is not actually, but it is very difficult to see ahead because of the airplane angle. So we did try to protect the high performance operation with the climb corridors.

It hasn't been too successful, despite the fact that the corridors are marked on the maps. People do wander into them.

Another problem is that usually departing aircraft want to go in another direction. The wind is another direction, for example. If we placed them all around each airport, we would completely block the air space. Our own view is that it is better to hold the speed and the performance down and give radar advisories, which would offer more safety than trying to sterilize the air space for two or three operations a day for high performance. That, perhaps, is not necessary.

Mr. DEVINE. I believe, General McKee, you figured that 80 percent of the aircraft is 12,000 feet or under.

Mr. THOMAS. That is correct.

Mr. DEVINE. But all aviation must go through this area in landing and taking off.

Mr. THOMAS. Yes, sir.

Mr. DEVINE. On a personal experience standpoint, I was talking to a physician over the weekend and in his practice he is examining flight tower personnel. He said that he was appalled at the number of flight tower personnel who wouldn't fly for love nor money because they know the situation that is up there.

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I think this is something that should be of concern to all people.

That is one of the reasons we should have rather broad hearings, Mr. Chairman, so that we can satisfy the public that everything is being done that should be done in this area.

Have you a comment?

General McKee. I have a comment, Mr. Devine. Occasionally, whenever we can, we try to take the tower personnel on a trip to some other place where they can see another type of operation, like going into New York. As far as I know, we haven't had anyone refuse to go yet.

Mr. Devine. I know, there are some frantic times in those towers. I have a great deal of respect and admiration for these men. I don't know why they all don't have nervous breakdowns after a while.

Mr. Thomas. A large number of them are pilots and were selected on that basis.

The Chairman. Mr. Rogers.

Mr. Rogers. Thank you, Mr. Chairman.

General McKee, I understand you said there are about 418 airports that serve commercial aviation that do not have this surveillance radar. Is that about correct?

General McKee. That figure is correct.

Mr. Rogers. How many airports are served by scheduled commercial aviation that don't even have towers?

General McKee. Without towers?

Mr. Thomas. 285, Mr. Rogers.

Mr. Rogers. As I understand it, you have a criteria where as soon as they have enough numbers of planes coming in and out this triggers whether they would get a tower or radar.

General McKee. That is correct.

Mr. Rogers. How many airports have qualified under your criteria that do not yet have radar and do not yet have towers? Could you give me those figures?

Mr. Thomas. Under the present criteria that we read for radar, there are some six. On towers there are around 50.

Mr. Rogers. When was your criteria last changed?

Mr. Thomas. I believe it was last changed about 1960. It was last reviewed in 1965 and reevaluated. It is looked at about every other year.

Mr. Rogers. But there has been no change since 1960 in the criteria?

Mr. Thomas. No, sir; the tower one has stood the test of time very well and the radar one was changed about 6 years ago. It was looked at again last year. Correction, 1965.

Mr. Rogers. What is your budget request for radar systems in the present budget, and for towers?

Mr. Thomas. There is nothing in the budget request for radar systems or towers in the current budget.

Mr. Rogers. Nothing?

Mr. Thomas. That is correct.

Mr. Rogers. As I understand it, your agency is going to get into the SST, which is already at approximately $700 million, if this appropriation is approved, and the House has already approved $142 million.

Do you give greater priority to the SST than to the radar systems and towers that perhaps do something on safety now?

General McKee. Mr. Rogers, I would like to answer that question. It is not a question of the FAA giving priority to radar or to the SST. The FAA just happens to be the manager of the SST program. The SST program is an administration program.

Mr. Rogers. I realize that. Radar programs are administration, too.

General McKee. I am not in a position to say let's cancel the SST program to get more radars.

Mr. Rogers. As I understand it, the idea originated in Germany some years ago.

General McKee. I think the idea of an SST started long before the FAA got into it. It started in NASA. I do know that General Quesada was interested in it.

Mr. Rogers. Let me ask you this question, because I don't have too much time. From my understanding of the testimony so far, it seems that this small plane was about 12 miles off. There were cloudy conditions. Wouldn't radar help a pilot in that condition?

As I understand, Atlanta had told him to come over to Asheville. Wouldn't radar help them identify where those planes were and they could give a warning to the pilots? Isn't that the purpose of the radar?

General McKee. Radar obviously has two purposes. That is the reason that it is concentrated in the high-density areas. Radar greatly speeds up traffic, control of traffic. It also serves another purpose of identifying where an aircraft is and giving a warning.

With regard to the Asheville problem, as the chairman pointed out I am in a position now, as the Administrator of the FAA where I cannot appropriately comment on what could or might have happened or what radar would or might have done.

Mr. Rogers. I understand that. You don't have the facts. We are not asking you. You don't make a determination of that. I am saying assuming.

General McKee. As a general matter, with money no object, as I pointed out, obviously there are many areas in the country that from our point of view, and the responsibility we have, sure, we would like to have radar. But there is a question of priority in the budget, looking at the overall national programs.

Mr. Rogers. But you have none requested in the budget this year.

General McKee. There is none before the Congress.

Mr. Thomas. There are no new ones. We have funds for the operation this year for six new radars going in as well as 10 towers. But they were all in last year's budget. As far as new radars are concerned, there are none in the budget.

Mr. Rogers. May I conclude by saying this, that I realize the anti-collision device is some years away, as I believe you said. I understand that from many experts. But it seems to me in areas where we can now do something, such as radar and control towers, this is the problem we ought to attack. We know something can be done.

I would hope that the Budget people and your own people would review your criteria and certainly your request for additional radar and control towers.

General McKee. I would like to say here, Mr. Rogers, that looking at the fantastic growth in aviation, both air carrier and general aviation, I would agree that this question must be reexamined hard and cold in the light of the overall situation in the country.

If it appears that it should be done, I am prepared to come in and recommend it.

Mr. ROGERS. That is encouraging, General. I think that would be helpful.

The CHAIRMAN. Mr. Harvey.

Mr. HARVEY. General McKee, in your judgment, is a good system of radar a solution to this problem, or should research and development develop a system that is not yet in existence?

General MCKEE. Both, Mr. Harvey. The radar system but even more important, really, than radar, is the instrument landing approach systems. I think they go hand in hand. This will give us right now, with the state of the art being here, a substantial improvement.

I covered for you the collision avoidance system and where we stand with it. We are also carrying on research and development in air traffic control systems beyond what we see today. We have to look beyond 1975 and look at the environment with which we will be confronted in the hopes that we will be able to manage and control the traffic in that era, where you will have jumbo jets, jets of all kinds, more and more jets coming in, the supersonic transport operating. So that is the picture we are confronted with.

But we cannot relax in the area of research and development.

Mr. HARVEY. But the airport actually had ILS, didn't it?

Mr. THOMAS. Yes, sir; it did.

Mr. HARVEY. It was not on in this case?

Mr. THOMAS. No, sir; it was on the opposite direction. It was on a 34 end for north landings and they were using a 16 end, for a south landing.

Mr. HARVEY. Last year we were talking about the New Orleans crash, General, where a Delta airliner had been practicing landing and takeoffs, with two engines out on landing, and so on. We all generally agreed at that time that that was a poor practice, of doing that over a metropolitan area.

Has the FAA issued any regulations since that time to prevent that sort of thing from happening again?

General MCKEE. As a result of that hearing and my commitment to the committee, the FAA had a series of meetings within the Air Transport Association, the Airline Pilots Association, and we did take a number of actions.

As a matter of fact, Mr. Chairman, I made a report in writing to the committee of the actions that we had taken. I have carried out my commitment. I don't know whether you want to take time now, but we are prepared to go into it.

Mr. HARVEY. Have you reported that to this committee?

General MCKEE. Yes, it has been reported to this committee.

Mr. HARVEY. I was not aware of that, Mr. Chairman. I don't believe the membership of the committee has received that information, so far as I know.

Those are all the questions I have, Mr. Chairman.

The CHAIRMAN. The clerk will be instructed to see that every member of the committee receives the information referred to.

Mr. Van Deerlin?

Mr. VAN DEERLIN. Thank you, Mr. Chairman.

General, our attention this morning, very understandably, has been concentrated in Asheville, the scene of the most recent collision, and at National Airport here in Washington.

I would like to waft your attention westward, if I may, to what is probably the second or third most crowded airspace corridor in the Nation, that of southern California. I have ascertained from your office in Los Angeles that just this year, in April and again in May, there were two near midair collisions reported on flights leaving San Diego International Airport. The first was on April 22, involving a Western Airlines 720 which had taken off on a Los Angeles-bound flight shortly past noon. The plane had to take evasive action at 8,000 feet to avoid two Navy jet fighters, which were apparently doing acrobatics in the path of a commercial liner.

The WAL pilot said he had to take evasive action, and claimed a near collision.

Again on May 24, American Airlines flight 46, a Boeing 727, departed from Lindbergh Field for Dallas. Six minutes later the pilot reported he had passed in close proximity with an unidentified light aircraft. That unidentified plane turned out to be a single-engine Navion, which later landed at Lindbergh Field. The private pilot acknowledge he was unfamiliar with San Diego airspace and uncertain of his position at the time of the near collision. FAA wrote it up as an unofficial near midair collision.

In connection with this one, the FAA explained that planes are released visually for takeoff from Lindbergh Field by the control tower. Radar control, which is based at a Navy field some 5 miles away, is supposed to pick them up within 1 mile of the end of the runway.

The commercial pilot in this near mishap got no word from this radar protection, although radar had picked up the other plane. It was somehow not made available to the pilot.

Inasmuch as the mishap occurred some minutes after he left the runway, I was wondering why it is that here is a field which is protected by radar—and I don't expect that you right offhand can have the answer—why there should be a delay in getting messages like this to the pilots?

General McKee. I think Mr. Thomas is acquainted with the particular incident you are talking about.

Mr. Thomas. I am acquainted with both of them. In the latter case, the radar is at Miramar, and we operate a Navy radar there for the benefit of the whole San Diego area. The American pilot, as I understand it, had not changed his departure control frequency. He was still working the local control frequency with the tower.

The radar did see both airplanes. They did pick up the light airplane. American passed almost immediately after takeoff. Neither of them declared it a near miss, although undoubtedly it was close. We examined both of them.

In the case of the Western and the two Navy airplanes, Western reported them as F4's. We followed them on radar until we lost radar coverage and had the other Navy bases try to pick them up. El Toro did pick up two A4's. There was not continuous radar contact and the A4's claimed they were not in the area. We went back to the Western

pilot and he said they were F4's, and the Navy is still searching for two F4 pilots in that area and we haven't found them yet.

But you do bring up the point of a need for continuous and almost instantaneous frequency changes. That is an equipment problem we are working on.

Mr. VAN DEERLIN. Do you find in general a reluctance on the part of commercial pilots, possibly for commercial reasons, to refrain from reporting near misses?

Mr. THOMAS. This has been stated, and has been stated by the pilots. I don't think it has anything to do with the commercial reasons. I think it is more a fear of punitive action in case they were in error, either by location or altitude or something else.

We are working with the pilot groups to try to get all the information we can and remove any possibility of punitive action. We want the facts as much as they do, to see what corrective action can we take.

Mr. VAN DEERLIN. I notice in the second one, the Dallas-bound flight, the pilot had refrained from recording it as a near collision, yet the FAA seems to have reached a different conclusion and has so logged it.

Mr. THOMAS. There was a surprise effect. There was a light fog there. The American 727 was emerging out of it and the Navion was on top of it. They both were surprised. I really don't know how close they came. It is a situation that we would like to correct. Whether it was an actual near miss or not. We would like to prevent surprises.

Mr. VAN DEERLIN. We have considerable military flights all over southern California, in addition to an increasing commercial and private flight capacity.

General MCKEE. As a matter of policy, we would like very much to see all real near misses reported because if we have the facts it gives us a good line on corrective action to be taken. I don't believe in sweeping any of this stuff under the rug.

Mr. VAN DEERLIN. Thank you.

The CHAIRMAN. Mr. Broyhill.

Mr. BROYHILL. Thank you, Mr. Chairman.

An airline pilot receives training and retraining in the course of their careers as airline pilots. Are private pilots required to take any retraining or recertification at any time?

Mr. THOMAS. No, sir; they are not.

Mr. BROYHILL. Has the FAA ever gone into this, to see whether you should require recertification?

Mr. THOMAS. Yes, sir; we have several times in the past. As a matter of fact, we are right now. Anything we would do in this regard obviously has to be handled under rulemaking, where we go out for comment. We do think that reexamination by FAA or checking by an instructor, or some demonstrations of recent experience demonstration would be helpful.

General MCKEE. I think your point is well taken, Mr. Broyhill. We recognize it and are moving in this direction.

Mr. BROYHILL. All pilots do have to take a physical examination periodically.

General MCKEE. That is correct.

Mr. THOMAS. Yes, sir, and they must have had recency of experience for any particular operation, such as landing, a takeoff, instruments, and so on, before they can carry passengers.

Mr. BROYHILL. How is this enforced or how is it policed by the FAA?

General MCKEE. The pilot statement. It is up to him to prove it in case anything goes wrong. It is not something that we could conveniently enforce or police any more than we can the last time he drove an automobile.

Mr. BROYHILL. The controllers are also continually trained and retrained? Do you have a program in this regard?

General MCKEE. Yes, sir. The controllers get a great deal of training. They are checked frequently. They are checked for each position which they operate. They are under constant supervision. This is an entirely different situation than a case where a member of the general public operates something, and not under direct supervision, as in the case of a controller, or an airline pilot, for that matter.

Mr. BROYHILL. In the Asheville-Hendersonville case, are you in a position at the present time to state whether or not you feel there was any lapse in the procedures, the prescribed procedures?

General MCKEE. I don't think we should comment on that at all, Mr. Broyhill.

Mr. BROYHILL. I have no other questions, Mr. Chairman.

The CHAIRMAN. Mr. Pickle.

Mr. PICKLE. Thank you, Mr. Chairman.

General McKee, I address this question to you, and to any representative of the CAB who might be here.

Why is it that the special Commission which has been set up to study airport congestion has not been more aggressive in making some announcement of plans or in holding public meetings, or in making recommendations either to us or to the Congress?

It seems to me that this special Commission has been both hesitant, timid, and certainly secretive in making known to the Congress its recommendations.

I will admit that you and Mr. Murphy, whom I assume head this Board jointly, have done a lot of planning. But so far as I know you have not given to us a plan or some kind of a concerted approach to this problem.

Your Commission has been in existence now for 8 or 9 months. I know that members of our subcommittee met with you and we know you are sympathetic to the problem. You said early this morning that the main problem here is airport congestion, and not just this one accident. Though, of course, we are looking into that this morning. But the biggest problem that faces us is airport congestion. That covers the whole field.

Why haven't you all made some sort of recommendations?

General MCKEE. Sir, I think there is a little misunderstanding about the Commission. This committee is cochaired by the Secretary of Transportation, Mr. Boyd, and the Chairman of the CAB, Mr. Murphy. I wanted to get that straight on the record. I am not in very much of a position to speak for those two distinguished gentlemen.

I can say that it is my understanding, and I have to underline that, that Mr. Murphy and Mr. Boyd have made a recommendation to the White House. It is further my understanding that their recommendations are under review. As to when a report will be made on these recommendations, Mr. Pickle, I am not in a position to answer.

Mr. PICKLE. I do recall now it was Secretary Boyd and Mr. Murphy who headed this Commission. I regret that neither one of them are here. I will address those questions to them later. I can see why you would hesitate to speak for them. But it is so secret we don't even know who is a member of this special Commission. Why would that be, gentlemen?

General MCKEE. I can't answer that question.

Mr. PICKLE. I sure am full of questions but I have the wrong man to ask.

Mr. ROGERS. Will the gentleman yield?

Mr. PICKLE. Yes.

Mr. ROGERS. Does the FAA have to wait for an outside commission before you can make a recommendation concerning the safety of airports?

General MCKEE. No, sir; we don't

Mr. ROGERS. What recommendations has your agency made?

General MCKEE. We do all we can in terms of the appropriations we have under the Federal Aid to Airport Act. There is an authorization, as you know, of $75 million a year. I am sure you are aware of the action Congress has taken on these appropriations. Within the resources we have we are taking every step forward we can.

Mr. ROGERS. I am not very encouraged by that answer. I don't even find a request for more radar and more towers in your budget to the Congress. You are not even requesting them. I don't think that is a very good answer.

I thank the gentleman for yielding.

Mr. PICKLE. Mr. Chairman, I am going to address my questions on this point to the CAB and the Secretary of Transportation, Mr. Boyd.

The CHAIRMAN. Mr. Watson.

Mr. WATSON. Thank you, Mr. Chairman.

I am sure the gentlemen sitting at the witness table are as concerned as I am. They say in golf that it is not only the way you address the ball or approach it but the followthrough that gives you a good shot.

I have been concerned about the interest that has been shown by this committee and by your agencies whenever we have these tragedies occur.

Perhaps the answer has been given to the chairman of the committee or to the staff, but as I recall there was an extensive investigation on several 727 crashes. So far as I know, I have never seen any follow-through on the part of those making the investigation.

We are concerned about congestion, but as I understand it this crash in Hendersonville was not a question of any congestion, but simply a matter of a plane in the process of taking off colliding apparently with one in the process of landing. Is that about it, Mr. Allen?

Mr. ALLEN. Yes, sir. You had one aircraft, the Piedmont flight 22, departing Asheville Airport and the Cessna 310 was approaching for a landing at the Asheville Airport.

Mr. WATSON. As I recall your reading some of the flight recordings, at one time was it not indicated that these planes were identified as being 3 to 4 miles apart?

Mr. ALLEN. No, sir, I don't recall that there was any distance given in the transcripts that I read.

Mr. WATSON. Well, we will not pursue that. I am sure your investigation has not been completed.

I am sure all of you have read the book by Capt. Vernon W. Lowell. I don't know the gentleman, but he makes some rather serious and grave statements. He deals with this matter of midair collisions. He states, and I wonder if any of you gentlemen will verify it, that the statistics on near collisions are shocking.

There are approximately 500 traffic-controlled near-misses in the United States annually that reach the record books, and he would conclude that many are never reported.

Is that factual, according to your record, Mr. Thomas?

Mr. THOMAS. Yes, sir; there are between 400 and 600 a year reported. We investigate those. How many that occur and are not reported, obviously, we don't know. This is out of about 250,000 flights a day.

Mr. WATSON. Yes; but over 500 reported is a rather grave matter, isn't it?

Mr. THOMAS. Yes, sir.

Mr. WATSON. He states further that when you have a midair collision there are seldom any survivors. That would be your experience, wouldn't it?

Mr. THOMAS. Yes, sir.

Mr. WATSON. I wonder what, specifically, your agency has done in trying to reduce this. This gentleman states further, and I do applaud him for not only criticizing but making some suggestions, on page 85, that, "There is in existence now an electronic collision warning device," and he recommends that all aircraft, large and small, be equipped with that.

Would you comment on that statement?

General MCKEE. I have already commented at length on the status of the collision avoidance system, Congressman.

Mr. WATSON. Perhaps I was reading this book and didn't hear you. I did hear some discussion about anticollision. I know the pilot would have to avoid the collision. I am thinking about a warning device.

General MCKEE. I made a complete statement on that, sir. I have a piece of paper that I didn't use in talking to it, but I would be happy to give it to you. It would give you the exact status of where that stands.

Mr. WATSON. I would be happy to read it. Is there or is there not such a thing as an electronic collision warning device in existence today?

General MCKEE. There is not. It is only in the research and development area. There is not one in production nor is there one that has been proved out.

Mr. WATSON. To your satisfaction or to whose satisfaction?

General McKee. To the satisfaction of the FAA, the industry and even the manufacturers. They have made great progress, very great progress. We are going to proceed into the actual hardware of making three of these. Each company is going to do it. They will be proof-tested to determine which is the best and to determine if it is really an effective system. If it is, the airlines have agreed that they will put it into their airplanes. FAA would have to come up to the Congress and ask for some $50 million, which we are prepared to do, to put in the ground system.

Mr. Watson. We are all aware of the accelerated speeds at which planes travel today, and you cannot rely upon visual observation. You would be on top of one another by the time you saw the plane. You would have to resort to some electronic or radar device for detection of an oncoming plane.

Mr. Thomas. Yes, sir. I just want to say one more thing on the collision warning device. The Air Transport Association within the last 30 days has issued specifications for such a device. This is a result of industry, government and the airlines all working together on it.

So all the brains that we know how to get on it have been on this problem.

With regard to the speeds, obviously, there is a speed where see and be seen is no longer valid. The only solution to that at the present time is radar control. This is why we have positive radar control at the high altitudes where those speeds are exercised.

Mr. Watson. Thank you. I hope we can pursue this diligently. This man further states that we have had 15 midair collisions in the past 20 years.

The Chairman. Mr. Rooney.

Mr. Rooney. Mr. Chairman, I will direct my questions to General McKee.

General, as you know, during the past 2 years of your administration I have been trying actively to get radar installed at the Allentown-Bethlehem-Easton Airport. This airport is no different than the Hendersonville Airport or any other airport in the country.

You speak about radar and you see the need for radar. You wish you could establish radar facilities at every airport in the country. You made that statement, is that correct?

General McKee. I said it would be highly desirable, obviously, if money was not an object.

Mr. Rooney. Every reply I have had from your office is always in dollars and cents versus lives. Last year, in fiscal 1967, under the new facilities and equipment, how much was requested by FAA?

General McKee. In fiscal 1967?

Mr. Rooney. Yes.

General McKee. On radar?

Mr. Rooney. Well, new facilities and equipment. Doesn't that include radar?

General McKee. The total for facilities and equipment that was requested of the Congress was $28 million. Our request was $73 million. That was to the Bureau of the Budget.

Mr. ROONEY. You requested $28 million in fiscal 1967 and you were granted $28 million.

General MCKEE. That is right.

Mr. ROONEY. This was $11 million less than you requested in fiscal 1966. So why don't you request more money?

General MCKEE. I think in that regard, Mr. Rooney, we have to look at the overall situation in the U.S. Government. All of the agencies of the Government, obviously, would like to have everything they think they want. Obviously, if everyone got what they thought they wanted, we would have a budget many billions of dollars more than the budget we have today.

I am only a part of an administration. We have to take into account the other problems. We have a problem in Vietnam. We have problems of highway safety. We have problems of marine safety.

So there are a lot of things that are highly desirable but, nevertheless, in the priority system we can't justify them.

Mr. ROONEY. You are now talking like the Director of the Bureau of the Budget. You told me that you needed the money, that we needed the facilities, and yet you don't request the money to install radar installations throughout the country.

Let's get back to 100,000 itinerant operations. That is a misnomer. We at the Allentown-Bethlehem Airport have 103,000 itinerant operations, but unfortunately, 37,000 of those are local. What difference does it make if you have a local plane landing and taking off to go to Washington and return to the A–B Airport? If you have 100,000 flights in and out of that airport, why can't they qualify for radar?

Mr. THOMAS. The reasoning behind it is that the local flights are familiar with the area and by our definition are those that are generally within the traffic pattern. From our viewpoint, those that require more traffic handling, particularly a function of the Federal Government, are those from away from that airport. Those in the traffic pattern we did not count.

We have been giving consideration to counting those as well. At the time they occupy the runway they look just like any other airplane.

Mr. ROONEY. I have two final questions.

General McKee, I would like to ask one other question about the 1966 request of $51 million for new facilities and equipment. You were granted $49 million. How much of that was spent?

General MCKEE. This was in 1966?

Mr. ROONEY. Yes.

General MCKEE. We asked for $51 million and were granted $49.8 million. Do you want the status of the expenditures?

Mr. ROONEY. You were granted $49 million in 1966. How much was unexpended?

General MCKEE. I don't have that figure with me.

Mr. ROONEY. It is in the neighborhood of $25 million.

General McKee. I will have to furnish that for the record. I can assure you that we spend it as fast as we reasonably can when we get it.

(The following information was subsequently submitted:)

FEDERAL AVIATION ADMINISTRATION STATEMENT ON UNOBLIGATED BALANCE OF FISCAL YEAR 1966 FACILITIES AND EQUIPMENT APPROPRIATION

Of the $49.8 million Facilities and Equipment money authorized for FY 1966, obligations of $30.1 million have been incurred as of June 30, 1967. In regard to the unobligated balance of $19.7 million, these funds are programmed for completion of projects which have been started. Included in this amount is $12.7 million for automation and $3.8 million for air traffic control tower facilities.

Mr. Rooney. I believe Mr. Allen made a statement about the physical condition of the pilot in the general aviation plane, and said his age and said that he did have corrective lenses and was told to carry another pair of glasses in the plane. Have you any idea whether or not the pilot had his glasses on at the time?

Mr. Allen. Mr. Rooney, at this point in time we have not been able to determine whether or not the pilot was wearing glasses, nor that he carried another pair in the aircraft. That does not mean that they were not there. It is a very difficult and painstaking search to locate these items.

Mr. Rooney. Mr. Chairman, I have no further questions, but I believe something is wrong with our entire operation on how we get to the formula for itinerant operations and I think something ought to be done for the FAA to install more radar facilities in every airport in this country that has an operation of 100,000, whether it is itinerant operations or locally based operations.

The Chairman. Mr. Brotzman?

Mr. Brotzman. Thank you, Mr. Chairman.

Time being what it is, I don't think we can go into all the areas that this committee really needs to look into in the limited time we have. I personally feel that the recent occurrences demand that we proceed further to know more about the whole area of air safety.

I have one question specifically, however: Is there a definition of a near-miss? What are we talking about when we talk about a near-miss?

Mr. Thomas. Yes, sir. The obvious definition is when a pilot reports a near-miss. We spend a great deal of time on it. We have classified them in no hazard, that is, when direction and altitude would have made a midair collision improbable regardless of evasive action taken. We get some reports of pilots watching for 2 minutes and a near-miss occurs, or he was at least 1,000 feet away. We tend to discount those.

Then we classify as potential, an incident which would probably have resulted in a collision if no action had been taken by either pilot. A proximity of less than 500 feet would usually by required in this case; that is where the pilot actually sees the situation and takes action and avoids it.

Then we say critical is a situation where collision avoidance was due to chance rather than the act on the part of the pilot. In other

words, he just saw something go by and took no action or didn't see it in time.

Of these 500 or 600 reported a year, there are very few that fall in the critical category. One of the reasons they may or may not, and we don't feel too good about our own statistics because we rarely get the other pilot's view, it is an unknown aircraft and we can't find him, so we have one pilot's view. Sometimes we have two, as in the case of the Navion-American flight. In the case of the Western and the two Navy aircraft, we don't know, so we just classify that as either potential or critical, because we don't know.

Mr. BROTZMAN. Are most of these near-misses occurring in airports where they do not have radar?

Mr. THOMAS. No, sir. There are two reasons for that. One is a large number of them occur en route where it is not a terminal situation at all. In the terminal situation where we have radar, we have the most traffic and, therefore, the most potential. Where we don't have radar we have the least potential.

We have analyzed them. Quite often you will find that they are in the terminal area with visibility of more than 5 miles. There will be a slight preponderance either departing or taking off and not just in the traffic pattern. So we find almost and equal number of them en route, and it is very random.

Mr. BROTZMAN. I believe you mentioned a moment ago that there seems to be some fear of reporting a near-miss, because of threatened punitive action. Is this the company that penalizes the pilot for something he has done, or is it the FAA?

Mr. THOMAS. The penalty would come from us. Of course, as I say, we are now trying to arrange to get the information without any penalty. But a pilot reports a near-miss and we examine it.

The way the fear originated was that we examined and found out that he was at the wrong altitude or hadn't followed his instructions or something else, some other violation. We then took some action. This is reputed to have dried up the near-misses.

However, I notice that the critical ones that are reported continue about the same. We are trying to encourage the pilots to give us all the information they can. Even if we find them in the wrong, we will not impose a penalty because we want to know the proper corrective action.

Mr. BROTZMAN. It would seem for us to understand this problem fully, we have to be able to nail these statistics down more accurately. I am just relying on a newspaper account that I read this morning, stating that in 1966 there were 463 near-misses reported, but that the average since 1960 has been 532.

This would indicate, if these figures are even in the ball park, that either the situation is getting better, which I doubt, or that there are, in fact, a lot of near-misses that are not reported.

Mr. THOMAS. Since the traffic is growing rapidly, the potential for near-misses would be increasing. The actual number reported is going down somewhat. I would suspect the situation is not improving, as the reports would indicate.

Mr. BROTZMAN. I thank the chairman.

General McKee. The main thing, I think, Mr. Brotzman, is we have to get to the bottom of this. That is the reason I am willing to take off the penalty and get the pilot to report so we find out what the situation really is.

Mr. Thomas. Could I add one more thing?

We have tried anonymous reporting. They were so anonymous that we had absolutely nothing. We just couldn't do anything with it.

The Chairman. The Chair notes that we have been in session now for some two hours and a half. If it is all right with the panel, we will resume at 2 o'clock.

We will stand in recess until 2 o'clock.

(Whereupon, at 12:38 the committee recessed, to reconvene at 2 p.m., the same day.)

AFTER RECESS

(The committee reconvened at 2 p.m., Hon. Harley O. Staggers, chairman, presiding.)

The Chairman. The committee will come to order.

When we stopped the proceedings at noontime, Mr. Satterfield was to question.

Mr. O'Connell, did you want to make a statement at this time that perhaps would be pertinent?

Mr. O'Connell. If you will permit me to.

Mr. Chairman, I have before me a summary of midair collisions which have occurred in the United States between 1956 and 1967. I also have before me a breakdown of those indicating in some detail the type of aircraft, the time of day, and pertinent information with respect to them. The summary is readily available, and has already been released, although not as up to date as this. The detail which accompanies it contains very valuable information, and it occurs to me that it would be very helpful if it were included in these proceedings, and I would like to offer it.

The Chairman. It will be included at this point in the record. Thank you.

(The material referred to follows:)

MIDAIR COLLISIONS, U.S. CIVIL AVIATION, 1956–67

Year	Number of accidents		Number of fatalities	Number of accidents by segments of aviation involved				
	Total	Fatal		Air carrier	Air carrier (general aviation)	Air carrier (military)	General aviation (military)	General aviation
1956	17	11	161	1	1	0	1	14
1957	15	6	[1] 19	0	0	1	4	10
1958	16	12	86	0	0	2	2	12
1959	13	10	20	0	0	0	3	10
1960	26	10	[2] 152	1	4	0	2	19
1961	20	10	22	0	0	0	0	20
1962	19	9	27	0	0	0	5	14
1963	13	3	6	0	0	0	2	11
1964	15	7	12	0	0	0	2	13
1965	27	14	30	1	0	0	2	24
1966 (preliminary)	14	6	21	0	1	0	0	13
1967 (preliminary)	11	9	126	0	2	1	2	6
Total	206	107	682	3	8	4	25	166

[1] Includes 3 persons on ground.
[2] Includes 6 persons on ground.

Source: Department of Transportation, National Transportation Safety Board, Bureau of Aviation Safety, July 20, 1967.

PRELIMINARY INFORMATION, 1966

Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Crew	Other	Total	Day/night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-0060	Feb. 5	Muscle Shoals, Ala	Aeronca L-16				None	Day	573	VFR	5+	None	Traffic pattern.	Go-around	Practice	No	No.
			Cessna 150				None					do	do	Level off/touchdown.	Trng	No	Yes.
2-0075	Mar. 10	Venice, La	Sikorsky S-62A				None	Day	150	VFR	5+	do	do	Ldg. final approach.	Air taxi passg.	No	No.
			Bell 47G-2A				None					do	do	Initial climb	do	No	No.
2-0091	Jan. 23	Rockton, Ill	Piper PA-22		1		1	Day	1,700	VFR	5+	VFR	1 mi	Cruise	Solo	No	Unk.
			Cessna 172	3	1		4					None	1 mi	do	Pleas	No	Unk.
2-0107	Feb. 5	Wappingers Falls, N.Y.	Beech 23	1	1		2	Day	865	VFR	5+	do	Traffic pattern.	Final approach.	Pleas	No	No.
			Piper PA-22		1		1					do	do	do	Pleas	No	No.
2-0178	June 11	Livermore, Calif	Schweiger SGS-126				None	Day	2,000	VFR	5+	do	2 mi	Climb to cruise.	Practice	No	No.
			Pratt-Reid LNE-1				None					do	2 mi	do	do	No	No
2-0178	June 11	Livermore, Calif	Schweiger SGS-126				None	Day	2,000	VFR	5+	do	2 mi	Climb to cruise.	Practice	No	No.
			Pratt-Reid LNE-1				None					do	2 mi	do	do	No	No.
2-0260	June 26	Ann Arbor, Mich	Cessna 150				None	Day	860	VFR	5+	do	Traffic pattern.	Initial climb	Dual	No	Yes.
			Piper PA-22				None					do	do	do	Solo	No	No.

Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Fatalities: Crew	Fatalities: Other	Fatalities: Total	Day/night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-0318	July 9	Kankakee, Ill	Cessna 150				None	Day	632	VFR	5+	None	Trffaic pattern	Final approach.	Dual	No	No.
			Beech 23				None					do	do	do	Solo	N	No.
2-0350	Jan. 22	Warwick, R.I	Piper PA-28		1		1	Day	Unk.	VFR	5+	do	do	Circling	Air taxi passg.	No	Unk.
			Cessna 150		2		2					do	do	Final approach	Dual	No	No.
2-0355	Feb. 20	Near Anchorage, Alaska	Piper PA-18				None	Day	500	VFR	5+	do	Beyond 5 mi.	Cruise	Pleas	No	Unk.
			do	1	1		2					do	do	Unk	Hunting	No	Unk.
2-0423	May 18	Santa Ynez, Calif	Piper PA-18				None	Day	743	VFR	5+	do	Traffic pattern	Final approach	Dual	No	No.
			Cessna 150				None					do	do	do	do	No	No.
2-0464	July 29	Minden, Nev	Cessna 150				None	Day	540	VFR	5+	do	do	Circling	Solo	No	Yes.
			do				None					do	do	do	Dual	No	Yes.
2-0479	Aug. 30	Los Angeles, Calif	Bell 47G-4	2	1		3	Day	800	VFR	5+	do	Beyond 5 mi	Cruise	Police patrol	No	No.
			do	1	1		2					do	do	do	do	No	No.
2-0515	July 23	Jacksonville, Fla	Piper PA-23				None	Day	341	VFR	5+	do	Traffic pattern	Final approach	Pleas	No	No.
			Piper PA-28				None					do	do	do	Pleas	No	No.
	June 16	Columbia City, Ind	Curtiss C-46		2		2								Cargo D		
			Piper PA-23		1		1										

1–0033	Dec.	4	Near Carmel, N.Y.	L–1049C	3	1		4	Day	11,000	VFR	5+	IFR	5 mi. +	Cruise	Passg. D	Yes	Yes.
				B–707				None							do	Passg. D	Yes	Yes.
2–0001	Jan.	1	Folsom Lake, Calif.	PA–24	3	1		4	Day	3,000	VFR	5+	None	5 mi. +	do	Pleas	Unk	Unk.
				Beech 35–33				None					do		Climb	Pleas	Unk	No.
2–0017	Jan.	17	Nashua, N.H.	PA–22				None	Day	223	VFR	5+	do	Traffic pattern.	Final approach	Solo	No	No.
				Cessna 140				None					do	do	do	Pleas	No	No.
2–0069	Feb.	21	Fredericksburg, Pa.	PA–22				None	Day	595	VFR	5+	do	do	do	Dual	No	No.
				Aeronca 7–AC				None					do	do	do	Pract	No	No.
2–0251	Feb.	26	Fort Lauderdale, Fla.	Boeing A–75	1			1	Day	2,500	VFR	5+	do	1 mi	Acrobatics	Show	No	No.
				NAA–T–6	1			1					do	1 mi	Cruise	do	No	No.
2–0256	May	2	Westerlo, N.Y.	Hughes 269A	1	1		2	Day	1,700	VFR	5+	do	2 mi	do	Pleas	No	Unk.
				T–craft BC–12D	1			1					do	2 mi	do	Pleas	No	Yes.
2–0283	Mar.	6	Cable, Wis.	PA–20				None	Day	1,800	VFR	5+	do	Traffic pattern.	Final approach.	Pleas	No	No.
				Fairchild M–62A				None					do	do	do	Pleas	No	No.
2–0287	Apr.	16	Kaplan, La.	Grumman G–164				None	Day	42	VFR	5+	do	5 mi.+	Swath	Aerial application.	No	No.
				do				None					do	5mi. +	do	do	No	No.
2–0292	May	14	Lodi-Garfield, N.J.	PA–22				None	Day	1,800	VFR	5+	VFR	3 mi	Climb	Solo	No	No.
				Beech 23	1			1					None	3 mi	Desc	Pleas	No	No.
2–0295	May	4	Garwood, Tex.	Funk F–23				None	Day	129	VFR	5+	do	½ mi	Swath	Aerial application.	No	No.
				Callair A–5				None	Day				do	½ mi	do	do	No	No.
2–0335	July	3	Atlanta, Ga.	Cessna 150				None	Day	2,600	VFR	5+	do	5 mi.+	Cruise	Dual	No	No.
				PA–24				None					do	5 mi.+	do	Pleas	Yes	No.

MIDAIR COLLISIONS, U.S. CIVIL AVIATION—Continued

1965—Continued

Docket No.	Date	Location	Aircraft	Fatalities				Day/ night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
				Passg.	Crew	Other	Total										
2-0454	May 26	Granite, Md	PA-28		2		2	Day	2,880	VFR	5+	None	4 mi	Cruise	Dual	No	Unk.
			PA-28		2		2					do	4 mi	do	do	No	Unk.
2-0514	Aug. 31	Bonita, La	PA-25				None	Day	250	VFR	5+	do	5 mi.+	Swath	Aerial application.	No	No.
			PA-25		1		1					do	5 mi.+	do	do	No	No.
2-0651	Sept. 2	Near Foxwells, Va	Champ 7-ECA				None	Day	1,850	VFR	5+	do	5 mi.+	Cruise	Fish spot	No	No.
			do				None					do	5 mi.+	do	do	No	No.
2-0672	Aug. 15	Near Fremont, Calif	PA-18				None	Day	3,300	VFR	5+	do	5 mi. +	Climb	Towing	No	Yes.
			Beech E-35				None					do	5 mi. +	Desc	Buss	No	No.
2-0673	Aug. 29	Northbrook, Ill	Cessna 150				None	Day	800	VFR	5+	do	¼ mi	Final approach.	Solo	No	No.
			do				None					do	¼ mi	do	Dual	No	No.
2-0689	July 12	Near Clements, Calif	Callair A-9		1		1	Day	750	VFR	5+	do	5+	Cruise	Aerial approach.	No	No.
			PA-25				None					do	5+	do	do	No	Yes.
2-0690	June 27	Neffsville, Pa	Cessna 170				None	Day	577	VFR	5+	do	¼ mi	Final approach.	Pleas	No	No.
			PA-24		1		1					do	¼ mi	do	do	No	No.
2-0693	Oct. 12	Montgomery, Ala	Lockheed T-33				None	Day	2,500	VFR	5+	VFR	2 mi	Cruise	Trng	No	No.
			PA-28				None					VFR	2 mi	do	Buss	Unk	Yes.
2-0698	Sep. 4	Flushing, N.Y	PA-23				None	Day	14	VFR	5+	None	Traffic pattern.	Final approach.	Pleas	No	No.
			PA-22				None					do	do	do	do	No	No.

2–0822	Nov.	1	Fort Wayne, Ind	Cessna 172			None	Night	933	VFR	5+	do	¼ mi	do	Solo	No	Yes.
				Cessna 150			None					do	¼ mi	do	do	No	No.
2–0826	Sept.	10	Louisville, Ky	DC–3			None	Day	2,349	VFR	5+	do	4 mi	Climb	Charter	No	No.
				Cessna 150	1		1					do	4 mi	Desc	Prac	No	No.
2–0844	Dec.	5	Wheeling, Ill	Beech 23			None	Day	996	VFR	5+	do	Traffic pattern	Landing	Pleas	No	Yes.
				Cessna 182			None					do	do	Climb	do	No	No.
2–1030	Nov.	14	New Carlisle, Ohio	PA–18			None	Day	1,600	VFR	5+	do	1 mi	Traffic pattern	Prac	No	No.
				J–3	1		1					do	1 mi	Cruise	Pleas	No	No.
2–1033	Dec.	19	Knox, Ind	PA–23	2	1	3	Day	1,714	VFR	5+	do	1 mi	do	Pleas	No	No.
				Stinson 108			None					do	1 mi	do	do	No	Yes.
2–1039	Oct.	31	Pacoima, Calif	Luscombe 8–A			None	Day	1,600	VFR	5+	do	3 mi	Traffic pattern	Dual	No	No.
				PA–28	1		1					do	3 mi	Climb	Pleas	No	Yes.
2–1083	Nov.	7	Tulsa, Okla	C–124			None	Day	9,000	VFR	N/R	IFR	5+	Cruise	Mil	Yes	Yes.
				Cessna 172	2	1	3				N/R	None	5+	do	Pleas	No	No.

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2–0033	Jan.	4	Palo Alto, Calif	Luscombe 8–A			None	Day	30	VFR	5+	None	Traffic pattern.	Final approach.	Instruct solo	No	No.
				Globe GC–1B			None					do	do	do	Pleasure	No	No.
2–0132	May	4	Baton Rouge, La	Piper PA–22	1		1	Day	100	VFR	5+	do	do	do	Practice	No	No.
				do	1		1					do	do	do	do	No	No.
2–0355	Apr.	30	Enid, Okla	do			None	Dawn	1,470	VFR	Unk.	do	do	do	Business	No	No.
				Cessna 210			None				Unk.	do	do	do	do	No	No.
2–0363	May	16	Westminister, Calif	Ercoupe 415–C	1		1	Day	2,500	VFR	5+	do		Cruise	Pleasure	No	Yes.
				Douglas A4–B			None					VFR	5+	Descending	Practice	No	No.

MIDAIR COLLISIONS, U.S. CIVIL AVIATION—Continued

1964—Continued

Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Fatalities: Crew	Fatalities: Other	Fatalities: Total	Day/night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-0476	July 8	Max, Nebr	Slingsby Lark 4				None	Day	7,000	VFR	5+	None		Cruise	Pleasure	No	Yes.
			Schleicher KA-6CR				None					do	5+	do	do	No	No.
2-0544	Aug. 6	San Jose, Calif	Cessna 170				None	Day	Unk.	VFR	5+	do	Traffic pattern.	Go-around	do	No	Yes.
			Cessna 150				None					do	do	Initial climb	Instruct dual	No	No.
2-0645	Sept. 3	Near Quincy, Wash	Boeing A-75				None	Day	1,400	VFR	5+	do		Procedure turn.	Aerial application.	No	Yes.
			Piper PA-25		1		1					do	5+	do	do	No	No.
2-0708	Sept. 9	Near Victoria, Tex	Beech D-18S		1		1	Day	16,000	VFR	5+	do		Normal cruise	Business	No	Unk.
			Grumman F-11A		1		1					do	5+	Climb to cruise.	Practice	No	Unk.
2-0816	Nov. 25	Santa Monica, Calif	Cessna 150-C				None	Night	1,000	VFR	3	do	Traffic pattern.	Circling	Instruct. solo.	No	No.
			Cessna 150-D				None					do	do	do	Instruct. dual.	No	No.
2-0833	Nov. 9	Ponca City, Okla	Cessna 206				None	Day	6,500	VFR	5+	do	4 mi	Normal cruise.	Air taxi, pass.	No	No.
			Piper PA-24		1	1	2					do	4 mi	do	Pleasure	No	No.
2-0938	Dec. 13	Anaheim, Calif	Cessna 120				None	Day	3,000	VFR	5+	do	4 mi	do	Instruct. check.	No	No.
			Cessna 150		1		1					do	4 mi	do	Practice	No	No.
2-0959	Dec. 12	Olathe, Kans	Cessna 182				None	Dusk	Unk.	VFR	5+	do	¼ mi	Final approach	do	No	Yes.
			Cessna 170-B				None					do	¼ mi	do	Pleasure	No	No.

2–1032	Nov. 23	Pomona, Calif.	Cessna 150–D	1	1	2	Day	1,850	VFR	5+	do	3 mi.	Normal cruise.	Demonstration.	No	No.
			Cessna 150–A	1		1					do	3 mi.	do	Instruct. solo.	No	No.
3–0429	Feb. 22	Albuquerque, N. Mex.	Cessna 150			None	Day	5,470	VFR	5+	do	Traffic pattern.	Final approach	Pleasure	No	No.
			Piper PA–22			None					do	do	do	Practice	No	No.
3–1517	June 2	Lexington, Tenn.	Cessna 310–C			None	Day	3,500	VFR	5+	do	5+	Normal cruise.	Corporate	No	No.
			Piper PA–22			None					do	5+	do	Pleasure	No	No.

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2–0307	July 30	Allentown, Pa.	Stinson 108	1		1	Day	2,000	VFR	Unl.	None	3 mi.	Cruise	Pleas.	No	No.
			Beech L–23	2		2					IFR	3 mi.	App.	Trng.	No	No.
2–0182	Jan. 30	Agawam, Mass.	Ercoupe			None	Day	150	VFR	2½	None	¼ mi.	TP	Bus.	No	No.
			T-Craft			None					do	¼ mi.	Final approach.	Pleas.	No	No.
2–0875	Apr. 13	West Hollywood, Fla.	Cessna 172			None	Day	60	VFR	NF	do	On	TO	Practice	No	No.
			Funk			None					do	Arp	do	Instruct.	No	No.
2–1120	Apr. 24	Pacoima, Calif.	Cessna 150			None	Day	250	VFR	NF	do	½ mi.	Final approach.	Practice	No	No.
			Cessna 172			None					do	½ mi.	do	Pleas.	No	No.
3–1606	Nov. 5	Warren, R.I.	Cessna 150			None	Day	Unk.	VFR	NF	do	5+	Cruise	Instruct.	No	No.
			Cessna 182			None					do	5+	do	Unk.	No	No.
2–1676	Apr. 1	Near Las Vegas, Nev.	Navion	1		1	Day	1,100	VFR	NF	Unk	5+	Descent	Bus.	Unk	No.
			F–105	1		1					Unk	5+	do	Trng.		No.
2–2064	July 17	Lombard, Ill.	Bellanca			None	Day	15	VFR	NF	None	On arp	TO	Pleas.	No	No.
			PA–15			None					do	On arp	do	Instruct.	No	No.

MIDAIR COLLISIONS, U.S. CIVIL AVIATION—Continued

1963—Continued

Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Crew	Other	Total	Day/ night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-2121	July 30	Tulsa, Okla	Cessna 172				1	Day	100	VFR	NF	None	¼ mi	Final approach.	Bus	No	No.
			Cessna 210				None					do	¼ mi	do	do	No	No.
2-2332	Oct. 13	Caro, Mich	Beech 35				None	Day	60	VFR	NF	do	¼ mi	do	do	No	No.
			Cessna 172				None					do	¼ mi	do	do	No	No.
2-2487	June 2	Wheeling, Ill	Aeronca 11				None	Day	50	VFR	NF	do	¼ mi	do	Pleas	No	No.
			Cessna 140				None					do	¼ mi	do	do	No	No.
2-2489	Aug. 25	Amityville, NY	PA -22				None	Day	35	VFR	NF	do	¼ mi	do	Instruct	No	No.
			Cessna 205				None					do	¼ mi	do	Bus	No	No.
2-2490	Sep. 2	Gainesville, Tex	Beech T-24				None	Day	Unk.	VFR	NF	do	½ mi	do	Instruct	No	No.
			Cessna 210				None					do	½ mi	do	Pleas	No	No.
2-2491	Sep. 12	Tempe, Ariz	N3-N				None	Day	Unk.	VFR	NF	do	5+	Cruise	Aerial application.	No	No.
			PA-22				None					do	5+	do	Pleas	No	No.

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Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Crew	Other	Total	Day/ night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-0028	Feb. 1	Broomfield, Colo	PA-24	1	1		2	Day	200	VFR	NF	None	¼ mi	Final approach.	Business	No	No.
			Cessna 150		2		2					do	¼ mi	do	Instruct		No.
2-0042	Jan. 18	Madera, Calif	Cessna 172		1		1	Day		TP	VFR	2½-3M	do	TP	do	Public fly	No	No.
			Piper PA-22	1	1		2					do	TP	do	Business	No	
2-0212	June 18	Glendive, Mont	PA-24		1		1	Day		TP	VFR	NF	do	TP	Climb	do	No	No.
			Cessna 170		1		1					do	TP	Final approach.	do		

2–0760	June	8	Tallahassee, Fla	Lockheed 18	2	2	4	Day	8,000	VFR	NF	IFR	2 mi	Cruise	Corporate	No	No.
				Lockheed T–33A			None					IFR	2 mi	Climb	Training (mil.).		
2–1389	Oct.	2	St. Augustine, Fla	Beech G–18	2	2	4	Day	Unk.	VFR	NF	IFR	5+	Unk	Corporate	No	No.
				USN F3H–2		1	1					Unk	5+	do	Mil. Op		
2–2166	May	30	Sherman, N.Y.	Cessna 172		1	1	Day	Unk.	VFR	NF	None	1¼ mi	Approach	Pleas	No	No.
				Aeronca 7	1	1	2					do	1¼ mi	do	do		
2–3489	Aug.	11	Steamboat Springs, Colo.	Beech T–34		1	1	Day	Unk.	VFR	NF	do	Unk	Swath run	Fire control	No	
				PB4Y			None					do	Unk	do	do	No	Yes.
2–3952	Aug.	15	Sacramento, Calif	Cessna 150		1	1	Day	350	VFR	NF	do	On arpt	Climb	Stu. solo	No	No.
				F9F			None					Mil	On arpt	do	Training	Yes	No.
2–4760	Nov.	10	Daggett, Calif	Cessna 320			None	Night	9,500	VFR	NF	VFR	5+	Cruise	Business	No	No.
				Cessna 182	1	3	4				NF	VFR	5+	do	Pleas	No	No.
2–0219	May	8	Wichita, Kans	Cessna 175			None	Day	250	VFR	9M	None	½ mi	Approach	Business	No	No.
				C–47			None					VFR	½ mi	do	Military	No	No.
2–1118	Oct.	22	Chickasha, Okla	Cessna 210			None	Day	10	VFR	NF	None	On arpt	do	Public flying	No	No.
				Cessna 170			None					do	On arpt	do	Business	No	No.
2–3352	Mar.	31	Montgomery, Ala	Cessna 172			None	Day	200	VFR	NF	None	On arpt	Final approach	Training	No	No.
				Cessna 150			None					do	On arpt	do	do	No	No.
2–4098	Oct.	13	Fort Collins, Colo	do			None	Day	50	VFR	NF	do	¼ mi	do	Dual training	No	No.
				Beech 35			None					do	¼ mi	do	Business	No	No.
2–4220	Sept.	14	Buffalo, N.Y.	Cessna 172			None	Day	150	VFR	NF	do	TP	do	Dual Instruct	No	No.
				Cessna 175			None					do	TP	do	Ferry	No	No.
2–4447	Dec.	5	San Jose, Calif	Cessna 140			None	Day	Unk.	VFR	5	do	TP	do	Training	No	No.
				Cessna 150			None					do	TP	Climb	Dual instruct	No	No.
2–4604	July	21	Moorpark, Calif	Cessna 182			None	Day	Unk.	VFR	NF	do	2 mi	Flight	Acrobatics	No	No.
				Centaur L–13			None					do	2 mi	do	do	No	No.

MIDAIR COLLISIONS, U.S. CIVIL AVIATION—Continued

1962—Continued

Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Fatalities: Crew	Fatalities: Other	Fatalities: Total	Day/night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-4681	Dec. 10	Palm Springs, Calif	Bell 47				None	Day	15	VFR	NF	None	TP	Final approach	Construction work.	No	No.
			do				None					do	TP	do	do	No	No.
2-4744	Dec. 3	Grain Valley, Mo	Mooney M-20				None	Day	400	VFR	NF	do	TP	Approach	Dual instruct	No	No.
			Piper PA-28				None					do	TP	do	do	No	No.
2-3562	Sept. 12	Middletown, Pa	Beech T-34				None	Day	Unk.	VFR	NF	do	Beyond 5 mi	Cruise	Experiment	No	No.
			Curtiss C-46				None					do	do	do	do	No	No.
								1961									
2-2798	Jan. 7	Boise, Idaho	Piper PA-12					Day	25	VFR	NF	None	¼ mi	Landing	Practice	No	No.
			Cessna 150									do	¼ mi	do	do	No	No.
2-0010	Feb. 21	Hopkins, Minn	Cessna 190		1		1	Day	150	VFR	NF	do	¼ mi	do	Air taxi	No	No.
			Cessna 210		1		1					do	¼ mi	do	Pleasure	No	No.
2-1275	Feb. 21	Spanaway, Wash	Cessna 195					Day	450	VFR	NF	do	Traffic pattern	do	do	No	Yes.
			Piper PA-18		1	1	2					do	do	do	do	No	No.
2-2704	Mar. 16	Pompano Beach, Fla	Grumman G-159					Day	15	VFR	NF	VFR	Over arpt	do	Business	No	No.
			Aeronca 7-AC		1	1	2					None	do	do	Pleasure	No	No.
2-0972	Apr. 4	Riverside, Calif	Beech K-35		1	1	2	Day	75	VFR	15+	do	Traffic pattern	do	Business	No	No.
			Cessna 172		2		2					do	do	do	Instruction	No	No.
2-0959	Apr. 22	Amarillo, Tex	do		1	1	2	Day	100	VFR	NF	Unk	do	Descending	Business	No	No.
			Cessna 170-B									None	do	Landing	Instruct solo	No	No.

2-0980	May 11	Bishop, Tex	Piper PA-18A				Day	10	VFR	NF	do	5+	Swath run	Aerial application.	No	No.
			do								do	5+	do	do	No	No.
2-4466	May 16	Troy, N.Y	Piper J-3				Day	1,500	VFR	NF	Unk	1½ mi	Cruise	Business	No	No.
			Luscombe 8-A	1	1	2					Unk	1½ mi	do	do	No.	No.
2-4465	May 22	Near Chinitna Bay, Alaska.	Piper J-3	1		1	Day	500	VFR	NF	None	Unk	Low pass	Hunting	No	No.
			Piper J-4	1		1					do	do	do	do	No	No.
2-0237	May 30	Spring Valley, N.Y	Cessna 150				Day	80	VFR	NF	do	Unk	Cruise	Practice	No	No.
			Cessna 172								do	do	do	Pleasure	No	No.
2-2847	June 10	Palo Alto, Calif	Beech 35-A				Day	10	VFR	NF	do	¼ mi	Landing	Business	Unk	No.
			Cessna 150								do	do	do	Dual instruct	Unk	No.
2-3572	June 21	Near Payson, Ariz	Beech T-34				Day	250	VFR	NF	do	Unk	Borate drop	Fire Cont	Unk	No.
			Cessna 180	1	1	2					do	do	do	do	Unk	No.
2-1587	June 29	Bishop, Tex	Piper PA-25				Day	10	VFR	NF	do	do	Swath Run	Aerial application.	No	No.
			Piper PA-18								do	do	do	do	No	No.
2-1693	Aug. 9	Friendswood, Tex	Cessna 150				Day	400	VFR	NF	Unk	¼ mi	Landing	Business	No	Yes.
			do								do	do	do	Dual Instruct	No	No.
2-4333	Sept. 22	Bellevue, Wash	Aeronica 11 AC				Night	250	VFR	NF	None	Traffic pattern.	do	Pleasure	No	No.
			do								do	do	do	do	No	No.
2-3329	Oct. 6	Pittsfield, Maine	Cessna 180				Night	4,400	VFR	NF	Unk	Unk	Cruise	Business	No	No.
			Piper PA-22								do	do	do	do	No	No.
2-4382	Oct. 15	Elsinore Valley, Calif	Schweizer 1-26				Day	Unk.	VFR	NF	None	Unk	Soaring	Pleasure	No	No.
			Pratt-Read S.P								do	do	do	do	No	No.

MIDAIR COLLISIONS, U.S. CIVIL AVIATION—Continued

1961—Continued

Docket No.	Date	Location	Aircraft	Fatalities: Passg.	Fatalities: Crew	Fatalities: Other	Fatalities: Total	Day/night	Alt. (feet)	Wx. cond.	Vis.	Flt. plan	Arp. prox.	Phase of operation	Kind of flying	Radar serv.	Evasive action
2-3921	Nov. 5	Santee, Calif	Cessna 140		1		1	Day	200	VFR	NF	None	Traffic pattern.	Take off	Solo instruct	No	No.
			Taylorcraft BC-12D		2		2					do	do	do	Dual instruct	No	No.
None	Nov. 22	Chia, Bogatá, Colombia	Piper Comanche		1		1	Day	300	VFR	NF	do	do	Climbing	Pleasure	Unk	No.
			Piper Cub		2		2					do	do	Landing	Dual instruct	Unk	No.
2-3979	Dec. 2	New Meridan, Conn	No American SNJ4					Day	1,000	VFR	NF	Unk	5+	Cruise	Photography	Unk	No.
			Luscombe 8-A									do	5+	do	do	Unk	No.

1960

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2-0003	Jan. 27	El Cajon, Calif	Cessna 182					Day	6,200	VFR	NF	None	More 5 mi	Cruise dual inst		No	No.
			Douglas AD-5W									Unk	do	do	Unk		No.
2-0656	Jan. 31	York, Pa	Piper PA-22					Day	150	VFR	NF	None	Traffic pattern	Landing	Air taxi	No	No.
			Cessna 120									do	do	do	Pleasure		No.
2-0442	Feb. 3	East Berlin, Mass	Fairchild M-62A	1	1		2	Day	Unk.	VFR	NF	do	More 5 mi	Cruise	do	No	No.
			Piper J-3									do	do	do	do		No.
2-0315	Feb. 7	Rosemont, Minn	Piper PA-20					Day	5	VFR	NF	do	Over arpt	Landing	do	No	No.
			Cessna 150									do	do	do	do		No.
2-0633	Feb. 28	Albuquerque, N.Mex	Piper PA-22					Day	20	VFR	NF	do	do	Takeoff	do	No	Yes.
			Cessna 140									do	do	do	do		No.
2-1483	Mar. 14	Deer Park, N.Y	Champion 7-FC					Day	80	VFR	NF	do	¾ mi	Landing	Student solo	No	Yes.
			Aeronca 7-AC									do	¾ mi	do	do		No.

2–0863	Mar. 14	Harvey, La	Cessa 180 (Seaplane)				Day	200	VFR	NF	do	Unk	do	Business	No	No.
			Cessna 180								do	do	Cruise	Unkn		No.
2–1718	Apr. 20	Hickory, N.C	Cessna 310	3	1	4	Day	125	VFR	NF	do	¼ mi	Landing	Business	No	No.
[1] 1–0061			Fairchild F–27								IFR	do	do	Sched. px. (air carrier).		Yes.
2–1994	May 20	Lake Village, Ark	Piper PA–18A				Day	50	VFR	NF	None	More 5 mi	Pull-up	Aerial app	No	No.
			do								do	do	do	do		No.
2–1913	May 22	Madera, Calif	DeHavilland 60–GM				Day	700	VFR	NF	None	Within 5 mi	Cruise	Air show	No	No.
			Davis DIW								do	do	do	do		No.
2–2071	May 27	Near Point Mugu, Calif	Cessna 172				Day	200	VFR	Unk	VFR	Unk	En route climb	Dual inst. (inst. trg.)	Unk	No.
			Military F4D1								do	On arpt unk	Takeoff climb	Military	Yes	Yes.
2–1515	June 26	Plain City, Ohio	Mooney MK–20A	3	1	4	Day	1,500	VFR	NF	None	Unk	Climb	Pleasure	No	No.
			do								do	On arpt unk	Cruise	do		No.
2–1146	July 4	Fort Wayne, Ind	Pack & Associates "D"	1		1	Day	80	VFR	NF	do	Over arpt	Air race	Air show	No	No.
			Kensinger	1		1					do	do	do	do		No.
2–2062	July 7	Bishop, Calif	Beech M–35				Day	5	VFR	NF	do	On arpt	Landing	Inst/dual	No	No.
			Cessna 150								do	Over arpt	do	Business		No.
2–4691	July 24	Winthrop, Wash	Mooney 20A				Day	100	VFR	NF	do	Traffic pattern	do	Pleasure	No	No.
			Cessna 180								do	do	do	Forest Service		No.
2–4246	Aug. 10	Dallas, Tex	Cessna 182				Day	100	VFR	NF	do	do	do	Business	Unk	No.
			Beech Bonanza (35)								do	do	do	Pleasure		No.
2–3902	Sept. 4	Elmira, N.Y	Schweizer 1–26				Day	Unk.	VFR	NF	do	Unk	Soaring	do	No	No.
			do								do	do	do	do		Yes.
2–2750	Oct. 1	Orlando, Fla	Beech A–35	1		1	Day	150	VFR	NF	do	Traffic pattern	Landing	Business	Unk	No.
[1] 1–0082			Martin 404								Unk	do	do	Sched/Px. (air carrier)		No.
2–2686	Oct. 4	Sacramento, Calif	Cessna 172	1	1	2	Night	70	VFR	Unk	VFR	do	Unk	Pleasure	Unk	No.
[1] 1–0075			C–46								Unk	do	Landing	Sched Px (air carrier)		No.

[1] Air carrier docket.

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1960—Continued

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				Passg.	Crew	Other	Total										
2-2219	Oct. 21	Riverside, Calif	Piper PA-24		1		1	Day	2,000	VFR	NF	None	Within 5 mi	Descending	Business	Unk	No.
			Cessna 150									do	do	Cruise	Inst/Dual		No.
1-0087	Nov. 17	Denver, Colo	DC-6					Day	500	VFR	NF	VFR	Traffic pattern	Landing	Sched/Px	Unk	No.
			Beech D-35									None	do	do	Business		Yes.
2-3137	Nov 18	Washington, N.C	Piper PA-17	0	1	0	1	Day	Unk.	VFR	NF	do	Unk	Formation flying.	Pleasure	Unk	No.
			Piper J-3A									do	do	do			Yes.
2-3058	Dec. 2	Palm Springs, Calif	Piper PA-23					Day	30	VFR	NF	do	Traffic pattern.	Landing	Business	Unk	No.
			Luscombe 8A									do	do	do	Pleasure		No.
2-3020	Dec. 3	Vero Beach, Fla	Piper PA-22					Day	15	VFR	NF	do	do	do	do	Unk	No.
			Stinson 108									do	do	do	do		No.
1-0083	Dec. 16	Near Staten Island, N.Y.	L-1049	39	5	6	50	Day	600	IFR	Unk	IFR	20 mi	Descending	Sched/Px	Yes	No.
			Constellation DC-8	77	7		84			IFR		IFR	20 mi	do	do	Yes	No.
2-1600	Dec. 20	Hamilton, Mont	Cessna 180	1	1		2	Day	Appr. 1,300	VFR	Unl	None	Unk	Cruise	Business	Unk	No.
			Taylorcraft BC-12		1		1					do	do	do	Pleasure		No.

2-0032	Feb. 1	Buena Park, Calif	Luscombe 8-A	1		1	Day	500	VFR	NF	None	TP	Takeoff	Pract				
			Piper PA-16	1		1					do	TP	do	Unk	No	No.		
2-1631	Mar. 26	Miami, Fla	Champion 7-FC	1		1	Day	125	VFR	NF	do	Over airport	do	Instruct				
			Cessna 150	1		1					do	do	Landing	do	No	No.		
2-2374	June 28	Halfmoon Bay, Calif	Beech 35			None	Day	50	VFR	NF	Unk	TP	do	Pleas		No.		
			Cessna 140			None					do	TP	do	Unk	No	No.		
2-4528	July 25	Calipatria, Calif	Boeing A-75N1			None	Day	Unk.	VFR	Unl	None	5+	Swath run	Aerial applic				
			do	1		1					do	5+	do	do	No	No.		
2-3159	Aug. 20	Chowchilla, Calif	Boeing A-75			None	Day	20	VFR	NF	do	Over airport	Takeoff	do		No.		
			Callair A-5			None					do	do	Landing	do	No	Yes.		
2-4485	Aug. 24	Moorehead City, N.C	Piper PA-18	1		1	Day	1,500	VFR	3 mi	do	5+	Cruise	Fish spotting	No	No.		
			Douglas A-4D			None					Unk	5+	Descending	Military	Yes	No.		
2-1350	Aug. 26	Near Cape Charles, Va	Piper PA-12	1		1	Day	300-1,000	VFR	Unk	None	5+	Cruise	Fish spotting				
			do	1		1					do	5+	do	do	No	No.		
2-1408	Sept. 30	Philadelphia, Pa	Aeronca L-16A			None	Day	50	VFR	NF	Unk	¼ mi	Final approach	Unk				
			Cessna 140	1		1						¼ mi	do	do	No	No.		
2-1753	Nov. 7	Mansfield, Ohio	Piper PA-22	2		2	Day	1,300	VFR	12	None	2 mi	Cruise	Dual instr				
			F-84F			None					VFR	2 mi	Low pass	Military	No	No.		
2-4509	Dec. 1	Fullerton, Calif	Piper PA-22			None	Day	1,000	VFR	Unk	Unk	TP	Landing	Practice				
			Bell 47J			None					do	TP	Approch	Business	No	No.		

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				Passg.	Crew	Other	To										
2-2964	Dec. 5	Palm Desert, Calif	Beech M-35	1			1	Day	Unk.	VFR	Unk	None	Unk	Cruise	Demonstr		No.
			Beech B-95	3	1		4					Unk	do	do	Unk	No	No.
2-1774	Dec. 15	Cheyenne, Wyo	Beech C-35		1		1	Day	2,850	VFR	Unl	VFR	4½ mi	do	Business		
			North American F-86L				None					VFR	4½ mi	do	Military	No	No.
2-4565	Sept. 18	Fort Pierce, Fla	Piper PA-11		1		1	Day	Unk.	VFR	Unl	None	¼ mi	Final approach.	Photo		
			Cessna 172				None					do	¼ mi	do	Instruct	No	No.

Note: NF—no factor; Unl.—unlimited

The CHAIRMAN. Mr. Satterfield.

Mr. SATTERFIELD. Thank you, Mr. Chairman.

General McKee, I gather from what has been said this morning that what you are really saying is that safety in and of itself depends upon a lot of different components, and that radar as such is only one such component.

General MCKEE. That is correct.

Mr. SATTERFIELD. I would like to ask you some questions about radar, since it seems to have been a center of discussion.

The radar that normally is employed at airports for control, control of aircraft, exactly how good is it as a safety tool?

General MCKEE. I will let Mr. Thomas answer that question, because he is more familiar with it than I am. It is good.

Mr. THOMAS. Mr. Satterfield, we use the best radar that we can buy, and it still is not perfect. As you know, and I think everyone knows, there are some targets that are very difficult to see—T–33, head on, some light aircraft, because it is dependent upon the airplane reflecting energy back to the radar and being picked up on a receiver. In addition, precipitation, weather, also makes it extremely difficult to see on radar.

Mr. SATTERFIELD. Is it possible to determine the altitude of the indications on the type radar you use?

Mr. THOMAS. No, sir. We do not use the so-called height-finding radar, because it isn't of much value in air traffic control.

Mr. SATTERFIELD. In other words, if you had two indications close together, they could be at the same altitude, or they could be 20,000 feet apart?

Mr. THOMAS. Yes, sir; this is one of the major deficiencies in our radar system, and we give out lots of traffic that really is of little interest to the other pilot. From a climb position, that is, if you were up, looking down, the paths would cross or come near each other. They may be separated by 10,000 or 15,000 feet. This is the sole aim of our big effort on the automation of the airspace, to put a device in the airplane that will read the altimeter, and then transmit the reading to the radar, and show it on the scope, but we are some distance away from that.

Mr. SATTERFIELD. Of course, this radar is located in a tower. Is it right where the tower controllers can see it, or does it require an individual to monitor it at all times?

Mr. THOMAS. No, sir; due to the fact that we use a cathode ray tube we are normally limited as to the light we can have, so we have a separate IFR room. In recent years we have had some progress in developing a so-called bright tube, and do have one scope in the tower cab itself, but usually, it is a separate darkroom, separated from the tower cab.

Mr. SATTERFIELD. So there would have to be communication between this room and the controller in the tower?

Mr. THOMAS. Yes, sir.

Mr. SATTERFIELD. In order to work properly, would it require constant surveillance, and would it not also require that every aircraft in the area be under constant control at all times?

Mr. THOMAS. Yes, sir; in order to provide traffic control, this is so. Now, we do provide radar advisory service, and I believe you heard

some of this in the transcript that was read, where we point out that there is unknown traffic 4 miles away. That does not include altitude or type, or anything more. It is an aid to the pilot so that he can look out and detect the traffic with his eyes. However, in order for the radar to provide for separation, the controller must know the identity of the airplane, must be in communication with it, must have a flight plan on it, and the pilot must comply with the instructions from the radar controller. Otherwise, it is not too valuable.

Mr. SATTERFIELD. So simply equipping certain airfields with radar in itself would not do much good, unless you had the other things to go along with it, to make it work to the maximum extent possible.

Mr. THOMAS. It would take a lot to go with it; yes, sir.

Mr. SATTERFIELD. I noticed some discussion was had earlier this morning with respect to dense areas like Washington, D.C., and I was interested in Mr. O'Connell's records that he is offering for the record. I wonder whether or not there is any indication in those records or of other statistics to show the percentage of midair collisions and whether or not more of them occur in high-density areas, than in low-density areas.

Mr. O'CONNELL. I would hesitate to be too specific, on the basis of what I have observed. A quick glance at the detailed information would indicate that a very small percentage of the total number of 206 midair collisions in the past 10 years have taken place in so-called congested or densly populated areas.

Mr. SATTERFIELD. I asked the question for a purpose, because it certainly appears to me, in my limited knowledge, that the higher the density and the more potential the danger, the better the safety record, and it would seem to me that herein lies many of the answers that we are seeking. I am not convinced in my own mind but what awareness on the part of the pilots that they are entering a more dangerous area might in some measure be reflected in the low incidence of collision in these dense areas.

Mr. THOMAS. I think that is true.

Mr. SATTERFIELD. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Kuykendall.

Mr. KUYKENDALL. General McKee, and members, it is good to have you here. You never know just how close to home some of these things we discuss on this committee may be. I noticed this morning in your testimony you mentioned that the 82d person was identified by a process of elimination, and about 20 minutes ago, I got word that this person was one of my good friends from Memphis, my hometown, so it gets pretty close.

General MCKEE. I can well understand.

Mr. KUYKENDALL. In your discussion this morning, I want to carry on a little bit with what Mr. Satterfield was saying, that he noticed some of these accidents were happening around the rather low-density areas. You also mentioned one of your problems being the fact that you have small country airports with, say, only four or six transactions a day from commercial airlines.

In your present penetration of radar into your commercial airports, do you have any idea what level of transactions that would be? Now, earlier in your testimony, General McKee, you, of course, pointed out that there will always be accidents, so we have to discuss here not the

total elimination of accidents, but just what practical steps we can take to reduce them.

I think we agree here on this; do we not?

General McKee. That is correct.

Mr. Kuykendall. Now, approximately—and if you cannot give this to us now, I would like to have an estimate in the record—how many transactions a day does the penetration of radar in our airports govern?

Mr. Thomas. I believe, Mr. Kuykendall, that on the hundred thousand, this is something less than 300 operations a day, on the average. They may or may not be air carrier. In the case of Asheville, which was just below the qualification, there are 30 air carrier landings and 30 air carrier takeoffs.

Mr. Kuykendall. That would be 60 transactions?

Mr. Thomas. Yes; so, generally, you would expect better than 60; somewhere between 50 and a hundred, depending on the mix of the other traffic.

Mr. Kuykendall. Now here is something that I am sure you do not have now, but I think this committee would be interested in, Mr. Chairman. Would there be some cost estimates to bring that down to the level of 30 transactions a day, or the level of 20 transactions a day? We know we cannot put in a radar service for six transactions a day; no one thinks we can. But what would it cost to bring it down to 30, or 20?

I think this information would be something the committee should have.

General McKee. We can develop that, and would be happy to supply it for the record. Obviously, you could have a scale of cost here, if you look at airports in the same category of Asheville—how many of them are there, is it desirable to put in radar, what is the cost going to be for that level of airport, and then for the next level. You can do this on a scaling basis.

(The following information was subsequently submitted:)

Federal Aviation Administration Statement on Estimated Cost of Installing Radar at Airports Serving 20 to 30 Daily Commercial Air Carrier Operations

The estimated cost of installing radar at all airports served by commercial aircraft which have 30 or more commercial aircraft movements a day is $30.8 million. We estimate it would cost an additional $39.8 million to establish radar service at airports served by air carrie aircraft which have 20 to 29 commercial aircraft movements a day.

Mr. Kuykendall. You mentioned this morning a $750,000 cost of installation of radar. I have seen these portable radar trailers that the Air Force owns, going around, where they can have a radar installation in a matter of 72 hours, let us say. Do these things cost $750,000?

Mr. Thomas. If you are looking at the normal, full-sized surveillance radar, yes. The equipment itself is not that much, but this includes all the installation and things to make it work. The Air Force and the military did develop a cheaper radar, but it is very limited in range, something like 15 miles, and it is limited in its activity, but our problem is here that even if we only have two operations a day, we should see them within the normal operating ranges and the altitudes. We are looking at a radar that would see about 50 miles, and up to, say 20,000 or 30,000 feet.

Mr. KUYKENDALL. Certainly.

Mr. THOMAS. The price for the electronics itself is much less than a half a million, probably around $400,000. The rest of it is getting it installed, and operating it, and the equipment that goes with it, to make it work.

Mr. KUYKENDALL. It is agreed that you are not in a position, since you are in the process of evaluating this evidence, of seeing the evidence that was involved in this accident, but those of us that heard the chronology of the tape here realize that it happened after they went off the radar here.

Now, a couple of quick questions. ILS does not require radar; yes?

Mr. THOMAS. No, sir.

Mr. KUYKENDALL. GCA does require radar?

Mr. THOMAS. GCA is radar, sir. That is one form of it.

Mr. KUYKENDALL. So ILS even though it would speed up traffic, and would allow traffic in bad weather, really would not have a direct connection to safety.

Mr. THOMAS. No; it would have a very positive relation to safety. It is a precision landing aid. It would not speed it up. It is a precision landing aid to deliver an aircraft to a precise point on the runway. We have, besides midair collisions, undershoots and overshoots and there is quite a bit of bad weather, so I think the ILS would have a decided beneficial effect on air safety.

Mr. KUYKENDALL. It was my understanding if you did not have ILS, you just would not land.

Mr. THOMAS. We do restrict them on weather. The way we get equivalent safety is not to permit them to land. You see, with ILS, you can land with 200 feet and a half mile.

Mr. KUYKENDALL. For a technical point of information, the collision deterrent equipment that you are projecting for the future, is there a counterreacting radar system?

Mr. THOMAS. What we are thinking about is cooperating equipment, between two large airplanes, based on atomic principles; that is, a very precise timekeeping device, with computers that would calculate the distance, based on each airplane knowing the precise transmitting time of all the other airplanes, and then the slant range between each two airplanes. This is still dependent upon an altimeter and a computer to tell the pilot what to do.

Mr. KUYKENDALL. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Adams.

Mr. ADAMS. Thank you, Mr. Chairman.

Following through on that, has there been developed or is there being used an extension of what used to be called the "friend or foe" device in World War II? This was simply an indication of an approaching plane which can be inexpensively placed on a plane. This sends out a radio signal at a particular frequency which will indicate a plane is within a certain range.

In other words, you have in effect a radio umbrella around you of 500 yards, a thousand yards, 1,500 yards, or 2,000 yards, whatever is selected, which indicates to the pilot that a plane is within that proximity. Is this type of device either being considered, or has it been tried anyplace?

Mr. THOMAS. This is an integral part of the system. We call it the radar beacon. Its development now, and it is beyond the old IFF, is

quite sophisticated, compared to that equipment, but the new ones, and one that is rapidly being installed in the fleets will give discreet identity, 4,096 codes, and it will also read an altimeter, and translate that altimeter reading back to the ground, so the controller can look on a radar scope and get both the identity and altitude associated with the radar targets. This is our so-called alpha numeric system.

Mr. ADAMS. I want to inquire on the alpha numeric system, too. I have seen the operation, which is used regionally in several of the areas, and I wanted to know whether or not this plane was still under —what is your regional center there, at Atlanta?

Mr. THOMAS. Yes, sir.

Mr. ADAMS. Was this still under Atlanta regional radar control in its carrier operation? I am talking now about the Piedmont carrier and the Cessna. I also don't know whether the Atlanta PPI scope would carry into the mountainous region there. Did it, or would it?

Mr. THOMAS. Yes, sir; under the air route traffic control center. I might explain for the benefit of others, we have 21 air route traffic control centers that cover almost the entire upper air space with radar. The centers are equipped with long-range radar, which are not located at the site of the center. We pipe radar signals in by telecommunications.

Mr. ADAMS. Pipe them in from the various locations and then plot them on your PPI scope?

Mr. THOMAS. Yes, sir; and that was a case here when he was under radar. But lest I leave a misimpression that the alpha numeric is with us, we have it and it is operating, but it will be the early 1970's before we will have the ground equipment in which will provide identity and altitude directly on the radar scope.

Mr. ADAMS. Now, I wanted to inquire about this regional radar because we have only talked about ground control radar. I don't want this particular accident to obscure from us the overall problem. Now do you contemplate in this to maintain a series of radio or radar beacons that would feed your regional centers and give you an overall traffic plot? Now, I know at the regional centers that I have been in, they can give you a plot of everything that is above the radar blank spots, in the entire 200-mile range. Now, was that being done in this area, or could it be done in this area?

In other words, did they pick up these planes on the Atlanta system?

Mr. THOMAS. It was being done, and can be done. We cover the entire United States with radar from our centers, and they give an indication of position, not altitude.

Mr. ADAMS. Not altitudes, I agree, but an indication of position.

Now, have you made any sort of an arrangement with, or should we be considering a tie into the military radar which, as I understand it, also covers the entire United States in a similar type operation. Do you feel that this would be helpful?

Mr. THOMAS. No, sir.

Yes, sir, we have, but I think one of the bright spots is that half of this radar is military. We use the same radar, sir.

Mr. ADAMS. That is what I was going to ask next.

Mr. THOMAS. Of the hundred we are using less than 50 are FAA, the rest are military, and they use our radar, so this is a joint use of these very heavy radar.

Mr. ADAMS. Now, I wanted to inquire about another thing. Was the Piedmont flight 22 a regular flight? I happen to have been in Asheville the day after this accident and as I understand it all those camps break on Wednesday. Was that a special or an extra flight coming out of that airport, or was this a regularly scheduled section?

Mr. THOMAS. I think it would be better for Mr. O'Connell to answer that question.

Mr. O'CONNELL. It was a regularly scheduled section.

Mr. ADAMS. Regularly scheduled.

Now, to go back again to the question of whether Atlanta radar had picked up the Cessna, I listened to the reports that were being read to us of the radio contacts that took place, and also will it be possible for you in the fairly near future—I know they were reported in the press there—to produce for us a sketch of the radio beacons and the locations of the two craft?

Mr. ALLEN. Yes, sir. This activity will be performed in the groups that will be participating in this activity, which will be the operations group, the air traffic control group, and the flight recorder read out.

Mr. ADAMS. I notice in your statement that there is a 10-day period, within 10 days after a key event, a summary report will be made. When will that be available?

Mr. O'CONNELL. I might answer that, Congressman. The summary report that I referred to will not be made in this case for some time, because it is planned that we make them 10 days after the public hearing in each case.

Mr. ADAMS. All right. Now, while I have you for a moment, I noticed in the record here, and you have indicated that you have a summary, starting on page 6 of your report, Mr. O'Connell, there are listed the five midair collisions, and four of the five, I notice, are in small centers.

Mr. O'CONNELL. Excuse me. Only two of the five are midair collisions.

Mr. ADAMS. I see. Then only the ones at Asheville and Urbana are midair collisions. Both are at smaller cities. Now, we have discussed previously the prohibitive expense of trying to go to full radar operations at the smaller cities. What have you contemplated, or what do you suggest that we might be looking into to authorize in terms of a supplemental system for the smaller fields which could be fed to regional centers, so the regional centers can at least protect commercial aircraft in the area by informing them of the traffic even if they cannot protect general aviation?

I am wondering, for example, in this case, whether Atlanta radar can be alerting the planes taking off at the smaller fields regarding the traffic in the area and what is happening at that particular point. I know they do this to some great degree, and I want to know whether you have considered this, or whether we need something else.

Mr. O'CONNELL. Well, I would like to say that our observation of the two midair collisions which we are discussing here, particularly——

Mr. ADAMS. Asheville and Urbana.

Mr. O'CONNELL (continuing). Do not lead us to a definite conclusion that would support a recommendation for a major expansion in the radar operation, based on these accidents. In the Urbana case, radar did exist.

Mr. ADAMS. The Urbana planes were on Dayton radar, weren't they?

Mr. O'CONNELL. That is right.

Mr. ADAMS. And this one was on—well, the plane itself was not on Atlanta radar, but the Cessna would be on Atlanta radar, so that the plane, as it is taking off, could be given information as to what the air traffic in the area was.

Mr. O'CONNELL. Well, it was on radar from Atlanta when it took off, but it had been turned over to Asheville, which had no radar, before this accident took place, so we have no radar at Asheville.

Mr. ADAMS. No. One more question, Mr. Chairman, and then I will desist.

Mr. THOMAS. May I, sir?

Mr. ADAMS. Yes.

Mr. THOMAS. The radar, as you know, emanates from the ground and goes out like an inverted cone.

My belief is that the coverage at Asheville on raw radar is around 7,000 or 8,000 feet. This will be determined by the Board, and the question is, can we use center radar to give more protection to smaller airports? You can within the limits of coverage.

Mr. ADAMS. Well, this is the last question that I had, and perhaps you gentlemen can submit a reply in writing, because I don't want to take any more time. But I want to pay my compliments to the regional control centers. I frankly don't know how the men manage to keep their minds with the tremendous amount of traffic they have to keep track of. But with the commercial airliner, which at this point we are dealing with, carrying large numbers of people, I want to know if it is possible to establish supplemental radar beacons which will feed to your center section information from the 400 airports that are using commercial traffic, and at that point, with whatever expansion of facilities is necessary, have these centers maintain contact with the commercial carriers to give them traffic reports in each area, whether or not they are flying in the metropolitan areas.

Now, that is the question that I have, and if you gentlemen want to submit it in writing that will be fine. I don't want to take too much of the committee's time now.

Mr. THOMAS. Sir, this is a matter of radar coverage, down low, and if we had the radar coverage down low, then we could give the information to all traffic. Generally, at these airports, we do not have radar coverage from the center down to low altitudes.

Mr. ADAMS. That is what I am inquiring of you.

Mr. THOMAS. If we could put it in——

Mr. ADAMS. I am not talking now about a full radar coverage in the general sense, but actually a supplemental radar beacon feed. In other words, all you have at the small field is a radar tower, which feeds by co-ax cable into your regional center. In this we are talking about the 400 airports that are now involved with commercial traffic and yet are below the present FAA cutoff point for full radar.

Mr. THOMAS. Sir, that is the $750,000 per site we are talking about.

The CHAIRMAN. Mr. Brown.

Mr. BROWN. Mr. Allen, I would like to direct my first question to you.

You have given a pretty thorough appraisal of the investigation done by your group, of everything from the psychology and health of the crew of the planes to the design and maintenance of the planes. To what extent do you investigate the adequacy of the performance

of FAA personnel under the regulations that are covering the circumstances of the crash, and the activities of that day in connection with them?

Mr. ALLEN. Well, Mr. Brown, first of all, I would say that we think quite adequately. I would say, first of all, that when you consider the method that the investigation is conducted, that this assures you that you go into just these aspects that you enumerated. First of all, you have representatives from every segment of the industry that is participating. I think that this assures you that you go into just these areas that you suggest.

Mr. BROWN. Have you had the authority to make recommendations with reference to FAA regulations?

Mr. ALLEN. Yes, sir.

Mr. BROWN. And do you frequently do this?

Mr. ALLEN. Yes, sir; we have. I cannot give you exact numbers as of today, but I think that over the years, our recommendations will number something on the order of approximately 80 to 100 a year.

Mr. BROWN. Would you be in a position, if this proved to be the case, to make a recommendation with reference to radar at that particular airport with reference to this particular accident?

Mr. ALLEN. If the recommendation in our judgment was justified, we would be in a position to do so.

Mr. BROWN. General McKee, I don't want to engage in an argument with you on the degree of congestion around Urbana, Ohio, but I would like to point out to you that you have within that area, as you are well aware, much airport space: Columbus, Dayton, and Cincinnati airports, wherein there is the beginning of descent or taking off climb to altitude of planes serving all those airports, fairly sizably trafficked airports, plus four military installations within a few miles, Wright-Patterson Air Force Base, Lockborn, Clinton Sherman Air Base, and Springfield, plus a number of small city airports.

Now, the reason I point this out is that I would like to ask you the question of what constitutes high congestion areas? Are we talking about the numbers of planes that, at any one time, are in the area? Are we talking about the number of landings that you suggest with reference to National Airport? How do we assess congestion, and is there any measure that you have that you think would be adequate to give me for, as an example, the top 50 regions in the country, or airports in the country, with reference to congestion?

General MCKEE. I think we can give you the picture in the number of operations in any particular area, and I, having lived at Wright-Patterson for 9 years, understand the conflict out there. There are a large number of individual operations, even though you may not have a tremendous number of commercial operations, but from an air traffic control point of view, we look at it in terms of managing the air traffic, whether it is military, civilian, or general aviation, as you well know, and in that area they are, obviously, a lot of operations going on; and that area, as you know, does have radar coverage.

Mr. BROWN. Well, would you suggest that this area is still not a congested area?

General MCKEE. Looking at the overall problem, I would not term that area congested. Maybe Mr. Thomas has a different idea on the congestion business, but I would not say that was a congested area.

Mr. BROWN. Not in the range that perhaps National Airport or La Guardia or JFK or O'Hare are congested.

General McKee. I would say it is a busy area?

Mr. Brown. Where does this range in the 527 commercial airports, the Dayton Airport? Do you have any idea? High? Low? Middle?

Mr. Thomas. Mr. Brown, all the airports you mentioned do have radar now.

Mr. Brown. I am not questioning the existence of the radar. I am talking about the fact that I think that the one at Dayton handles an awful lot of traffic.

General McKee. Dayton is a busy place, as we well know. But I still don't think it would range high on the list of congested areas.

Mr. Brown. Well, is it possible for you to give me the top 10 percent of the airports in the country with reference to whatever congestion means in your terms?

General McKee. I could not give them to you offhand.

Mr. Brown. No. I don't mean now. But in written form.

General McKee. Oh, yes; we would be happy to.

(The following information was subsequently submitted:)

Federal Aviation Administration Compilation of Annual Air Traffic Volume and Instrument Operations at 35 U.S. Airports, in Rank Order

Herewith submitted is a list of the 35 U.S. airports having the greatest number of annual instrument operations. These airports represent slightly more than 10 percent of the airports having FAA traffic control service. Also attached is a list of the top 35 airports in terms of total aircraft operations.

Attachment No. 1.—*Rank order, total instrument operations, fiscal year 1967*

1.	Chicago (O'Hare), Ill	532, 889
2.	Los Angeles, Calif	350, 131
3.	John F. Kennedy (International) N.Y	339, 213
4.	Washington (National), D.C	299, 500
5.	Atlanta (Municipal), Ga	269, 237
6.	Miami, Fla	252, 928
7.	Oakland, Calif	243, 707
8.	San Francisco, Calif	216, 107
9.	Detroit (Wayne), Mich	200, 854
10.	Dallas (Love Field), Tex	196, 546
11.	Denver, Colo	176, 298
12.	Boston, Mass	173, 994
13.	La Guardia, N.Y	171, 124
14.	Newark, N.J	165, 254
15.	Philadelphia, Pa	163, 545
16.	Cleveland-Hopkins, Ohio	162, 885
17.	Pittsburgh (Greater), Pa	162, 735
18.	Honolulu, Hawaii	153, 951
19.	St. Louis, Mo	143, 418
20.	Houston, Tex	142, 302
21.	San Antonio (Intl.), Tex	133, 318
22.	Minneapolis (W. Chamberlain), Minn	127, 313
23.	Phoenix, Ariz	124, 355
24.	Kansas City (Municipal), Mo	122, 879
25.	Seattle-Tacoma, Wash	119, 562
26.	Norfolk, Va	113, 088
27.	Columbus, Ohio	110, 878
28.	New Orleans (Moisant), La	109, 126
29.	Oklahoma City (Rogers), Okla	104, 603
30.	Dayton, Ohio	104, 540
31.	Memphis, Tenn	104, 537
32.	Tampa, Fla	102, 140
33.	Covington (Grtr. Cincinnati), Ky	101, 534
34.	Baltimore (International), Md	96, 562
35.	Long Beach, Calif	96, 261

ATTACHMENT No. 2.—*Rank order, total aircraft operations, fiscal year 1967*

1.	Opa Locka, Fla	596,949
2.	Chicago (O'Hare), Ill	588,527
3.	Van Nuys, Calif	543,324
4.	Long Beach, Calif	499,724
5.	Fort Lauderdale, Fla	451,910
6.	John F. Kennedy Int., N.Y	451,533
7.	Miami, Fla	441,156
8.	Los Angeles, Calif	437,777
9.	Denver, Colo	436,105
10.	San Jose, Calif	382,548
11.	Tamiami, Fla	382,211
12.	Santa Monica, Calif	377,015
13.	Torrance (Municipal), Calif	372,831
14.	Minneapolis (Flying Cloud), Minn	368,916
15.	Santa Ana, Calif	366,109
16.	Phoenix, Ariz	359,071
17.	Dallas (Love Field), Tex	344,779
18.	Oakland, Calif	343,967
19.	St. Louis, Mo	341,918
20.	Seattle (Boeing), Wash	332,806
21.	Atlanta (Municipal), Ga	330,279
22.	Islip, N.Y	319,304
23.	Washington (National), D.C	318,241
24.	La Guardia, N.Y	316,246
25.	Hawthorne, Calif	314,159
26.	San Francisco, Calif	298,908
27.	Bedford, Mass	294,325
28.	Honolulu, Hawaii	291,816
29.	Cleveland-Hopkins, Ohio	291,090
30.	Concord, Calif	290,946
31.	Wichita, Kans	285,307
32.	Columbus, Ohio	285,103
33.	Kansas City (Fairfax), Kans	281,187
34.	Detroit (Wayne), Mich	279,763
35.	Chicago (Midway), Ill	278,939

Mr. BROWN. Now, I would like to suggest one other thought to you, You mentioned segregation by altitude, and segregation by airport. I think there is a possibility, also, of segregation by time, is there not?

General MCKEE. The problem that we have in midair collision is that two planes try to occupy the same space at the same time. Is it possible that there could be some place in the regulations which you set up a segregation by time?

Mr. THOMAS. Yes, sir, this is one of the methods of separation that air traffic control uses, but that is for the aircraft under the controller.

Mr. BROWN. Has that ever been thought of as a means of segregating use of the facility?

Mr. THOMAS. I am not certain that I understand the question.

Mr. BROWN. Use of the facility by commercial planes for the 45 minutes after the hour, and use of it by private planes for 15 minutes before the hour.

Mr. THOMAS. No, sir.

Mr. BROWN. Would this have any practical possibility?

Mr. THOMAS. I don't believe it would, Mr. Brown, because even if you segregated them by 45 and 15, they leave that airport, and then they cross someplace else.

Mr. BROWN. Well, it would control the airspace in that particular locality, would it not?

Mr. THOMAS. Yes, sir, but I think you could do it more advantageously and more efficiently by controlling the aircraft and not separating them by their class of operation.

Mr. BROWN. As I understand, you indicated that the last change in material on number of operations relating to insulation of radar was examined in 1965, and the last change was made in 1960. Now, I have some testimony that was made before another committee of the Congress just in 1963—November 1963—which would indicate that we had a 55 percent increase from the testimony you gave today in the last 3½ years of the number of operations which are being handled on a daily or annual basis by FAA.

Now, don't you think this calls for some change in the criteria under which you operate?

General MCKEE. I would like to state as a matter of policy, Mr. Brown, that this is now 1967, and we are reexamining this criteria now.

Mr. BROWN. The one that you established in 1960 and examined in 1965?

General MCKEE. Right.

Mr. BROWN. General, have you any knowledge of something called AIM, a research project at Wright-Patterson Air Force Base that is supposed to create a low-cost anticollision avoidance device?

General MCKEE. Yes. I know about it. I don't know about it in detail. I think Mr. Thomas has been into that.

Mr. BROWN. It is under the control of the Air Force, I believe.

Mr. THOMAS. Yes, sir. We are part of that effort.

Mr. BROWN. Does it hold any promise that you are aware of in this field?

Mr. THOMAS. The work by this effort—and we are a part of it—has to do with the use of the radar beacon, for getting more information to the ground and trying to get a cheaper addition to the radar, which would read off altitude and identity, if the aircraft were equipped, and you have the basic radar on the ground, plus some other equipments. We are very much a part of that. It is not a fundamental anticollision device, by itself.

Mr. BROWN. You think it offers some promse?

Mr. THOMAS. It offers a great deal of promise.

Mr. BROWN. For noncommercial aircraft, that is, for private aircraft?

Mr. THOMAS. Oh, yes, sir, because we are doing a lot of the work, working with them up at Atlantic City in our own laboratory.

Mr. BROWN. General, I would like to ask a question about congestion. On the ground, around the airports, again, using the example of Wright-Patterson Air Force Base, there has been an effort to control the development, through zoning, of the land around this military airfield, particularly with reference to runways. Is there any effort like this across the country generally to control the use of land at the end of runways, or where it is possible that a plane might have a collision?

General MCKEE. Oh, there is a major effort, not only from the point of view of safety, but also from the point of view of noise. We are working on this with Housing and Urban Development, HEW, NASA, and we consider it a major problem, and one that requires a major effort, not only on the part of the Federal Government, but on the

part of the local communities, and an awareness of the local communities of the importance of the problem.

Mr. BROWN. Has the FAA established any numbers of occupancy of the ground per square mile that is desirable in this?

General MCKEE. No, not by numbers per square mile.

Mr. BROWN. How do you establish your zoning regulations, then?

General MCKEE. We have no authority to establish zoning regulations. We can only make recommendations.

Mr. BROWN. What recommendations do you make to HUD in this area?

General MCKEE. I cannot give you the recommendations. But take New York, for example, around JFK and some of the other airports. After we have made recommendations, and this has happened in other areas, the local authorities have permitted housing developments to go up around airports that we strongly objected to, mostly from a noise standpoint, I must say; but, nevertheless, if you are going to get developments going up out at the end of runways, you obviously do have a safety hazard, and I think communities would be well advised, particularly in building new airports, or modernizing airports, to take all of these things into consideration.

This is being done very vividly down in Texas, where they are proposing to build a regional airport, and those people are wise; they are buying up 10,000 acres for the airport, and then buying up 10,000 acres around the airport in order to protect it.

Now, Mr. Jarman's place, down in Oklahoma, at Tinker Air Force Base, they have done the same thing.

Mr. BROWN. We are getting a little deeper into this than I would really like to get.

Mr. Chairman, I would like to ask for some specific information, again submitted in writing, if we can get it. The discussion earlier included the number of commercial airports that have radar, and the number that have towers.

Are these the only two criteria that you established, or the only two facilities for which you have established criteria? How about high intensity lighting?

General MCKEE. Oh, no, also for lighting, also for ILS. Mr. Thomas pointed out earlier, we really have more accidents on takeoff and landing than, by a considerable degree, midair collisions. We have to establish criteria for all these facilities and equipment, to be sure that the money we spend goes to the places where it is most urgently required.

Mr. BROWN. Would it be possible, Mr. Chairman, for the FAA to submit the facilities at airports for which they have established criteria, the number of airports which have these facilities for which criteria have been established, and the number which meet the criteria but do not have the facilities? Now I am including, I am broadening the expression of interest that was evidenced earlier beyond radar, and beyond towers to include high intensity lighting, anything else that you may have.

General MCKEE. I think this is important. We have to look at the whole package and not get diverted that radar solves all of our problems.

(The information requested follows:)

FEDERAL AVIATION ADMINISTRATION STATEMENT ON CRITERIA ESTABLISHED FOR AIRPORT NAVIGATIONAL FACILITIES

Submitted herewith is a copy of FAA Handbook 7031.2 dated May 11, 1965, entitled "Airway Planning Standard Number One-Terminal Air Navigation Facilities and Air Traffic Control Services". (The handbook referred to has been placed in committee files.) That Handbook contains the current criteria for the establishment of air navigation facilities and air traffic control services. The table below indicates the extent to which FAA, at the end of the Fiscal Year 1967, has installed in accordance with that criteria four of the major types of terminal air navigation facilities and air navigation services at airports served by air carrier aircraft.

Facility or service	Airports where installed	Airports which meet criteria but where not installed
Control towers	238	29
Airport surveillance radar	109	10
Instrument landing system	206	35
Approach lighting	187	56

Mr. BROWN. General, I could not agree more with you, and I think if the chairman will give me just 1 minute to make a personal comment, I think we have got to go into this thing in depth, not just to the idea of excluding noncommercial aircraft from commercial airports, but, rather, with an idea to finding out all of the factors which contribute to air safety, or the lack of air safety; and then seeing whether or not the job being done by FAA and those facilities over which the Congress has some control are adequate, including, I would hope, to come to a comment that you made earlier, today, whether or not you have legislative authority to change regulations in certain areas, because I was under the impression that the FAA had pretty broad authority to change regulations with respect to air safety, and it comes to me as a shock that you feel that you don't have that authority.

General MCKEE. I don't think we said that we didn't have authority to change regulations where it is strictly a matter of air safety. It all depends, of course, on what regulation you are talking about, but we do have authority to change regulations with regard to the operation of aircraft, and all of the rest of it, which is a very broad mandate that we have under the law. As far as the authority that we have under the law is concerned, the 1958 act, to the best of my knowledge and ability, we are discharging the mission that was given to us with that act.

Mr. BROWN. Well, if there is any area, General, in which you do not have the authority to establish air safety regulations, and this committee can give you that authority, or can see that that authority is conferred upon somebody, so that action can be taken in some of these areas, I would certainly urge that the committee give it consideration.

General MCKEE. Thank you, sir.

The CHAIRMAN. Mr. Kornegay.

Mr. KORNEGAY. Thank you, Mr. Chairman.

General McKee, what is the history of the air traffic control?

General MCKEE. The history of the air traffic control?

Mr. KORNEGAY. The history of it, with reference to when it started.

General MCKEE. I would like to ask Mr. Thomas to give this, since he grew up with it. He started out with it.

Mr. KORNEGAY. All right.

General MCKEE. And has suffered through the whole business.

Mr. THOMAS. Mr. Chairman, when particularly the airlines started flying on instruments, that is, in clouds, in the early 1930's, they occasionally would arrive over the same fix at the same time, such as at Chicago. The first attempt in the early 1930's was a combination of the airlines. They got together and would simply exchange information, and agreed that planes coming up from the south would be at 3,500 feet, and from the west, would be at 5,500 feet, and then they would make their descent. It soon was evident that just an exchange of information was not enough, and some direction would have to be included, so the airlines started an air traffic control system in 1935. This was taken over by the Federal Government in 1938, and by the beginning of World War II, there were eight centers established within the United States, controlling traffic within a radius of roughly 50 to 100 miles from the centers. These were places like New York, Cleveland, Chicago, Los Angeles, Atlanta.

During World War II, it became obvious with the buildup of the military traffic that this system should be vastly expanded, and should include the airport traffic control towers, as well as the en route operation. It was expanded to cover the entire United States at that time, and after, and it was operated on a manual basis, simply by filing a flight plan, people exchanging information, until the Grand Canyon—essentially until the Grand Canyon collision of 1956.

There was impetus put on then for major expansion and radar, en route, and since that time, it has grown; equipment has been added to it, computers have been added. It has become highly sophisticated since that time.

Mr. KORNEGAY. Well, how many control centers do you have at the present time?

Mr. THOMAS. If we limit ourselves to the 48 States, and this is easier, there are 21.

Mr. KORNEGAY. Within the continental United States.

Mr. THOMAS. Within the continental United States. That is the en route traffic.

Mr. KORNEGAY. And 21 control centers?

Mr. THOMAS. Yes, sir. These are the regional centers that were mentioned.

Mr. KORNEGAY. The regional centers, and you referred to Atlanta as a regional center.

Mr. THOMAS. Atlanta Air Traffic Control Center; yes, sir.

Mr. KORNEGAY. An area that covered western North Carolina?

Mr. THOMAS. Yes, sir.

Mr. KORNEGAY. Now, do you feel, Mr. Thomas, that the system needs to be expanded?

Mr. THOMAS. We are in the process of putting in——

Mr. KORNEGAY. Over what we talked about, including equipment and a larger system—putting more equipment in smaller airports. Do you need to expand the system itself?

Mr. THOMAS. Well, we have about a $300 million effort going on right at this moment to automate these large centers, so that they can get altitude and identity information directly instead of by means of the pilot speaking and the controller remembering it. We have gradually been enlarging the radar service that is supplied by the airports that are now equipped, and, obviously, more airports will be equipped with radar. We have been trying to work on a priority basis, where the most need is, to put our efforts there first, and as I mentioned this morning, about 90 percent of the passengers are now covered at the airports with radar service. And the en route environment is essentially covered as far as their air carrier operations are concerned.

The base of the en route coverage may vary from 5,000 above the terrain to 8,000 or 10,000 feet above the terrain, as you move away from the system.

Mr. KORNEGAY. The farther you get——

Mr. THOMAS. The higher, and in the Far West, there are places that we are up to 15,000 or 18,000 feet above sea level, before we have radar coverage.

General MCKEE. I think it is very interesting to note, Mr. Kornegay, that since 1959, the Congress has appropriated over $1 billion in the area of facilities and equipment, directly traced to air traffic control, and to air safety. My guess is over the next 10 years they will appropriate a significant sum, probably greater than this.

Mr. KORNEGAY. Even greater than that, I would think, with the increase in air traffic.

General MCKEE. So the Congress is well aware of the problem.

Mr. KORNEGAY. And the complexity of the system, and everything else.

Now, let me ask you this, Mr. Thomas: I don't believe it has been touched on in the hearings by any of the questions. With reference to paint and lights, in other words, the ability of one aircraft to see and detect another aircraft in the air, in the vicinity, there are rules and regulations, I am sure, on those developments, are there not?

Mr. THOMAS. Yes, sir. Well, not on paint. We have had a lot of experience and experiments with paint, as has the military. A few years ago, we tried fluorescent paints to see if this would attract more attention. We have run tests on patterns of painting that would be most susceptible of being seen.

Actually, if you have contrasting colors on the airplanes, it does somewhat increase their conspicuity. One of the problems here is that color, though, fades out with distance very rapidly, and one is dependent more than not on the silhouette of the airplane and its contrast with its background. This led us into lights, and the rotating beacon that you are so familiar with is one of the most useful things, if the sky is dark, and you are not in bright sunlight. We have tried condenser discharge lights. We are going to do more work on that.

One of the things that we are working at cross purposes on, smoke emitted from an airplane, is the best anticollision device I know, because you can see the smoke trail, and then see the airplane. We have an antipollution problem, so we are trying to get rid of the smoke, so depending on the problem, we work at cross-purposes. But, actually, we are doing a lot of work, trying to improve conspicuity, and my own

belief is that lights offer our best promise, despite the fact that in bright sunlight, they are very difficult to see.

Mr. KORNEGAY. What about the strobe light? I think you referred to it by a different name.

Mr. THOMAS. Yes, sir; the strobe light or condenser discharge is very effective. Some of the airlines have them on, and if you see them, they attract your attention.

Mr. KORNEGAY. Would they be visible much longer than the rotating beacon would be?

Mr. THOMAS. Yes, sir. We are going to try some light aircraft with those and see if they work. The problem with those, even the condenser discharge, high power lights, is that they are not visible in strong sunlight. We are also looking at reflective devices, thinking we can get some reflection from the sun. This ground has been ploughed over; we are going to plough it again, because we may have left some stone unturned.

Mr. KORNEGAY. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Ottinger.

Mr. OTTINGER. Thank you, Mr. Chairman.

I must say, General McKee, that I am not as sanguine as some of my colleagues about the way the agency has exercised its responsibilities in the area of air safety. I really think you have been derelict in your duty in terms of actively pursuing the reasonable things that might be done to improve air safety.

For one thing, while you are not an independent agency——

General MCKEE. I am not an independent agency, Mr. Ottinger.

Mr. OTTINGER. Right.

General MCKEE. I am a part of the Department of Transportation.

Mr. OTTINGER. You are a part of the Department of Transportation, but still you are the only technical agency in the Government that is responsible for air safety.

General MCKEE. That is correct.

Mr. OTTINGER. And it seems to me that your responsibility is to define the needs for improvements in air safety, whether or not you can get Bureau of the Budget approval for them. You are the one agency of the Government to which we in Congress and to which the public can look for a definition of what is reasonably needed.

If you need more radar, if you need more control towers, if you need more landing lights, if you need more airports, whatever it may be, you should come here and ask for them. It is your duty to do so. It is really no answer to say, "Well, the Bureau of the Budget would not approve an additional request for funds."

The same thing when it comes to authority. You say that with respect to separating general aircraft from commercial aircraft, you don't have the authority. It seems to me it is your responsibility to ask for the authority, if you need it, and I think we would consider it very seriously, if you did. You made this remark specifically with respect to moving general aircraft from National Airport to perhaps Anacostia, or some other area.

It seems to me that is your definite responsibility, to set out for this committee and for the public what is needed to improve air safety. We look to you, as the expert, for this information. You, as the experts,

should define for us what is needed and what could materially improve air safety in the United States.

Now, I will just tick off some areas in which I am particularly concerned about lack of sufficient FAA pursuit of safety procedures and devices. I have asked about some of these matters before and gotten just vague assurances such as: "We are working on it," or "We are studying on it." I think more action, more active steps are required, because I think there are very serious problems.

One area of concern is the matter of continuous ground control of all aircraft in the Northeast corridor, which is very congested at the present time. As I understand it, at present there is only intermittent ground control. I think that action is needed to see that aircraft are under continuous control during the entire area.

Another area of concern is the aspects that have been discussed here of introducing ILS and radar and lighting to commercial airports that don't have them. I think it's outrageous that the FAA didn't ask for one penny for these purposes this year.

Also I would mention an item about which I wrote you, having secondary radar installations available to protect against the radar failures we have had recently at Kennedy Airport, and we have had often at La Guardia Airport.

Another concern is development of new kinds of radar, especially three-dimensional radar. An article in the July 24 issue of Electronics says that there are four companies at the present time that can produce three-dimensional radar, Maxon Electronics Corp., the Hughes Aircraft Co., AVCO Corp., and ITT-Gilfillan. The article says:

> Any of these companies could install a three-dimensional radar backup system at any U.S. airport for less than $2 million.

I also have indication that the Navy has presently three-dimensional radar. It seems to me that you should be more aggressive in seeing to it that if this really makes a difference to safety it is pursued.

Still another area of concern is the proliferation of small aircraft around commercial airports. This would seem to me to be clearly a threat to safety. Whether you separate small aircraft by requiring them to use different airports, or whether you separate them by time, or by the experience of the pilots or equipment carried by the planes, it seems to me greater action is required.

Control tower problems have been written about a great deal, and the difficulty a controller has today to keep track of all the planes in the congested areas. This is another area that seems to require greater corrective action.

You testified this morning there are no recertification procedures for noncommercial pilots. This certainly requires correction.

The question of cockpit visibility, the question of control over air taxis, are two other items. I understand that while your regulations and requirements for commercial carriers are complete and very strict, there are virtually no controls over air taxis.

These are just some of the things that, as a nonprofessional, have come to my attention, where it seems to me your action is inadequate. Your answer is always, "We are studying it; we are looking into it. Maybe we will do something in the far future."

In view of the real crisis that we are confronting, it would require action now. I think you have been derelict in your duties in pursuing these matters more diligently.

General McKee. I do not accept your language that I have been derelict. Neither I nor my other people in FAA have been derelict in their duties. I don't know of any 43,000 people in the United States who work around the clock and work harder than the people in FAA. And in defense of those people, and you can give me all the hell you want to personally but I stand up for those people, every speck of the way. We have got 14,000 controllers working in this control work and working in these centers, and I am proud of them. There are not a finer bunch of men in this country, and if everybody in this country did the job those people are doing, this country would be a hell of a lot better off, and that is my speech, Mr. Ottinger, and I will stand by it.

Mr. Ottinger. Well, I'd certainly agree that your controllers are doing an outstanding job under the most trying circumstances. But that misses the point, which concerns the diligence of your agency in pursuing new safety devices and requiring new safety procedures. Here, the editors of Electronics magazine certainly don't agree with you. They say:

> Of all the thousands of Government agencies, it would seem almost impossible to rate one as the worst, yet technical men who have studied the air traffic control problems are ready to give that malodorous distinction to the FAA. The agency born to perform great feats of technical innovation has turned out to be weak, ineffectual, unimaginative, and apathetic. The threat of midair collision hanging over the United States when the FAA was formed is still with us, only worse than ever. And the FAA is as far from coping with this threat as it was on the day it was founded.

That certainly isn't a very glowing approval.

General McKee. I would like to answer that, too.

The Chairman. Just a moment. I will allow the gentleman to answer that, then that will be all. You may go ahead and answer it.

General McKee. All I wanted to say is that if I just read the criticisms directed at me and FAA, I would do nothing else, and the FAA wouldn't. We would not even have an air traffic control system. I consider that an irresponsible article, and the aviation community will back me up 100 percent. I am surprised you even bring it up.

The Chairman. Mr. Blanton.

Mr. Blanton. Thank you, Mr. Chairman.

General McKee, I am not going to try to put you on the spot, because I realize that the administration has other things in mind, but I would like to ask you this one question. Do you think, if the Anacostia strip was made available to private aircraft, it would ease some of the congestion at National Airport?

General McKee. Yes, we said this last summer. Obviously, any airplane, or number of airplanes, that you take out of a particular airport serve to relieve the congestion.

Mr. Blanton. Now, I am leaving out the directive that you—you would not have to direct them over there. They would willingly use it, provided it was available.

General McKee. I think that is true, a lot of them would, and a lot of them would not.

Mr. BLANTON. I know that without a directive, that some of them would not.

General McKEE. This is true. Well, of course, even if it were available, Mr. Blanton, it would only be available on a completely VFR basis, and for airplanes in the Piper Cub category, and very light airplanes, because you are quite circumscribed, as you know, in the area. It would not be available for the heavier general aviation aircraft, or for business jets, or for private jets. So it surely would relieve congestion somewhat.

Mr. BLANTON. It would not be available for business jets?

General McKEE. They could not operate there, Mr. Blanton. You see, you have a very limited runway at Anacostia.

Mr. BLANTON. 5,000 feet, isn't it

General McKEE. 5,000; but there is a lot of building, as you know, going up at Bolling, and there has been a misunderstanding. They talk about Anacostia-Bolling. Bolling is building right now, and there is nothing available at Bolling.

Mr. BLANTON. There is one question I would like to ask you on these near misses. How do you investigate this?

Mr. THOMAS. If they are reported in the air, and they sometimes are, we will try to follow, if we see the other airplane on the radar, we will try to follow him down, and chase him down to his point of destination, and get the story from both pilots, get whatever information that we can. It is very difficult. There are no tracks left in the air, as you know, and we normally are not that lucky, and the report is some time later, so we have the one pilot's story of what happened, and we do the best we can by examining any record we have of traffic at that time, and try to get all the information we can. It is a very difficult and usually unrewarding job.

Mr. BLANTON. Well, isn't it true that the majority of these critical near misses occur while under radar surveillance?

Mr. THOMAS. No, sir. There are some that do, however, and——

Mr. BLANTON. The majority is not under radar surveillance?

Mr. THOMAS. I will have to look at the statistics. My recollection is that more than half are not beyond the radar surveillance.

Mr. BLANTON. But if they are under radar surveillance, and you have a man on duty on the radar, he can very easily see these near misses, provided it is reported?

Mr. THOMAS. Yes, sir.

Mr. BLANTON. I know he cannot see the altitude, but he can see the flight path.

Mr. THOMAS. Yes, sir.

Mr. BLANTON. Let me ask you this: These fellows that are on radar, I know they are busy, to say the least, from hearing just the center's report recording read this morning before us, you can see they are busy. How much extra would it cost to have an extra man on duty looking for these collisions rather than in actual direction of the traffic at these centers?

Mr. THOMAS. I cannot answer that directly. You have about 8,000 people in the centers now, and let's say that it increased that by 25 percent. I don't know whether this is right or not. That would be about $20 million a year, $30 million a year. But I hope that the present controllers are seeing the traffic, and I think that they do, and I am

not sure that the increase in personnel just for that purpose is warranted, but we will have to give you—it would help. I don't know whether it is 2,000 or not, but it would be in that order, I would think.

Mr. BLANTON. Of course, the thing over in North Carolina this past week not being under radar surveillance would not make any difference, if you had 20 people standing there.

Mr. THOMAS. No, sir.

Mr. BLANTON. But it is my opinion that the majority of them do occur under radar surveillance, because they are in congested areas, which are under radar surveillance. And I cannot see why that an extra man for this specific job, a monitor screen of his own, to look for these things, project them, and warn of the possibilities, as I understand it, you have no such men as this, other than the ones that are actually in direct control of the traffic at the present time. Is that right?

Mr. THOMAS. That is correct.

Mr. BLANTON. Well, I would like to propose this as being investigated, as a possibility for some safety as far as collision is concerned, and I realize that as you said before, that the collisions are a minor part of our accidents. I mean, as far as numbers and dollars and cents and so forth.

Who gets the reports whenever you make a report on these critical near-misses?

Mr. THOMAS. The report, if it is given by radio, is given to the controller. He gives it to our flight standards people, if it is an air carrier, the nearest air carrier, and then it is immediately forwarded into our office here in Washington. We have on duty 24 hours a day communication duty officers who take all irregularity reports, and the investigation starts usually with someone meeting the reporting pilot at the point where he taxis into wherever his point of destination is, to get the freshest information we can.

If we are successful in detecting or the other airplane reports, sometimes both report—rarely, but this sometimes happens—then we will meet the other plane and get the information. I think there may be a little bit of misunderstanding about the radar surveillance. It may occur in areas where we have radar, but they may be outside the radar coverage.

Mr. BLANTON. I will address my last question to your report of your investigation, not the reporting of the near miss.

Mr. THOMAS. Oh, our report.

Mr. BLANTON. And you give out excellent reports on crashes, and so forth. I read them myself, but I never see any reports on investigation on a near miss. Now, who gets these reports? Are these just kept for your records, or do you give the report to the pilot reporting them, or the airline, or the carrier, or whoever is involved?

Mr. THOMAS. We will let whoever is involved know, and then we keep them for our own information, and then—we do not publish them, no, as a matter of a published document on them. The information is available.

Mr. BLANTON. I raised this question before, about whenever a pilot goes into a congested area, about equipment requirement and pilot requirement. Has there been any study made about congested areas, as to what General McKee said this morning that a bunch of people

cannot come into this airport unless there is a safety problem, but could not this be a possibility as far as safety, as far as equipment and pilot qualifications?

Mr. THOMAS. Yes, sir, there are, depending on the airport, some requirements. Most generally, if there is a tower, there is a requirement for two-way communications, and there is not, for locations where there is no tower. Some airports will not permit, for example, student instruction, I know of no airport that will not permit the current private pilot with two-way radio to land under good weather conditions. As a matter of fact, a private pilot can follow a flight path to the runway, successfully.

Mr. BLANTON. Thank you.

The CHAIRMAN. Mr. Stuckey.

Mr. STUCKEY. Thank you, Mr. Chairman.

General McKee, first I would like to say that I think your flight service people, your air traffic controllers, do a fine job, and I, for one, am very appreciative of the job that they do, and I am real familiar with your flight service operation particularly in our area, and I would like to say in Georgia, I think we have got the finest that you have anywhere.

A lot has been said concerning the general aviation and excluding them from a lot of our congested airports, and I realize that we have 50 private or general aviation planes for every commercial plane, but let me ask this question of you: Particularly with our private aircraft, private business, coming into airports such as National, aren't most of these pilots basically rated very similar to your commercial pilots, most of them; don't they have an IFR ticket?

General McKEE. I don't know the percentage. Do you have any feeling for the percentage of them?

Mr. THOMAS. No, sir. The busier the airport, though, the higher the percentage, because we run into a very high percentage of air taxis and corporates, and they may be better equipped than the airlines.

Mr. STUCKEY. Right. So this point I am trying to make, is just—take a pilot with a private certificate. Very very few of them would come into an area like National Airport, right?

Mr. THOMAS. I suspect they are very minimal.

Mr. STUCKEY. So let us say that you banned general aviation from National Airport. Your congestion there really is not the problem as much as it is your ramp space and facilities like that, isn't it?

General McKEE. That is true.

Mr. STUCKEY. Well, anyway, the point I am getting at is by excluding general aviation, and for some reason, it looks like they have to make general aviation the whipping boy here today, I don't see where this answers any of our problems. And, as far as safety is concerned, take a small pilot, he stays within a general area of, say, 200, 250 miles, and he does not venture into an airport like National Airport, so I don't think really that by banning general aviation from these airports that you are really going to improve your safety factor.

Mr. BROWN. Would the gentleman yield?

Mr. STUCKEY. Yes.

Mr. BROWN. Didn't I understand you to say that the segregation by airport is largely voluntary; that general aviation itself tries to stay away from these high congestion areas, as much as possible? Wasn't that the thrust of your testimony?

Mr. THOMAS. Yes, sir, the thrust was that this is the way it works, and those that do come into the highly congested area are, as Mr. Stuckey said, either the air taxis, bringing people in, or the corporates, who themselves are very well equipped.

Mr. BROWN. Is there any involuntary segregation? Do you limit any airports at the present time from use by general aviation?

Mr. THOMAS. No, sir, except for radio requirements.

Mr. STUCKEY. JFK has tried to eliminate general aviation.

Mr. THOMAS. There are some places that do it by dollars, by landing fees.

Mr. STUCKEY. Yes, sir.

Mr. BROWN. But not by any safety regulation, other than the two-way radio?

Mr. THOMAS. No, sir, because the general said, if we had an involved safety problem, we could take action. I think we are dealing with the convenience problem more than anything else.

Mr. STUCKEY. The point I am trying to make—and I would like to hear you, if you agree with this, say so—is that just by banning general aviation from our largest airports, this is not going to improve our safety factor, is it?

Mr. THOMAS. No, sir, but by the same token, we would like to see more airports built that are equipped and suitable, so that there would be a diversion of aircraft to other airports, as our traffic goes up. Our concrete is yet so limited.

Mr. STUCKEY. Wouldn't this also apply to your commercial?

Mr. THOMAS. Yes, sir.

Mr. STUCKEY. So we need more general airports.

Mr. THOMAS. Yes, sir; we need them.

Mr. STUCKEY. And for general aviation—I agree with you, but the point I am trying to make, it looks like in a sense we have tried to make general aviation the whipping boy, from what I have heard so far, and I don't think the separation has affected the safety of the airports we have talked about.

Mr. BROWN. Would the gentleman yield? I don't want to intrude on your time, if you have another area of inquiry, but we have hit this point earlier today, and that is the relationship between National, Dulles, and Bolling Field, Anacostia. Now, does the FAA have within its jurisdiction the opportunity to require commercial aircraft to use Bolling or Dulles, and exclude them from National on any basis, either a flat exclusion, a requirement for certain devices, or on any basis?

General MCKEE. I have no authority to require any general aviation aircraft to use Anacostia, because I don't have any authority to use Anacostia, even if I wanted to.

Mr. BROWN. Well, now, with Dulles.

General MCKEE. Unless I could make a safety rule and just say, "General aviation cannot use Washington National, because it is definitely unsafe, and, therefore, you can't go in, and I don't care where you go," whether you go to Dulles or whether you go to Friendship, or whether you go to Fairfax, or wherever you go, but I am unable to make that determination.

Mr. BROWN. There was an effort made, was there not?

General McKee. We have encouraged, and, as a matter of fact, I think we ought to commend the business community, a great many of the leading firms in the country. I wrote to each one of them, wrote each one of them a letter, and a great many of them have moved their business flights to Dulles. A lot of them are using it. General Motors and—oh, there are any number of them that use Dulles, and prefer Dulles.

Mr. Brown. Wasn't there an effort some months ago to require that only planes that would land within 500 miles use National, and that other longer haul planes use Dulles?

General McKee. Sir, that was the hot summer of 1966.

Mr. Brown. Yes, sir. But you did have that authority to make that regulation, if you had wished to, in view of the heat that you received, did you not?

General McKee. In view of the great heat I received.

Mr. Stuckey. Let me ask one other question concerning the Piedmont airplane, and the Cessna 310. Were both of them equipped with transponder equipment?

Mr. Allen. Mr. Stuckey, the 727 was transponder equipped. I do not have information concerning the 310 at this time as to whether it was transponder equipped or not.

Mr. Stuckey. We have also spent a lot of time today talking about your radar, and the cost of it, and the safety factors with our airplanes. Don't you think that the transponder has gone a long way as far as making it a lot safer for flying if it was utilized more?

General McKee. Yes, sir.

Mr. Stuckey. I have no further questions, Mr. Chairman.

The Chairman. Mr. Friedel.

I might say this before you start: that any of these gentlemen that have a question or two to ask, I am going to ask them if they will give it. I hope they won't take their 5 minutes, any of them, because I think most of the questions have been asked, and I don't see any sense in repeating questions that have been asked, so with that understanding, I am going to go around again.

Mr. Friedel.

Mr. Friedel. Thank you, Mr. Chairman. I assure you that the question I have has not been asked yet, and the first question is:

I have received some mail about aircraft accidents caused by the pilot drinking. For the record, will you tell us about any regulations prohibiting pilots from drinking before takeoff?

General McKee. They are quite extensive, and spelled out. That has been a major subject of concern to us, and I will ask Mr. Moore or Mr. Thomas to spell out the regulation.

Mr. Thomas. Mr. Friedel, most of the airlines have their own rules, and most of them prohibit drinking for 24 hours before a trip, and as far as I know, these rules are quite rigidly followed. In the case of general aviation, there is the normal legal regulation against operating under the influence of—that is alcohol or drugs, or any other adverse effect. There is no particular provision as to the number of hours before the flight. We tried number of hours, once, but enforcing it, actually finding out whether or not they did drink within a certain time period is almost impossible and also, the varying effect of the amount of the

drink and what it was is difficult to determine. So we rely on operating under the influence.

Mr. FRIEDEL. Well, I understand the commercial pilots are watched very rigidly, and there is no question in my mind that they are all right. But in general aviation, in so many hundreds of airports all over the country where they don't have towers or anything, is there any thought being given to how they could be regulated?

Mr. THOMAS. Yes, sir; we have given it a lot of thought, but this is an extremely difficult one to enforce, or actually detect, whether or not they have been drinking, so we have gone the education route, or designated medical examiners to give out the information on the difficulty of flying after drinking, and particularly the effect of oxygen, which is cumulative over the longer effects of drinking. But principally, we are trying to get at it by education, and enforcement is extremely difficult, because we do not want to follow the pilot, or have no way of following him immediately before he takes off.

Mr. FRIEDEL. All right, now one more question. A very prominent citizen of Baltimore and a pioneer in aviation safety, Mr. Charles Adler, invented an "airplane proximity indicator" in 1951 and obtained a patent on it. He turned this device over to the Government for $1. Some time after that I went up to an FAA installation in Atlantic City to witness some experiments they were conducting with this device. It could warn the pilot if a plane was too close from the right, left, forward, or rear within a distance of 25 miles. I would like to know if anything more is being done to perfect this device, or what did you learn from your experiments?

Mr. THOMAS. Yes, sir; I am sorry, Mr. Friedel. I didn't recognize it immediately. Yes, sir, we are pursuing this, if it is the one that I am thinking of, but I think to be more accurate Mr. Blatt should describe it. I believe it is altitude coded light.

Mr. JOSEPH D. BLATT (Associate Administrator for Development, FAA). It is both a split quadrant from the tail section and an altitude-coded light Mr. Adler has developed and we have recognized Mr. Adler's contributions to aircraft exterior lighting by giving him an agency award, and his work is being pursued at Atlantic City.

Mr. FRIEDEL. I understood they can tell if a plane was 5, 10 miles, up to 25 miles away, but they couldn't give the altitude, and that was the part you were trying to correct.

Mr. THOMAS. This depends on the ambient backgrounds, how well one could see lights.

Mr. FRIEDEL. Thank you.

The CHAIRMAN. Mr. Springer.

Mr. SPRINGER. General McKee, I would like to pursue my question this morning. I didn't have a chance to finish.

With reference to Washington National Airport, now there were an average of 876 landings and takeoffs last year per day. You made the statement, I believe, and if I didn't get this correct, would you correct me? You said it was safe.

General MCKEE. I said what?

Mr. SPRINGER. You said Washington National Airport today is safe.

General MCKEE. I say it is as safe as any other airport we have with a like number of operations.

Mr. SPRINGER. Well, that is a pretty general statement, because most of the airports are pretty well alike.

General MCKEE. That is correct. Just a degree of safety, there is no 100-percent degree of safety at any of them.

Mr. SPRINGER. I know that, but the problem is, I think, should it be made safer? General McKee, do you believe it ought to be made safer? Or more safe, I should say.

General MCKEE. I would like to make it so safe that we could be sure we would never have an accident there, if possible.

Mr. SPRINGER. All right.

General MCKEE. But on the other hand, as you know, we have taken action to severely restrict the number of operations there per hour. And you can imagine the pressures that have been on me to increase the number of operations.

Mr. SPRINGER. All right. Now, the ones that the pressures have been on have been chiefly, I presume, every commercial airline. Is that correct?

General MCKEE. Well, everybody would like to use it. Not only the commercial airlines like to have more operations.

Mr. SPRINGER. Well, the commercial aircraft want to run more. They want to schedule more carriers coming in. Isn't that about the size of it?

General MCKEE. Well, last summer, yes; they didn't want any restriction, which I can well understand, but they did volunteer, when I talked to the presidents of the various airlines about the seriousness of the problem confronting us, they did volunteer to put in this 40-an-hour limitation.

Mr. SPRINGER. All right. Now, General, let's just assume, if we took this, the way I figure it, of 876 per day average, and I don't know how that is, but that is the only way I can come about it, is an average, if you take the number of private aircraft, and take those out, you come to 233, to be exact, 222.9—223 landings and takeoffs average a day. If you took those out to some other airport, you would have a landing of only 653 per day.

Now, that is not only a safety factor, that is a reduction in the number of flights, the controllers, that the equipment there has to take care of, of probably a third, roughly.

Thirty percent, that is almost a third. If you take 30 percent of 876 and take it out of that airport, you will have removed from that an average of 223 per day. Now, that is a sizable reduction, isn't it?

General MCKEE. It is.

Mr. SPRINGER. Now, it would be reasonable, would it not, to assume that if the controller, whoever is in charge of all their equipment, did not have to log in and out and keep track of those 223 which were going to some other airport, it certainly would make it considerably safer, wouldn't it?

General MCKEE. Not necessarily make it safer. It would certainly reduce the workload on the controllers.

Mr. SPRINGER. All right.

General MCKEE. We have controllers at other areas handling more operations by far than they are handling at Washington National.

Mr. SPRINGER. Well, we are back to this thing, though, of where you don't allow any more commercial aircraft to come in out there, isn't

that true, because of the factor that there is a danger of too many coming in?

General McKee. No; that is not the reason.

Mr. Springer. What is the reason?

General McKee. The reason is congestion in the terminal, congestion in the parking lots, congestion on the ramps. We just can't physically handle them.

Mr. Springer. All right, now is that the reason that you are not allowing any more?

Is it not because of the safety factor, of those coming in and going out?

General McKee. The primary reason is congestion in the terminal facilities, parking facilities, and all the rest of them.

Mr. Springer. Then it is not safety factor.

General McKee. We do not have a significant, a real safety factor. You always have the safety factor. Mr. Springer, even if you have two airplanes.

Mr. Springer. I understand, I am not trying to pin you down to impossible situations.

General McKee. We did not do it on the safety basis, we really did it on the basis of actual congestion and physically being able to handle the people, not only on the ramps and in the terminals, and the parking areas, the access roads, the whole thing.

Mr. Springer. I have got a very few minutes; I have got to get all this in the record. Your reason, then, for restriction is not—let's qualify it to see if I can get a correct answer—primarily safety.

General McKee. No.

Mr. Springer. All right, I just want to be sure. Now that is your considered opinion as of today.

General McKee. As of today.

Mr. Springer. All right. Well, then, I will have to admit that the information I am getting is not the same information you are getting, but you are in a better position, I say, better qualified than I am from a technical standpoint to judge this, but I am getting what I think is substantial opinion, from whom I would consider qualified people that there is a safety factor, and I am not trying to put you on the spot, if we have an accident, but I will have to admit when I go out there and watch this thing, and I am not affecting, that I haven't experience on this thing, and I have been through a lot of accidents in those 17 years, and as I watch those landings and takeoffs, I can't help but come to a conclusion that there is a safety factor to all those people coming in and out, and I will admit I have thought twice a month, I go through the same thing, but that is not nearly as bad as some of the airports I have run into, I will admit that, as far as the parking and getting my baggage, isn't as bad as some other airports, but I have a sort of feeling that there is a danger, and I can't express it to you any better than that, but if you say, and it is your considered opinion, taking in all of the factors that you know about, that safety is not the primary reason for your not allowing for commercial aircraft to land, then I will take your word for it.

General McKee. If the number of operations at Washington National were up to a point where we in the FAA thought that there

was a safety factor, I wouldn't hesitate one spec to further restrict the airport.

Mr. SPRINGER. All right, now apparently I didn't read your release very well, and I didn't absorb that, last—I believe it was in January, when you cut back to 300 miles around Washington? Was that in January?

General MCKEE. Oh, that was last summer.

Mr. SPRINGER. All right.

General MCKEE. I hoped you wouldn't bring up last summer.

Mr. SPRINGER. I am not, I am just trying to find out and follow through if I can. I thought that was the safety factor.

General MCKEE. No, that was to try to limit the number of operations, and again, in terms of the terminal, in terms of all of the facilities. We just had too many people coming in and more airplanes and more people than we could handle on the ground.

Mr. SPRINGER. All right, let me get this straight in the record, then your reason for cutting back to 300 miles on the allowance of the aircraft landing and takeoff, at Washington, was due to internal factors, not safety?

All right. I just want to be sure that this was on the record, because I certainly did not understand it this way, General McKee, and I am glad to have that matter cleared up.

I will say that, that I hope you will inform the newspapers, because as I understand it, and I talked to some of them, it isn't their belief of what the situation is. It mentioned this question only the other day, but they don't believe this is the primary factor, they believe that that is a danger factor.

Mr. BROWN. Will the gentleman yield?

Mr. SPRINGER. Yes.

General MCKEE. I read the newspapers all the time, and people prognosticate a terrible tragedy at Washington National, and you can predict, or I can sit here right now and predict that we are going to have a tragedy in the next year someplace, whether it is at Washington National or some other place.

Now, if it doesn't occur, nobody pays attention to it; if it does occur, the guy that makes the great prediction, he becomes a hero and I become a heel.

Mr. SPRINGER. I don't think you are going to get too many like happended down at Hendersonville, because there is apparently this field which does not have much traffic.

General MCKEE. Certainly wasn't congested.

Mr. SPRINGER. I don't think the danger of two aircraft coming together is as high as it would be here or at Chicago, or New York, or Los Angeles.

Anyway, I thank you for your answer.

Mr. FRIEDEL. Will the gentleman yield?

Mr. SPRINGER. I had promised to yield to Mr. Brown.

Mr. BROWN. If I may reverse the question, at what point would congestion become a safety factor, or perhaps to ask the question more directly, what would be the area of breakdown, if you just increased with unlimited degree the traffic at an airport?

General McKee. My point is that when the air traffic control system, including the air traffic controllers, can no longer reasonably and sensibly handle the traffic, and they limit them right now. When they reach the limit point at La Guardia or J. F. K., that the reason a lot of airplanes at Washington National, when the weather is bad in New York, just sit on the ramp out here, because they can't handle them in New York.

Mr. Brown. How many flights would that be a minute?

General McKee. Would all depend on what the airport is, what the weather is, and if you have got a better answer, Mr. Thomas, you are controller.

Mr. Thomas. No, sir; it depends entirely upon the operation. For example, just for noise reasons alone, JFK can go down to half its normal operations under one wind condition as opposed to another.

Washington National can drop down to half, depending on weather, and whether you land to the south or north, so this is why we have empowered the controller to impose what we call full control, and when he says that he has no further room for the airplanes, or it is getting out of land, he just skirts the flow off. He does this all over the United States; he does it right now.

Mr. Brown. I am not sure that answers my question. Is the critical factor the aircraft traffic controller and the capacity of the air traffic controller to handle the traffic, depending upon the situation?

General McKee. That is right. And he judges, and he shuts it off, and he is the umpire.

Mr. Brown. But it is the controller.

General McKee. Yes, sir.

Mr. Brown. Who is the critical breakdown point. Is that right?

General McKee. Well, he is the one that determines it. It may be a blocked runway. It may be an instrument landing system out. It may be the weather went to low minimums, but he is the one that determines when capacity has been reached, and he needs to divert, or to stop traffic.

Mr. Brown. If I could just pursue the point one step further, Mr. Chairman, what I am really asking is that without radar, the air traffic controller may have a certain point at which congestion becomes too great for him to handle.

With radar, that point may be a little higher. In other words, an increased amount of traffic, with radar, and bad wind conditions, or something else, but the critical factor is the air traffic controller, in his capacity to handle the traffic; is that right? Under the circumstances?

General McKee. I think we are playing on words. If we have no radar we will operate 10 to 15 per hour. With radar, the wind in the right direction, we will go 90 an hour. It is the same controller; he is as capable and is as busy under one time as he is the other.

He handles the traffic, depending upon what the facilities will take. It is not the man that breaks down, it is the facilities that break down; it is a lack of a runway. It is a lack of an ILS, and the controller is the one that pulls the plug—"It won't take any more." Because the facilities broke down, not the man.

The CHAIRMAN. Mr. Rogers.

Mr. ROGERS. Thank you, Mr. Chairman. Now, Mr. O'Connell, do you have any responsibility at all to see after you have made recommendations and findings of violation of safety that some corrective measure is taken, or does your group make any recommendations at all?

Mr. O'CONNELL. My responsibility is primarily to make recommendations, after the investigations of accidents.

Mr. ROGERS. Do you follow through to see if any action is taken?

General MCKEE. He sure does. I have to answer. I write letters every day. It used to be the Chairman of the Civil Aeronautics Board, and now to Mr. O'Connell, describing in detail exactly what action we took on every recommendation they make.

Mr. O'CONNELL. Congressman, I might amplify that by pointing out that under the statute under which we operate, we are required to make public every recommendation which we make to the Administrator or to any other agency in Government with respect to safety. They are expected to respond to report what action, if anything, is taken, that always becomes a matter of public record.

Mr. ROGERS. Suppose the action is not taken that you thought should have been taken?

Mr. O'CONNELL. We have no power to go beyond the recommendation.

Mr. ROGERS. Who would act in that event? For instance, suppose you made recommendations and the FAA told you what they did about it, but there is another plane crash where the same thing happened, where if a change had been made, perhaps——

General MCKEE. They get a new Administrator of the FAA. That is the action that is taken on that one.

Mr. ROGERS. Who does that? The Secretary?

General MCKEE. The President.

Mr. ROGERS. The President only.

General MCKEE. I guess the Secretary of Transportation would request that they get a new Administrator.

Mr. ROGERS. If we could have for the record, then, a list of the recommendations, I would like to see it to give us an example, say, in the last 5 years, and the changes that have been brought about to carry out those recommendations.

I think it would be helpful for the committee to have it.

Mr. O'CONNELL. I would be very happy to submit that for the record.

(Following is a list of contents of aviation safety recommendations, 1963–67, submitted by the National Transportation Safety Board in response to Mr. Rogers' request. The page numbers refer to the file copies of such recommendations, which are in the committee files.)

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1967

Reference No.	Recommendation subject	Submitted	Page No.
7-RE-1	Issue AD Beech King air model 90 re fuel switches, flap electrical system and fuel crossfeed system.	July 12, 1966	1
7-RE-2	Insure compliance with applicable provisions CAR's re Hawker-Siddeley aileron and elevator control lock	Aug, 1, 1966	6
7-RE-3	Nord 262 oil pressure warning light system	Aug. 9, 1966	9
7-RE-4	Aero Commander 200; elevator trip position indicator, trim tab limits and inspection access.	Aug. 19, 1966	18
7-RI-5	CL-44D crosswind component limitations	do	22
7-RE-6	Replacement Delrin stem all aircraft equipped with Bendix RSA-5AD1 fuel injector system (PA-30).	Sep. 1, 1966	25
7-RI-7	Explore possibility improving quality-intelligibility cockpit voice recorders	Sep. 19, 1966	29
7-RE-8	Reevaluate P-5 pitot system BAG-1-11 and insure reliability in rain and below freezing temperatures	Sep. 23, 1966	33
7-RE-9	Improve fuel manifold on P. & W. J.T.4A engines (B-707)	Sep. 28, 1966	38
7-RE-10	Revise maintenance handbook and establish definite time interval for inspection main rotor driver transmission Hughes 269B helicopter.	Oct. 3, 1966	42
7-RE-11	Fuel selector system Piper PA 32-260 and PA 28-235	Oct. 12, 1966	47
7-RE-12	Engine failures, Nord 262	Oct. 14, 1966	51
7-RE-13	Emergency gear extension system, Beech D-185	do	57
7-RE-14	Carburetor float clearance, Marvel-Schebler carburetors, Bell 47G helicopters.	do	60
7-RE-15	Relocate cockpit voice recorders on aircraft with aft-mounted engines	Oct. 28, 1966	63
7 RE 16	Design safety criteria BAC 1-11	Oct. 31	65
7-RE-17	Adequacy and distribution of manual material and other service information high performance, general aviation aircraft (Turbo-Commander).	Nov. 9, 1966	73
7-RE-18	Modification inner blade bearing installation—main rotor system brantly	Dec. 22, 1966	82
7-RE-19	Reevaluation of fuel system Beech model 95-B55 and alert pilots regarding uncoordinated maneuvers with minimum fuel.	Jan. 12, 1967	87
7-RE-20	System for detecting explosives	do	90
7-RE-21	Electrical system, aircraft heater, Convair aircraft, Allegheny Airlines	do	92
7-RE-22	Replace rotor blades A. & S. model 18, gyroplane	Jan. 18, 1967	96
7-RI-23	Approach zone obstruction lighting	Jan. 20, 1967	100
7-RE-24	Clarify bench test procedures, propeller governor, Piper PA-30; also single-engine emergency procedures.	Feb. 10, 1967	102
7-RE-25	Positive locking device, rudder pedal mechanism, B-707 and 727 aircraft	Feb. 17, 1967	106
7-RE-26	Immediate inspection Hartzell HCB34302E propeller blades; also similar model propellers.	Feb. 20, 1967	109
7-RE-27	Standardize basic operating procedures for ground equipment	Mar. 3, 1967	112
7-RE-28	Manufactures production, repair and inspection of yaw damper coupler, Boeing aircraft, be reviewed and improved testing procedures be implemented.	Mar. 10, 1967	115
7-RE-29	Require mandatory inspection lower spar cap outboard outer wing panel attach point, BEECH C-45H.	Mar. 13, 1967	117 9
7-RE-30	Include contents AD66-2-4 in an additional AD to adequately cover inspection and rework wood and glue joining Mooney 18.	Mar. 23, 1967	122
7-RE-31	Revise flight manuals for Hiller UH-12 to include proper procedures for engaging mercury drive clutch.	Mar. 27, 1967	128
7-RE-32	Allison Aeroproducts propeller pitch lock	Mar. 30, 1967	130
7-RE-33	Issue airworthiness directive requiring internal inspection main integral fuel tanks Piper PA 28/32.	do	134
7-RI-34	Aircraft evacuation hazards caused by certain seat arrangements and sign	Apr. 17, 1967	137
7-RE-35	Review in depth manufacturing process and quality control system at Allison.	Apr. 18, 1967	140
7-RE-36	Need for immediate corrective action re inflight wing structural failures Beechcraft -18.	May 5, 1967	143

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1966

Reference No.	Recommendation subject	Submitted	Page No.
6-RI-1	Inspection requirements—Excess fuel landing	To FAA July 16, 1965	1
6-RE-2	FAA review adequacy all airline takeoff abort procedures and FAA's abort certification test procedure to encompass captain to copilot.	To FAA July 19, 1965	5
6-RI-3	Display of limitation information re radar vector service	To FAA July 23, 1965, and Sept. 24, 1965.	12
6-RE-4	Pratt & Whitney turbine engine modification and overhaul procedures.	To FAA Aug. 20, 1965	22
6-RE-5	Inspection of outboard engine fire extinguishing lines on Boeing 707 and 720 aircraft.	To FAA Aug. 24, 1965	27
6-RE-6	Alert field inspectors and operators of DC-7 aircraft of potential wear condition in aileron attachments.	do	30
6-RI-7	Failure cam drive gear, P. & W. engine in DeHavilland Beaver (Australian).	To FAA Aug. 27, 1965	33
6-RE-8	Inspection of tail rotor blades P/N B2-111-11, Brantly model aircraft.	To FAA Sept. 2, 1965	37
6-RE-9	FAA assure that air carrier flight crews are adequately trained on systems they control and operate. (Nose gear retractions, Boeing 707 and 720 aircraft.)	To FAA Sept 16, 1965	39
6-RE-10	C-46 landing gear drag strut	To FAA Sept .20, 1965	45
6-RE-11	CV-240 wing gap straps	do	48
6-RE-12	Be alert to condition of excessive wear, elevator torque tube attach pivot point, DC-6 aircraft.	To FAA Sept. 24, 1965	52
6-RE-13	Improve instructions re inspection of 727 landing gear wheels for cracks and corrosion.	do	54

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1966—Continued

Reference No.	Recommendation subject	Submitted	Page No.
6-RI-14	Aircraft loading under pt. 135	To FAA Sept. 24, 1965	57
6-RI-15	Suggested revisions to Convair 240/340 check list and training procedures (updating Allegheny Air Lines operations manual).	To FAA Sept. 28, 1965	60
6-RE-16	Require improvements in fuel manifolds of JT3D engines per P. & W. S.B. 369,635.	To FAA Oct. 8, 1965	65
6-RE-17	Require compliance with Boeing S.B. 1178 to bring to safety standards those 707/720 series aircraft not modified.	do	69
6-RI-18	Misleading labeling in electrical wiring diagram in Piper Twin Com. service.	To FAA Oct. 12, 1965	73
6-RE-19	Recommend survey of air carrier seatbelt installations	To FAA Oct. 13, 1965	77
6-RE-20	Alert all owners and operators of Piper PA-30 existence of fuel injection vapor problem.	To FAA Oct. 20, 1965	81
6-RE-21	Examine and reevaluate lifejacket provisions of PAWA now and in time all air carriers.	To FAA Oct. 22, 1965	85
6-RE-22	Give additional consideration to requiring installation of sound transmitters on flight recorders.	To FAA Oct. 29, 1965	88
6-RE-23	Require improved inspection of impeller assembly or limit service life, Martin 404.	To FAA Nov. 2, 1965	92
6-RE-24	All F-27A aircraft incor. Fairchild S.B. 27-26; provide more adequate landing flap warning light test circuit, etc.	To FAA Nov. 18, 1965	96
6-RE-25	Rerouting fuel lines Boeing 727 and similar aircraft	To FAA Nov. 30, 1965	101
6-RE-26	Require emergency lights be turned on during all takeoff and landing operations of Boeing 707, 720, 727.	do	107
6-RE-27	Action be taken to modify Hughes 300AG electrical wiring to prevent shorting magneto leads.	To FAA Dec. 2, 1965 and Feb. 21, 1966.	113
6-RE-28	Inspect all 2d stage P/N 421602 fan disks on JT3D-1 engines for radial cracks.	To FAA Dec. 3, 1965	117
6-RI-29	Recommend maximum age requirement be considered for pt. 135 operations.	do	121
6-RE-30	Suggest exploring overtemperature problem, GTC-85 auxiliary power unit as installed in Grumman Gulfstream.	To FAA Dec. 13, 1965	123
6-RE-31	That combustion testing of materials used in aircraft interiors be expanded to provide for testing of various combinations of materials.	To FAA Dec. 16, 1965	127
6-RE-32	Installation of additional spacer under pawes to arrest runaway stabilizer in brake assembly on B-727.	To FAA Feb. 15, 1966	133
6-RE-33	Inspection of quality control procedures in instrument overhaul of vertical gyro assembly (AAL-B-727).	To FAA Feb. 21, 1966	136
6-RE-34	Appropriate action be taken to prevent used connecting rod bolts being installed in Lycoming engines (Brantly).	To FAA Feb. 24, 1966	140
6-RE-35	Investigate quality control procedures of EAL regarding altimeter installations and maintenance.	To FAA Mar. 7, 1966	144
6-RE-36	Action be taken regarding fatigue failures in Bell 47 tail rotor blades in grip section.	To FAA Jan. 18, 1966, and Apr. 21, 1966.	151
6-RE-37	Require precautionary inspection for cracks in vertical stabilizer rear spar attachment fittings; B-707, B-727 aircraft.	To FAA Mar. 29, 1966	157
6-RE-38	Speed restriction and flutter characteristics of Piper PA-30	May 2, 1966	159
6-RE-39	Improved detection methods for cardiovascular disease be employed during airmen's medical examination.	May 5, 1966	163
6-RI-40	That air carrier pilots receive instruction on hazards of aquaplaning and techniques to use when encountered.	May 11, 1966	174
6-RI-41	Amendment to FAR pts. 23 and 135 to provide for wing-flap-actuated gear audible warning device for general aviation aircraft.	May 20, 1966	177
6-RI-42	Amend pt. 23 to specifically provide fuel selector control must be located in full view of pilot and accessible to him.	May 25, 1966	185
6-RE-43	Revise FAR pt. 23 to aid in prevention of ground loop type accidents	do	189
6-RE-44	The recording of additional flight data parameters through use of improved flight records.	June 1, 1966	193
6-RE-45	Improve drive coupling assembly of Thompson Products model TF-1900 fuel pump, Beech G-35 aircraft.	June 9, 1966	197
6-RI-46	Evaluate Piper PA-24 and PA-30 landing gear systems re electrical current load and rigging.	do	202

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1965

Reference No.	Recommendation subject	Submitted	Page No.
5-RO-1	Clarification of language of FAR and FIM	To FAA July 10, 1964	1
5-RE-2	Make appropriate inspections on all Beech 18 wing spars as rapidly as possible.	To FAA July 13, 1964	4
5-RO-3	Provision of adequate number of visibility reference points and maintenance of current visibility reference charts.	To USWB July 20, 1964	8
5-RO-4	Clarification of special weather observation criteria—Tahoe Valley Airport.	To USWB July 23, 1964	11
5-RO-5	SAWRS improvement program	do	14
5-RO-6	Improvement of communication of Tahoe Valley observations	do	17
5-RO-7	Review of operations similar to Paradise Airlines	To FAA July 24, 1964	20
5-RO-8	Emergency smoke-removing procedures	To FAA July 30, 1964	24
5-RO-9	Modification of air traffic control procedures re transmission of flight identification.	To FAA Aug. 4, 1964	30

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1965—Continued

Reference No.	Recommendation subject	Submitted	Page No.
5-RE-10	Reevalutation of tail rotor service life on Bell 47	To FAA Aug. 17, 1964	35
5-RE-11	Improve accuracy and survivability of flight recorders	To FAA Aug. 21, 1964	38
5-RE-12	Installation of lower coupling drive shaft on Hughes 269 helicopter	To FAA Sept. 1, 1964	45
5-RO-13	Depiction of towers and obstructions in attention-drawing manner	To FAA Sept. 9, 1964	50
5-RO-14	Designation of Alpena, Mich., control area extension on year-round basis and provision of ATC services.	To FAA Sept. 23, 1964	52
5-RE-15	Advise owners through FAA general aviation inspection aids to insure proper cleaning oil filter cover on Cessna 205 aircraft.	To FAA Sept. 28, 1964	56
5-RE-16	Reassess structural integrity of Hughes tail rotor drive shaft in models 269A and 269B.	To FAA Oct. 1, 1964	59
5-RE-17	Modification to fire extinguishing system for lower cargo compartment.	To FAA Oct. 9, 1964	71
5-RA-18	Transistor watches—Potential source of interference to aircraft navaids.	To FAA Oct. 15, 1964	76
5-RE-19	Action re self-sealing fuel tank cells Convair PB4Y-2 and World War II aircraft.	To FAA Oct. 20, 1964	79
5-RO-20	Charting of Navy student jet training areas	do	82
5-RO-21	Correction of USAF flight information publication (approach chart)	To USAF Oct. 23, 1964	85
5-RE-22	Evaluate adequacy of S-62A fuel quantity gaging system design	To FAA Oct. 26, 1964, Dec. 30, 1964, and Feb. 17, 1965.	88
5-RO-23	Team aerial agriculture application by 2 or more aircraft	To FAA Oct 29, 1964	98
5-RE-24	Require use of shoulder harness and crash helmet, agricultural flying and other operations involving low and slow flying.	To FAA Nov. 3, 1964	99
5-RE-25	Review maintenance and inspection procedures of Hawthorne-Nevada Airlines.	do	105
5-RO-26	Standardization of in-runway lighting at John F. Kennedy International Airport.	To FAA Nov. 5, 1964	111
5-RE-27	Study be initiated to determine defective weld inspection method in center section truss assembly, Bellanca aircraft.	To FAA Nov. 17, 1964	113
5-RO-28	Use of smoke masks in Viscount aircraft	To FAA Nov. 16, 1964	118
5-RE-29	Require suitable modification for Brantly B-2 helicopter shock strut design.	To FAA Nov. 18, 1964	120
5-RE-30	Reevaluation of icing of Kollsman pitot head	To FAA Nov. 19, 1964	123
5-RE-31	Effectiveness of FAA's surveillance policies of air carrier operators and methods of certificating approved repair stations.	To FAA Nov. 20, 1964	127
5-RE-32	Appropriate inspection and rework procedures for B-707 main landing gear aft axle be made mandatory.	To FAA Nov. 23, 1964	133
5-RE-33	F-27 emergency exit door, aft right side, require compliance with regulations; also establish inspection schedule to detect fretting of wing.	To FAA Nov. 24, 1964	138
5-RO-34	That the depiction of altitude restrictions on the plan view of approach plates be included on the expanded profiles.	To FAA Nov. 25, 1964	143
5-RE-35	Determine possible use of reinforced polyesters for protection in commercial aircraft and feasibility of such material.	To FAA Dec. 1, 1964	147
5-RO-36	Revision of Jeppensen approach chart	To Jeppensen Dec. 24, 1964	148
5-RE-37	Consider a redesign of B-707 electrical system to prevent prolonged interruption of essential power.	To FAA Dec. 30, 1964	159
5-RE-38	Modify Lockheed Jetstar landing gear emergency extension system	To FAA Dec. 31, 1964	164
5-RE-39	Advise operators Bell 47G-3 re power lag in Franklin 6VS-335 engines.	To FAA Jan. 8, 1965	170
5-RE-40	Reevaluation nose gear mechanism design of emergency system B-720 and all other aircraft using similar systems.	To FAA Jan. 15, 1965	173
5-RE-41	Use of lift strut as a step undesirable re Cessna 140, 150, 170, 180, 210.	To FAA Jan. 27, 1965	178
5-RO-42	Hazards to air carrier personnel during handling of large jet aircraft.	To FAA Feb. 2, 1965	182
5-RE-43	Improvement in fuel systems Convair 340 aircraft	To FAA Feb. 9, 1965	187
5-RE-44	Modification of Brantly B2A fuel pump drain line	To FAA Feb. 18, 1965	192
5-RE-45	Formation of industry-government task force to reassess current passenger safety procedures.	do	197
5-RO-46	Markings on aeronautical charts of wire installations over land or water.	To C. & G. Mar. 4, 1965	201
5-RO-47	Promulgation of information on location of emergency exits	To FAA Mar 12, 1965	202
5-RE-48	Issue AD re B-727 inboard trailing edge flaps	To FAA Mar. 18, 1965	204
5-RE-49	Equip Hughes 269A having Vertx II-100 spray kit with baffle	To FAA Mar 22, 1965	210
5-RO-50	Radar air traffic control procedures	To FAA Mar 30, 1965	213
5-RE-51	Improvements in service time for R-2800 cylinders—Allegheny Airlines.	To FAA Mar. 31, 1965	222
5-RO-52	Installation of computer-based digital displays of RVR information	To USWB Apr. 1, 1965	229
5-RO-53	Revision of pt. 3 of the CAR's with record to landing gear visual position indicator and stallwarning aural signal.	To FAA Apr. 5, 1965	232
5-RE-54	Changes in fuel selector system, Lockheed 18	To FAA Apr 8, 1965	250
5-RE-55	Expedite FAA approval and mandatory required fuel surge, tank detection, and suppression system for B-707; reorient FAA's lightning group.	do	255
5-RE-56	Require mandatory installation of reverser in transit light to assist crew detection of hazardous asymmetrical thrust condition.	To FAA, Apr. 21, 1965	259
5-RO-57	Revision of flight manual for Hughes helicopter to include information on "low fuel" warning light.	do	265
5-RE-58	Conduct fleet campaign to determine if contaminated Ledex relays are installed in other L-1049H aircraft.	To FAA, Apr. 22, 1965	269
5-RE-59	Classify certain sprays as "hazardous" both in general and air carrier aviation.	To FAA, Apr. 26, 1965	276

SAFETY REC MMENDATIONS SUBMITTED DURING FISCAL YEAR 1965—Continued

Reference No.	Recommendation subject	Submitted	Page No.
5-RO-60	Revision of Hughes 269A helicopter preflight inspection checklist	To FAA Apr. 26, 1963	279
5-RE-61	Spectrometric oil analysis	To FAA, Apr. 27, 1965	284
5-RO-62	Modification of Brantley B-2 helicopters	To FAA, May 4, 1965	287
5-RE-63	Action to insure good security of spacer block of Schempp-Hirth models S, SH, and SH1.	To FAA, May 17, 1965	292
5-RE-64	Inspection requirement for J-T3D 2d-stage fan disks; revise overhaul manuel.	To FAA, May 25, 1965	296
5-RO-65	Minima applicable to special VFR	To FAA, June 3, 1965	302
5-RO-66	Revisions of pilot examinations re human oxygen requirements	To FAA, June 14, 1965	324
5-RE-67	Redesign of the stator vane pilot valve assembly on General Electric CT-58-100 engines.	To FAA, June 18, 1965	327
5-RO-68	Require carriage of a battery-powered transceiver on all air-carrier aircraft.	To FAA, June 22, 1965	332
5-RE-69	Mandatory inspection of Piper aircraft	To FAA, June 29, 1965	342

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1964

Reference No.	Recommendation subject	Submitted	Page No.
4-RF-1	That steps be taken to advise flight service personnel in regard to use of the term VFR.	To USWB July 5, 1963	1
4-RF-2	Development of a standard means of making and maintaining a record of information provided pilots in weather briefings.	do	5
4-RF-3, MIA63-114	Provisions to include weather radar information derived from W/B WSR-57 equipment in ATC facilities.	To FAA July 5, 1963	7
4-RF-4-FTW63-119	Provide for establishment of minimum altitudes for air carrier training maneuvers.	To FAA July 17, 1963	11
4-RE-5, MKC63-85	Design rear spar upper plant fitting and quality machining L1049G be reviewed. Determine extent corrective action necessary.	To FAA July 12, 1963	14
4-RE-6, NYC63-189	All CV 240, 340, 440 operators be required to perform one-time inspection landing gear, to insure proper length screw in locking position gland nut.	To FAA July 24, 1963	20
4-RE-7, CHI63-182	Immediate and recurring inspection of Cummings and Sanders CS-9400 seat belts.	To FAA July 22, 1963	25
4-RE-8, DCA63-8	Overhaul facilities be alerted to potential dangers improper magnaflux techniques.	To FAA July 30, 1963	29
4-RE-9	Recommend issuance AD on connecting rod bolts, Lycoming engine, model VO-540.	do	32
4-RE-10, FTW63-159	Modify Beech 35 to incorporate 4 removable inspection panels.	To FAA Aug. 8, 1963	34
4-RE-11	Care in use of 4340 steel used in main landing gears.	To FAA Aug. 21, 1963	37
4-RF-12	Government responsibility for private navigational facilities.	To FAA Aug. 22, 1963	40
4-RE-13, SEA62-12	Reevaluate front seat safety belt attachments, Cessna 172 and 182.	To FAA Sept. 18, 1963	47
4-RE-14, MKC64-20	More extensive mandatory inspections on Hiller UH12 D and E rotor blades.	To FAA Sept. 19, 1963	54
4-RE-1, CHI64-32	Reduction of inspection time Cessna 195 main spar from 4500 hours to 1000 hours.	To FAA Sept. 26, 1963	57
4-RE-16, NYC63-159	Investigate leading edge failure trend possibility of Aero Commander.	do	60
4-RE-17, FTW64-13	Issue AD or alert to replace oil line Piper PA23 from engine to cooler with more durable type.	do	65
4-RE-18	FAA require all models of Aero Commander with fuel booster and primer system control switches be retrofitted.	To FAA Sept. 27, 1963	67
4-RF-19, DCA64-1	Revision of dispatch regulations	To FAA Sept. 30, 1963	72
4-RF-20, MIA62-56	Early consideration be given to requiring the installation of runway distance markers at all air carrier airports.	To FAA Oct. 3, 1963	75
4-RO-21	Recording of in-flight briefing	To FAA Oct. 8, 1963	78
4-RE-22, MIA64-36	AD on HS JFC25 fuel controls requiring redesign of throttle valve assembly plus interim improvements.	do	83
4-RO-23, MIA63-114	Amendment of instructions, reissuance of SIGMET advisories.	To USWB Oct. 17, 1963	92
4-RE-24	Improvements of emergency radio signaling devices.	To FAA Oct. 17, 1963	95
4-RE-25, DEN62-39	Discrepancy in Cessna 310C owner's manual be brought to attention of FAA.	To FAA Oct. 21, 1963	101
4-RO-26	Revision of regulations regarding wearing of seat belts.	To FAA Oct. 25, 1963	104

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1964—Continued

Reference No.	Recommendation subject	Submitted	Page No.
4-RE-27, LAX64-21	Pneumatic locking of extended ejector	To FAA Nov. 4, 1963	107
4-RO-28, CHI64-46	Hazards involved with use of plastic sheeting in vicinity of aircraft operations.	To FAA Nov 6, 1963	110
4-RE-29, DCA64-2	Conditions for ungrounding Vertol 107, review procedures for establishing overhaul times.	do	113
4-RE-30	Review maintenance and inspection departments and procedures in order to improve airworthiness standards.	To FAA Nov. 27, 1963	119
4-RE-31, LAX64-33	Navion Rangemaster wing flutter	To FAA Dec. 12, 1963	123
4-RO-32	Discrepancies in weight and balance data contained on the repair and alteration form 337.	do	132
4-RE-33, DCA64-3	Provide protection from igniting turbine fuel vapors.	To FAA Dec. 17, 1963	137
4-RE-34, DCA64-3	Improved crash resistance of flight recorders	do	144
4-RO-35	Rescheduling of general and business aviation flight activities.	To FAA Dec. 20, 1963	149
4-RE-36, OAK64-28	Review maintenance procedures policies of AAXICO Airlines.	To FAA Dec. 27, 1963	158
4-RE-37, NYC64-56	Improvement of emergency evacuation procedures and stowage of carryon baggage.	do	162
4-RE-38, FTW64-51	Incorporation of strengthened compressor spacers.	do	170
4-RO-39	Misleading climb instructions issued by Great Falls Center.	To FAA Jan. 9, 1964	175
4-RE-40	Fire hazard Boeing 707/720, quicker compliance requirement for proposal AD.	To FAA Jan 20, 1964	180
4-RE-41	Inspection schedule for Boeing 707/720 at early date re cracks in wing spar.	To FAA Jan. 24, 1964	188
4-RE-42	Inspection and overhaul procedures at Pacific Airmotive.	To FAA Jan. 30, 1964	193
4-RO-43	Departure procedures authorized due to terrain clearance considerations.	To FAA Feb. 4, 1964	197
4-RO-44	Removal of IFR traffic from and publicity about area of parachute jumping.	To FAA Feb. 11, 1964	202
4-RE-45, OAK64-47	FAA evaluate integrity of the 47-620-485-9 shear screws on Bell helicopter.	To FAA Feb. 24, 1964	206
4-RE-46, NYC64-97	Interim inspection be performed of compressor exit vanes on JT-4 engines prior to overhaul.	To FAA Feb. 25, 1964	221
4-RE-47, MIA64-70	Redesign fuel selector cockpit control to preclude inadv. oper. modify aux. fuel tank filler to eliminate water seepage into tank.	To FAA Feb. 27, 1964	225
4-RE-48, ANC64-12	Fix for landing gear warning system on C-46 aircraft.	To FAA Feb. 28, 1964	230
4-RE-49	Boost system filter caps be changed from aluminum to steel.	do	237
4-RE-50, MKC64-55	Redesign of landing gear position indicators to prevent false indication of gear position to crew.	do	241
4-RO-51, MIA64-75	Reevaluation of regulations concerning air taxi certification and operation.	do	247
4-RE-52	Revise AD 59 14-2 to include recurring inspection of valve core on fuel selection valve at designated periods on Mooney M-20-A.	To FAA Mar. 30, 1964	250
4-RE-53	Additional measurements necessary on O/H for proper clearances between turbine discs and inner sealing ring assemblies.	To FAA Apr. 2, 1964	255
4-RO-54	Revision of Aero Commander Flight Manuals	To FAA Apr. 3, 1964	258
4-RO-55	Ground rest periods and duty time limitations for flight crews.	To FAA Apr. 22, 1964	264
4-RE-56	Pertinent maintenance and overhaul procedures be reviewed industrywide for adequacy of inspection and assembly regulation.	do	265
4-RO-57	Adequacy of nighttime visibility reference markers and charts depicting same.	To USWB Apr. 23, 1964	268
4-RO-58	Specific responsibilities for copilots during instrument approaches.	To FAA Apr. 23, 1964	273
4-RO-59	Modification of instructions re dissemination of SIGMET's	To FAA Apr. 24, 1964	276
4-RO-60	Formulation of criteria re time reference and coordination with FAA.	To USWB Apr. 27, 1964	282
4-RO-61	Restriction of intentional parachute jumping operations.	To FAA Apr. 29, 1964	288
4-RO-62	Updating FIDO's supply of USGS quadrangle charts.	To FAA May 6, 1964	290

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1964—Continued

Reference No.	Recommendation subject	Submitted	Page No.
4-RO-63	Amendment of WB Form 652-16A	To USWB May 6, 1964	293
4-RE-64	Fleet assembly inspection on all DC-8 stabilizer drive assemblies to assure proper assembly.	To FAA May 6, 1964	295
4-RE-65	FAA change procedures to prevent STC with back-dated effective date; FAA change procedure to prevent installation of incompatible STC's; change in CAR to prevent certifying aircraft having dangerous loading characteristics.	To FAA May 8, 1964	301
4-RE-66	Inspection and protection of landing gear skids.	To FAA May 13, 1964	309
4-RO-67	Relocation of sensing equipment at Hilo, Hawaii.	To USWB May 22, 1964	312
4-RE-68	FAA consider modification of B-720-B horizontal tail to preclude stick force lightening.	To FAA May 27, 1964	314
4-RE-69	Recurrent structural inspections of Mooney M18C.	do	320
4-RE-70	1,000-hour retirement life on idler pulley, Hughes 269A/B, be reduced.	do	325
4-RO-71	Replacement of control valve on crew oxygen bottles.	To FAA June 5, 1964	329
4-RE-72	AD be issued for immediate inspection of S-10K Fafnir bearings.	To FAA June 12, 1964	332
4-RO-73	Change in wording of par. 265.12 of Air Traffic Control Procedures Manual re special VFR operations.	To FAA June 16, 1964	338
4-RO-74	Equal application of VFR landing standards to all carriers.	To FAA June 18, 1964	342
4-RE-75	Periodic inspection on crankshaft of Piper Twin Comanche.	To FAA June 19, 1964	344
4-RO-76	Maintenance of Navaids in condition existing at time of accident.	To FAA June 22, 1964	349
4-RO-77	Briefing on location and operation of life rafts and preservers.	do	352
4-RO-78	Inclusion of appropriate provisions of pt. 42 in air taxi operators' operations specifications.	To FAA June 26, 1964	356
4-RE-79	Heim rod end failures on Cessna 310 airplanes	do	359
4-RE-80	Landing gear failures, Cessna 120/140 aircraft	do	363
4-RE-81	FAA review quality of work performed by certified repair stations.	do	368

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1963

Recommendation No.	Recommendation Date	Recommendation	Page No.
63-1	July 3, 1962	To FAA: Compliance with service bulletin A-Ty 79-15 at an early date be made mandatory to guarantee an ample warning margin in operating engines. (B-96)	1
63-2	July 20, 1962	To FAA: Advising FAA of the engine overhaul irregularities found during our investigation and recommending that the overhaul practices and procedures of the Pacific Airmotive be reviewed by FAA. (B-96)	8
63-3	do	To FAA: FAA conduct survey to determine number and type of old emergency escape slides in service and to require removal of such slides from service within a reasonable length of time. (B-96)	9
63-4	July 21, 1962	To FAA: Recommending correction of discrepancies in flight information publications and charts. (B-93)	12
63-5	July 24, 1962	To FAA: Advising them that the detailed examination of the landing gear fitting disclosed that the source of the fracture was fatigue	13
63-6	Aug. 10, 1962	Require routine engine instrument logbook entries at WAL be considered; examine WAL procedures and practices with respect to EGT indicating system checks	15
63-7	do	Reduce current overhaul period at Avalon Air Transport from 1,500 to 600 hours; conduct field check of blade slippage within retaining clamps; reevaluate clamp design for retaining and indexing blade in subject model of Hartzell propeller	20
63-8	Aug. 14, 1962	Call attention of the Administrator to need for design changes in landing gear door and hinge beyond the manufacturer's change to steel replacement hinge	25
63-9	Aug. 22, 1962	Calling to attention of Administrator failure of section of anti-ice air duct in fuselage near aft baggage compartment which was weakened by severe intergranular corrosion caused by improper pickling	29
63-10	Aug. 23, 1962	1-time inspection be made of all Cessna CH-1C tube braze assemblies and if FAA approves new design AD be issued requiring new assembly on all CH-1C's	31
63-11	Aug. 24, 1962	Consideration be given to establish shorter periods between inspections and between parts replacements than previously established for such components as landing gears and flaps	34

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1963—Continued

Recommendation No.	Recommendation Date	Recommendation	Page No.
63-12	Aug. 24, 1962	Shifting system be revised to allow operation of bypass valve before mechanical control linkage is shifted	37
63-13	Aug. 28, 1962	Conversion to "frequency recording" as opposed to "position recording" at ATC facilities	48
63-14	Sept. 5, 1962	FAA take a look at configurations to be used in new 3-class passenger service in Boeing 707 type aircraft to assure that proper access to over-wing exits is maintained	54
63-15	Sept. 11, 1962	Review quality of welds by manufacturer to insure that other Mooney aircraft are not being operated in an unsafe condition	58
63-16	Sept. 24, 1962	Operators of C-46 aircraft be required to inspect, lubricate as necessary and make functional checks of the fire extinguishing system at intervals of approximately 6 months	63
63-17	Sept. 25, 1962	AD be issued requiring temporary deactivation of the Spartan electric trim system	66
63-18	Oct. 4, 1962	That action be taken by Administrator to assure that radar personnel and facilities at Shemya meet FAA standards	68
63-19	Oct. 8, 1962	That the term "true bearing" be substituted for "true radial" in designation of airways, based on true north reference	72
63-20	do	FAA investigate accident procedures, alarm system, fire fighting, rescue, and medical facilities at McGhee-Tyson Airport. Also FAA provide technical assistance and cooperation to fullest extent possible at said airport	74
63-21	Oct. 11, 1962	Recommend design change in fore and aft cyclic system, Bell 47G-2, and subsequent models. Conduct 1-time inspection of fore and aft cyclic as interim safety precaution	77
63-22	Oct. 18, 1962	Inspection procedures Flying Tiger Line be reviewed and improvements be required to eliminate fuel contamination	82
63-23	Oct. 24, 1962	FAA examine maintenance and operating practices, Flying Tigers, in detail to assure acceptable level of airworthiness	86
63-24	Oct. 25, 1962	Recommend FAA expedite matters to issue official stand at earliest possible date re recap requirements either by a TSO or MSO	89
63-25	Oct. 29, 1962	CAB endorses FAA efforts to develop flight recorders, measuring added parameters	92
63-26	Oct. 30, 1962	Recommend FAA conduct research to determine proper operational height for anemometers, preferred location(s) of wind measuring equipment on runway complex	95
63-27	Oct. 31, 1962	Pilots' examinations relative to flight characteristics and emergency procedures—single-engine, high-performance aircraft	99
63-28	Nov. 5, 1962	Abbreviated departure message be transmitted by service B teletype on all nonair carrier a/c for delivery and action required by ATS facilities serving destination airport	125
63-29	do	FAA require repetitive special inspection, Bell P/N 47-642-020-1 blade	130
63-30	do	Mandatory corrective action be taken to modify door hinge mechanism	132
63-31	Nov. 7, 1962	Consideration be given during FAA study of flight time limits to need for clearly defined criteria in adequacy of airborne rest facilities and duty time limits	135
63-32	Nov. 8, 1962	Weather Bureau consider revising delineation system, aviation forecast areas to facilitate proper interpretation of forecasts	138
63-33	do	Improvements be made in area of liferaft stowage, lights on rafts and jackets: TSO-C13 be reviewed; adequacy of seat tiedown; emergency information be issued	140
63-34	Nov. 15, 1962	FAA provide that data re effective altitudes on this airway be displayed more prominentaly on all aeronautical charts. Provide special Notams and alert bulletins as means of alerting unsuspecting pilot of danger in this undesignated airspace	145
63-35	Nov. 20, 1962	Appropriate procedural documents of ATC be amended to require ARTC radar controllers indicate positively to pilot when radar handoff is to be employed in connection with his flight	148
63-36	Nov. 21, 1962	Cited approach plate remarks be amplified to include statement that no centerline guidance may be available during final stages of approach. See LTR Sept. 9, 1963	152
63-37	Dec. 19, 1962	ATC personnel be authorized to refuse approach clearance to aircraft in weather conditions below lowest minimums applicable to requested approach	154
63-38	Nov. 28, 1962	FAA arrange with DOD to provide periodic scheduled lectures by FAA ATC personnel re ATC operating procedures at military bases where undergraduate jet flight training is conducted	162
63-39	Dec. 13, 1962	Immediate action be taken to effect changes outlined in letter. Discrepancies in Airman's Guide, ILS	165
63-40	Dec. 19, 1962	ATS procedures be revised to require operationally significant weather information pertinent to approach areas involved be transmitted routinely to approaching aircraft	171
63-41	Dec. 26, 1962	Study be made by FAA of physical layout of RVR readout displays at Idlewild and other locations where PAR installed	175
63-42	do	Runway visibility observing program be initiated at such locations when measurements not available and prevailing visibility or pilot reported visibility is 1 mile or less. Runway visibility observers should be certificated by USWB	177
63-43	do	Consideration be given to development of staffing plans and work schedules so designed that during periods of adverse weather, one of the observers on duty at airport stations is relieved of all responsibility other than that of maintaining constant watch on weather and recording observations.	179
63-44	Dec. 27, 1962	That Weather Bureau consider revision of current aviation weather observing instructions regarding "partial obscuration"	181
63-45	Dec. 26, 1962	Duplicate letter to FAA urged matter be discussed jointly by Weather Bureau and FAA. Representatives of BOS will be available for consultation	183
63-46	Dec. 31, 1962	Recommend current airworthiness requirements for automatic flight control systems in sec. 4b.612 of CAR and related CAM policy material as applied to high-speed swept-wing design turbojet aircraft be reevaluated for establishing realistic performance criteria	85

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1963—Continued

Recommendation No.	Recommendation Date	Recommendation	Page No.
63–47	Dec. 31, 1962	Recommend that newly designed bellcrank (steel) be evaluated and, if found satisfactory, its use be made mandatory on all existing and future Brantly B–2 helicopters	193
63–48	Jan. 4, 1963	Recommend bird strike be reviewed for information to expand general background on bird ingestion and for data which may warrant revising the tentative programs of FAA currently scheduled bird ingestion tests	198
63–49	do	Recommend FAA seriously consider conducting tests on stabilizer surfaces of aircraft of manufacturer other than the Viscount 745D's, one of which was in subject accident	202
63–50	Jan. 18, 1963	Evaluation be made structural integrity latest configuration main rotor blade Brantly B–2	209
63–51	Jan. 16, 1963	Action be taken to assure written record is made of all tower visibility observations and effective means of coordination and control be established assuring responsible units at A/B are recording and reporting the same values of visibility at all times	212
63–52	Jan. 18, 1963	Equivalent level of protection be afforded users of areas having IFR approach procedures as is provided to designated airspace	215
63–53	Jan. 24, 1963	Consideration be given to amending pts. 40, 41, 42 of CAR to require flotation devices on overwater flights	225
63–54	do	FAA thoroughly evaluate interference to glide slope reception at airports and take whatever steps necessary to preclude this possible hazardous condition	227
63–55	Feb. 4, 1963	That the term "forecast" as used in pts. 40, 41, 42, and 60 be defined so that the paragraphs wherein this term is employed will become truly regulatory in nature	231
63–56	Feb. 14, 1963	To Administrator, FAA: DC–8 operators and FAA maintenance inspectors be alerted to corrosion and lubrication problem DC–8 bogie beam	234
63–57	Mar. 5, 1963	FAA consider modifying alert bulletin to require immediate inspection bolts and flap track area; magnaflux inspection or replacement of bolts below torque; check for excessive clearance due to wear in bolt holes	237
63–58	Mar. 7, 1963	That joint review referred to in Mr. Thomas' letter (Jan. 8, 1963) (encompass the areas outlined in our letter of Mar. 7, 1963, and that consideration be given to consolidating FAA procedures governing radiotelephone dissemination of aviation weather information by ATC personnel into one area of FAA internal procedural publications	240
63–59	Mar. 11, 1963	Recommended that the USWB in cooperation with FAA arrange to provide appropriate means of measuring cloud height at New Orleans Airport. Also recommended that provision of suitable visibility reference marker charts for use of observers at that location be made	241
63–60	Mar. 12, 1963	Recommend action to eliminate apparent ambiguity by amplifying SR–445 to include all IFR operations wherever they may be initiated	246
63–61	Apr. 9, 1963	Consideration be given to promulgation of procedures advising controllers to withhold information re turbulence when providing services outlined in ATF 7110.1A, par. 352.1, except that reported by aircraft traversing same route	248
63–62	do	1-time inspection carburetor air duct actuating arm all MK–20–B aircraft. Review fabricating and brazing techniques, Mooney aircraft, where necessary require improvements	250
63–63	Mar. 19, 1963	Recommend that maintenance and overhaul procedures of Trans Air Lines be reviewed	254
63–64	Apr. 24, 1963	Recommended that phraseology sequencing be established to identify the fix, inbound course and direction of turn, etc.; that such standardization would reduce the probability of ambiguous interpretation, more likely when the reciprocal value of the inbound course is given or reference to cardinal points of the compass is made	257
63–65	Apr. 24, 1963	Recommended that in order to enhance safety in operation of such aircraft the manufacturers furnish an FAA approved Airplane Flight Manual with all future certificated aircraft	259
63–66	Apr. 24, 1963	Convene FAA/industry meeting to explore causes of and corrective measures for false fire warnings on turbojet-powered aircraft; require compliance with Boeing S/B 1788	263
63–67	May 3, 1963	Flight recorder installation approvals for United Data Control and LAS be reevaluated	270
63–68	May 2, 1963	Immediate inspection be made of elevator hinge bolts all CL–44	273
63–69	May 8, 1963	That the Flight Services Quality Control staff be alerted to the situation outlined above and that appropriate corrective action be initiated	276
63–70	May 14, 1963	DC–8 main landing gear design be modified and adequate inspection system be set up	279
63–71	May 15, 1963	Conduct reevaluation shimmy dampener and nose wheel fork design Cessna	285
63–72	May 22, 1963	Require 1-time mandatory inspection Hiller UH–12E4 tail rotor drive assembly; continue frequent inspections until modification or other permanent corrective measures established	288
63–73	May 24, 1963	Consideration be given by FAA to establishment of restricted airspace within boundaries of existing caution area, coordination be effected with U.S. Air Force to determine mutually acceptable ceiling on this extension to avoid unduly penalizing other users of the airspace	294
63–74	May 29, 1963	Require compliance with Piper service letter No. 356; FAA initiate study to consider relocating circuit breaker and identification panels	300
63–75	do	1-time inspection of scissors arm assemblys; retirement schedule for swashplate scissors arms and link assemblys after accidents on Bell 47	310
63–76	do	Establish operating rules to assure ground personnel are aware materials being carried aboard which could be hazardous to persons on ground in event of an accident	313
63–77	June 10, 1963	Maintenance and overhaul procedures and practices of Standard Airways be reviewed	321
63–78	June 14, 1963	Mechanical low pitch stop assembly be incorporated in Curtiss electric propellers as expeditiously as possible	323
63–79	do	To achieve the desired improvement with respect to methods for observing and recording visibility and clouds and the operational use of such information, following actions are recommended: (a) Locate a ceilometer in the approach area to each instrument runway and whenever practical at middle marker	333

SAFETY RECOMMENDATIONS SUBMITTED DURING FISCAL YEAR 1963—Continued

Recommendation No.	Recommendation Date	Recommendation	Page No.
63-80	June 14, 1963	(b) Provide transimissometer at end of each instrument runway and at center of runway complex	333
63-81	do	(c) Report cloud heights in terms over a specified time interval with an indication of significant variations from the average or, as a preferred alternative, report "Approach light contact height"	333
63-82	do	(d) Report runway visual range or runway visibility in a manner similar to that described for cloud heights (average and significant variability over a specified time interval)	333
63-83	do	(e) Employ runway visual range or runway visibility as a sole criteria for establishing airport meteorological minimums	333
63-84	do	(f) Rely upon separation from cloud criteria and height of terrain criteria in the establishment of VFR flight conditions	333
63-85	June 17, 1963	Consider requiring placard to alert pilot to possibility of fuel-tank outlet becoming uncovered on Cessna 210	341
63-86	June 26, 1963	That renewed emphasis be placed by FAA on compliance with the provisions of AF10 supp. 11, by Air Defense Command personnel and that this document be updated to reflect current situation and procedures applicable in the upper airspace	348
63-87	do	That a requirement for communications recording equipment be established, applicable to those military facilities responsible for the control of aircraft operating in accordance with the joint FAA-USAF agreement for fighter interceptor operations (AF10)	358

Mr. FRIEDEL. Would the gentleman yield?

Mr. ROGERS. Yes. Don't take all my time.

Mr. FRIEDEL. I just want to make a statement here. I remember back when General McKee issued his orders for Washington National. And he did order a lot of flights out of Washington National, and diverted them to Dulles and Friendship. And then there was a howl—not by the public, by the Members of Congress, who wanted the convenience of using National to go to their homes regularly, and under that pressure the order was changed.

I hope that the Members of Congress will realize they are going to have to go a little bit farther to get to the airport, if Washington National is to be safe for all people.

Mr. ROGERS. If the gentleman would permit me, I don't agree with him. I think the Washington National Airport should provide service other than just a shuttle service to someplace close. I think it should be a terminal where you can go to Florida, or California, or somewhere else, and properly so, so long as the safety is concerned.

Now, let me ask for the record, too, for a list of cities which do not yet have radar, if we may have such a list furnished for the radar.

I realize you wouldn't have this now, and also a list of the cities, of airports, that do not have the control towers, and then a list, if you would, of those which have qualified for radar or for control towers, under the criteria set by FAA, so that we may compare those, ILS, lighting, or whatever safety features that they may qualify for, but do not yet have them.

General MCKEE. I will be happy to provide that, Mr. Rogers.

(Information requested follows:)

FEDERAL AVIATION ADMINISTRATION COMPILATION OF AIRPORTS WHICH ARE SERVED BY COMMERCIAL AIRCRAFT WHICH DO NOT HAVE RADAR, CONTROL TOWERS, ILS, LIGHTING; AND AIRPORTS WHICH HAVE QUALIFIED FOR THESE FACILITIES UNDER FAA CRITERIA BUT DO NOT HAVE THEM

Submitted herewith are 8 lists of such airports as follows:

1.—**Airports without radar.**
2.—**Airports without control towers.**
3.—**Airports without an ILS.**
4.—**Airports without approach lighting.**
5.—**Airports qualified for, but without radar.**

6.—Airports qualified for, but without tower service.
7.—Airports qualified for, but without ILS.
8.—Airports qualified for, but without approach lighting system.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*

Community	*Airport*
ALABAMA	
Anniston	Municipal.
Decatur	Pryor Field.
Dothan	Dothan.
Gadsden	Municipal.
Huntsville	Huntsville-Madison County.
Muscle Shoals	Muscle Shoals.
Tuscaloosa	Van de Graaf.
ALASKA	
Annette Island	Annette Island.
Clear	Clear AF Auxiliary.
Cordova	Cordova Mile.
Homer	Homer Municipal.
Juneau	Juneau Municipal.
Kenai	Kenai.
Kodiak	Kodiak NAS.
Kotzebue	Ralph Wein Memorial.
McGrath	McGrath FAA.
Nome	Nome.
Unalakleet	Unalakleet.
Yakutat	Yakutat.
ARIZONA	
Flagstaff	Pulliam.
Grand Canyon	Grand Canyon National Park.
Kingman	Kingman Municipal.
Page	Glen Canyon.
Prescott	Prescott Municipal.
Winslow	Winslow Municipal.
Yuma	Yuma International.
ARKANSAS	
El Dorado	Goodwin Field.
Fayetteville	Fayetteville-Drake.
Fort Smith	Municipal.
Harrison	Boone County.
Hot Springs	Memorial.
Jonesboro	Municipal.
Pine Bluff	Grider Field.
Texarkana	Municipal.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

Community	*Airport*
CALIFORNIA	
Arcata	Arcata.
Bakersfield	Meadows Field.
Blythe	Blythe.
Chico	Chico Municipal.
Cresent City	Jack McNamara Field.
Fresno	Fresno Air Terminal.
Imperial	Imperial County.
Inyokern	Inyokern-Kern County.
Lancaster	Gen. Wm. J. Fox Airport.
Marysville	Yuba County.
Merced	Merced Municipal.
Modesto	Modesto City-County.
Monterey	Monterey Peninsula.
Oxnard	Ventura County.
Palm Springs	Palm Springs Municipal.
Paso Robles	Pasco Robles County.
Redding	Redding Municipal.
Santa Barbara	Municipal.
Santa Maria	Santa Maria Public.
Santa Rosa	Sonoma County.
Stockton	Stockton Metropolitan.
Tahoe Valley	Lake Tahoe.
Visalia	Municipal.
San Bernardino	Apple Valley.
COLORADO	
Alamosa	Municipal.
Aspen	Aspen-Pitkin County.
Cortez	Cortez-Montezume.
Durango	Durango La Plata County.
Grand Junction	Walker Field.
Gunnison	Gunnison County.
Hayden	Yampa Valley.
Lamar	Lamar Municipal.
Montrose	Montrose County.
Pueblo	Pueblo Memorial.
CONNECTICUT	
Bridgeport	Bridgeport Municipal.
Groton	Trumbull.
New Haven	Tweed-New Haven.
DELAWARE	
Wilmington	Greater Wilmington.
FLORIDA	
Daytona Beach	Municipal.
Fort Lauderdale	Fort Lauderdale.
Fort Myers	Page Field.
Gainesville	Municipal.
Key West	Key West International.
Melbourne	Cape Kennedy Regional.
Ocala	Ocala International.
Panama City	Panama City-Bay County.
Sarasota	Sarasota-Bradenton.
Tallahassee	Municipal.
Valpariso	Eglin AFB.
Vero Beach	Municipal.
West Palm Beach	Palm Beach International.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

GEORGIA

Community	*Airport*
Albany	Albany Municial.
Athens	Athens Municipal.
Augusta	Bush Field.
Brunswick	Malcolm-McKinnon.
Columbus	Muscogee County.
Moultrie	Moultrie-Thomasville.
Rome	Russell Field.
Waycross	Waycross-Ware County.

HAWAII

Hana, Maui	Hana.
Hilo	General Lyman.
Kaunakakai	Molokai.
Kahului, Maui	Kahului.
Kailua, Kona	Kona.
Kamuela, Hawaii	Kamuela.
Lanai City, Lanai	Lanai.
Lihue	Lihue.

IDAHO

Boise	Boise Air Terminal.
Burley	Burley Municipal.
Coeur D'Alene	Coeur D'Alene Air Terminal.
Hailey	Friedman Memorial.
Idaho Falls	Fanning Field.
Lewiston	Lewiston-Nez Perce.
Pocatello	Pocatello Municipal.
Twin Falls	Twin Falls Municipal.

ILLINOIS

Bloomington	Bloomington-Normal.
Champaign	University of Illinois—Willard.
Danville	Vermilion.
Decatur	Decatur Municipal.
Galesburg	Galesburg Municipal.
Marion	Williamson County.
Mattoon-Charleston	Coles County Memorial.
Moline	Quad City.
Mount Vernon	Mount Vernon-Outland.
Peoria	Greater Peoria.
Quincy	Quincy Municipal Baldwin Field.
Rockford	Greater Rockford.
Springfield	Capital.
Sterling-Rock Falls	Whiteside County.

INDIANA

Bloomington	Monroe County.
Evansville	Dress Memorial.
Kokomo	Kokomo Municipal.
Lafayette	Purdue University.
Marion	Marion Municipal.
Muncie	Delaware County-Johnson Field.
South Bend	St. Joseph County.
Terre Haute	Hulman Field.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

Community	*Airport*
IOWA	
Burlington	Municipal.
Cedar Rapids	Cedar Rapids Municipal.
Clinton	Clinton Municipal.
Dubuque	Dubuque Municipal.
Fort Dodge	Fort Dodge Municipal.
Iowa City	Municipal.
Mason City	Do.
Ottumwa	Ottumwa Industrial.
Sioux City	Municipal.
Waterloo	Do.
KANSAS	
Dodge City	Municipal.
Garden City	Garden City Municipal.
Goodland	Renner Field.
Great Bend	Municipal.
Hays	Hays Municipal.
Hutchinson	Hutchinson Municipal.
Liberal	Liberal Municipal.
Manhattan	Municipal.
Parsons	Tri City.
Salina	Salina Municipal.
Topeka	Phillip Billard.
KENTUCKY	
Bowling Green	Bowling Green-Warren County.
Lexington	Blue Grass.
London	Corbin-London War Memorial.
Owensboro	Owensboro-Daviess County.
Paducah	Barkley Field
LOUISIANA	
Alexandria	Esler Field.
Baton Rouge	Ryan.
Lafayette	Lafayette.
Lake Charles	Municipal.
Leesville	Fort Polk AAF.
Monroe	Monroe Municipal.
MAINE	
Auburn-Lewiston	Auburn-Lewiston Municipal.
Augusta	Augusta State.
Bangor	Dow AFB.
Bar Harbor	Bar Harbor.
Portland	Portland Municipal.
Presque Isle	Presque Isle Municipal.
Rockland	Rockland Municipal.
MARYLAND	
Hagerstown	Hagerstown Municipal.
Salisbury	Salisbury-Wicomico County.
MASSACHUSETTS	
Hyannis	Barnstable Municipal.
Martha's Vineyard	Martha's Vineyard.
Nantucket	Nantucket Memorial.
New Bedford	New Bedford Municipal.
Worcester	Worcester Municipal.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

MICHIGAN

Community	*Airport*
Alpena	Phelps-Collins.
Battle Creek	W. K. Kellogg Regional Airfield.
Benton Harbor	Ross Field.
Detroit	Pontiac.
Cadillac/Reed City	Municipal.
Escanaba	Escanaba Municipal.
Flint	Bishop.
Grand Rapids	Kent County.
Hancock	Houghton County Memorial.
Iron Mountain	Ford.
Ironwood	Gogebic County.
Jackson	Reynolds Municipal.
Kalamazoo	Kalamazoo Municipal.
Lansing	Capital City.
Manistee	Manistee-Blacker.
Marquette	Marquette County.
Menominee	Menominee County.
Muskegon	Muskegon County.
Pellston	Emmet County.
Saginaw	Tri City.
Sault Ste. Marie	Sault Ste. Marie Municipal.
Traverse City	Traverse City Municipal.

MINNESOTA

Bemidji	Municipal.
Brainerd	Brainerd-Crow Wing County Municipal.
Fairmont	Municipal.
Hibbing	Chisholm-Hibbing.
International Falls	Falls International.
Mankato	Mankato Municipal.
Rochester	Municipal.
Thief River Falls	Do.
Winona	Winona Municipal-Max Conrad.
Worthington	Municipal.

MISSISSIPPI

Columbus	Columbus-Lowndes County.
Greenville	Greenville Municipal.
Greenwood	Municipal.
Gulfport	Do.
Hattiesburg	Do.
Laurel	Do.
Natchez	Hardy-Anders.
Oxford	University-Oxford.
Pascagoula	Jackson County.
Tupelo	Municipal.
Vicksburg	Vicksburg Municipal.

MISSOURI

Cape Girardeau	Cape Girardeau Municipal.
Columbia	Municipal.
Jefferson City	Jefferson City Memorial.
Joplin	Joplin Municipal.
Kirksville	Clarence Cannon Memorial.
Moberly	Omar N. Bradley.
St. Joseph	Rosecrans Memorial.
Springfield	Springfield Municipal.
Tribune	Forney AAF (Fort Leonard Wood).

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

Community	*Airport*
MONTANA	
Billings	Logan.
Bozeman	Gallatin.
Butte	Silver Bow County.
Glasgow	Glasgow International.
Glendive	Glendive.
Havre	Havre City-County.
Helena	Helena.
Kalispell	Flathead County.
Lewistown	Lewistown Municipal.
Miles City	Miles City.
Missoula	Missoula County.
Sidney	Sidney-Richland Municipal.
West Yellowstone	West Yellowstone.
Wolf Point	Wolf Point.
NEBRASKA	
Alliance	Alliance Municipal.
Chadron	Municipal.
Columbus	Columbus Municipal.
Grand Island	Municipal.
Hastings	Do.
Kearney	Kearney Municipal.
Lincoln	Lincoln Municipal.
McCook	Municipal.
Norfolk	Karl Stefan Memorial.
North Platte	Lee Bird Municipal.
Scottsbluff	Municipal.
Sidney	Do.
NEVADA	
Elko	Elko Municipal.
Ely	Ely Yelland Field.
Reno	Reno Municipal.
NEW HAMPSHIRE	
Berlin	Berlin Municipal.
Keene	Dillant Hopkins.
Laconia	Laconia Municipal.
Lebanon	Lebanon Regional.
Manchester	Grenier Field-Manchester Municipal.
NEW JERSEY	
Trenton	Mercer County.
Wildwood	Cape May County.
NEW MEXICO	
Alamogordo	Alamogordo Municipal.
Carlsbad	Municipal.
Clovis	Clovis Municipal.
Farmington	Farmington Municipal.
Gallup	Senator Clarke Field.
Hobbs	Lea County.
Roswell	Roswell Municipal.
Santa Fe	Santa Fe County Municipal.
Silver City	Silver City-Grant County.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

NEW YORK

Community	*Airport*
Elmira	Chemung County.
Glens Falls	Warren County.
Islip	Long Island-MacArthur.
Ithaca	Tompkins County.
Jamestown	Jamestown Municipal.
Massena	Richards Field.
Ogdensburg	Ogdensburg Municipal.
Olean	Olean Municipal.
Plattsburgh	Municipal.
Poughkeepsie	Dutchess County.
Saranac Lake	Adirondack.
Watertown	Municipal.
White Plains	Westchester County.

NORTH CAROLINA

Asheville	Asheville.
Elizabeth City	CGAS.
Fayetteville	Grannis Field Municipal.
Goldsboro	Seymour Johnson AFB.
Hickory	Hickory Municipal.
Kinston	Stallings Field.
New Bern	Simmons Nott.
Rocky Mount	Rocky Mount Municipal.
Southern Pines	Pinehurst-Southern Pines.
Wilmington	New Hanover County.
Winston-Salem	Smith Reynolds.

NORTH DAKOTA

Bismarck	Bismarck Municipal.
Devils Lake	Devils Lake Municipal.
Fargo	Hector.
Grand Forks	Grand Forks International.
Jamestown	Jamestown.
Minot	Minot International.
Williston	Sloulin Field International.

OHIO

Lima	Allen County.
Mansfield	Mansfield Municipal.
Portsmouth	Scioto County.
Zanesville	Zanesville Municipal.

OKLAHOMA

Bartlesville	Frank Phillips.
Duncan	Halliburton.
Enid	Woodring Field.
Guymon	Municipal.
Lawton	Do.
McAlester	Do.
Muskogee	Davis.
Ponca City	Ponca City Municipal.
Stillwater	Searcy Field.

1.—*Air carrier airports without an airport surveillance radar, calender year 1966*—Continued

Community	*Airport*
OREGON	
Astoria	Clatsop County.
Baker	Municipal.
Corvallis	Do.
Eugene	Mahlon Sweet.
Medford	Municipal.
North Bend	Do.
Ontario	Ontario Municipal.
Pendleton	Pendleton Municipal.
Redmond	Roberts Field
Roseburg	Roseburg Municipal.
Salem	McNary Field.
PENNSYLVANIA	
Allentown	Allentown-Bethlehem-Easton.
Bradford	Brandford-McKean County.
Du Bois	Du Bois-Jefferson County.
Erie	Port Erie.
Franklin	Chess-Lamberton.
Hazleton	Hazleton Municipal.
Johnstown	Johnstown-Cambria County.
Lancaster	Lancaster.
Martinsburg	Blair County.
Philipsburg	Mid-State.
Reading	Gen. Carl A. Spaatz.
Williamsport	Williamsport-Lycoming County.
PUERTO RICO	
Mayaguez	Mayaguez.
Ponce	Mercedita.
SOUTH CAROLINA	
Anderson	Anderson County.
Columbia	Columbia Metropolitan.
Crescent Beach	Myrtle Beach.
Florence	Municipal.
Greenwood	Greenwood County.
SOUTH DAKOTA	
Aberdeen	Aberdeen Municipal
Brookings	Brookings Municipal.
Huron	W. W. Howes Municipal
Mitchell	Mitchell Municipal.
Pierre	Pierre Municipal.
Rapid City	Rapid City Municipal.
Sioux Falls	Joe Foss Field.
Watertown	Watertown Municipal.
Yankton	Chan Gurney Municipal.
SOUTH PACIFIC	
Agana, Guam	Agana NAS.
Wake Island	Wake Island.
TENNESSEE	
Clarksville	Outlaw Field.
Jackson	McKellar Field.
Shelbyville	Bomar Field.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

Community	*Airport*
TEXAS	
Beaumont	Jefferson County.
Big Spring	Howard County.
Borger	Hutchinson County.
Brownsville	Rio Grande Valley International.
Brownwood	Municipal.
College Station	Easterwood Field.
Galveston	Scholes Field.
Harlingen	Harlingen Municipal.
Laredo	Municipal.
Longview	Gregg County.
Lufkin	Angelina County.
McAllen	Miller International.
Midland	Midland Air Terminal.
Paris	Cox Field.
San Angelo	Mathis Field.
Temple	Draughon-Miller Municipal.
Tyler	Pounds Field.
Victoria	Victoria County-Foster.
Waco	Municipal.
Wichita Falls	Wichita Falls-Sheppard AFB.
UTAH	
Cedar City	Cedar City Municipal.
Moab	Canyonlands Field.
Vernal	Vernal.
VERMONT	
Barre-Montpelier	Barre-Montpelier Municipal.
Newport	Newport Municipal.
Rutland	Rutland Municipal.
VIRGINIA	
Charlottesville	Charlottesville-Albemarle.
Danville	Danville Municipal.
Dublin	New River Valley.
Hot Springs	Ingalls Field.
Lynchburg	Lynchburg Municipal-Preston Glenn.
Newport News	Patrick Henry.
Staunton	Shenandoah Valley.
VIRGIN ISLANDS	
Charlotte Amalie	Harry S Truman.
Christiansted	Alexander Hamilton.
WASHINGTON	
Ephrata	Ephrata Municipal.
Hoquiam	Bowerman.
Olympia	Olympia Municipal.
Pasco	Tri-Cities.
Port Angeles	Clallam County.
Pullman	Pullman-Moscow Regional.
Seattle	King County-Boeing Field.
Tacoma	Tacoma Industrial.
Walla Walla	Walla Walla City-County.
Wenatchee	Pangborn Field.
Yakima	Yakima Municipal.

1.—*Air carrier airports without an airport surveillance radar, calendar year 1966*—Continued

WEST VIRGINIA

Community	*Airport*
Beckley	Raleigh County Memorial.
Bluefield	Mercer County.
Clarksburg	Benedum.
Elkins	Elkins-Randolph County.
Huntington	Tri-State.
Martinsburg	Martinsburg Municipal.
Morgantown	Morgantown Municipal.
Parkersburg	Wood County.
Wheeling	Wheeling Ohio County.

WISCONSIN

Eau Claire	Eau Claire Municipal.
Green Bay	Austin Straubel.
Janesville	Rock County.
La Crosse	La Crosse Municipal.
Land O'Lakes	King's Land O'Lakes Municipal
Clintonville	Clintonville Municipal.
Madison	Truax Field.
Manitowoc	Manitowoc Municipal.
Oshkosh	Winnebago County.
Rhinelander	Rhinelander-Oneida County.
Stevens Point	Stevens Point Municipal.
Wausau	Municipal.

WYOMING

Casper	Casper Air Terminal.
Cheyenne	Cheyenne Municipal.
Cody	Municipal.
Jackson	Jackson's Hole.
Laramie	General Brees Field.
Powell	Powell Municipal.
Riverton	Municipal.
Rock Springs	Do.
Sheridan	Sheridan County.
Worland	Municipal.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*

ALABAMA

Community	*Airport*
Anniston	Municipal.
Decatur	Pryor Field.
Dothan	Dothan.
Gadsden	Municipal.
Muscle Shoals	Muscle Shoals.
Tuscaloosa	Van de Graaf.

ALASKA

Clear	Clear AF Auxiliary.
Cordova	Cordova Mile.
Homer	Homer Municipal.
Kenai	Kenai.
Kodiak	Kodiak NAS.
Kotzebue	Ralph Wein Memorial.
McGrath	McGrath FAA.
Nome	Nome.
Unalakleet	Unalakleet.
Yakutat	Yakutat.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

Community	*Airport*
ARIZONA	
Flagstaff	Pulliam.
Grand Canyon	Grand Canyon National Park.
Kingman	Kingman Municipal.
Page	Glen Canyon.
Prescott	Prescott Municipal.
Winslow	Winslow Municipal.
Yuma	Yuma International.
ARKANSAS	
El Dorado	Goodwin Field.
Fayetteville	Fayetteville-Drake Field.
Harrison	Boone County.
Jonesboro	Municipal.
Pine Bluff	Grider Field.
Texarkana	Municipal.
CALIFORNIA	
Arcata	Arcata.
Blythe	Blythe.
Chico	Chico Municipal.
Crescent City	Jack McNamara Field.
Imperial	Imperial County.
Inyokern	Inyokern-Kern County No. 8.
Marysville	Yuba County.
Merced	Merced Municipal.
Oxnard	Ventura County.
Paso Robles	Paso Robles County.
Redding	Redding Municipal.
San Bernardino	Apple Valley.
Santa Maria	Santa Maria Public.
Visalia	Municipal.
COLORADO	
Alamosa	Municipal.
Aspen	Aspen-Pitkin County.
Cortez	Cortez-Montezuma County.
Durango	Durango La Plata County.
Gunnison	Gunnison County.
Hayden	Yampa Valley.
Lamar	Lamar Municipal.
Montrose	Montrose County.
CONNECTICUT	
Groton	Trumbull.
New Haven	Tweed-New Haven.
FLORIDA	
Fort Myers	Page Field.
Gainesville	Municipal.
Ocala	Ocala Municipal.
Panama City	Panama City Bay County.
Vero Beach	Municipal.
GEORGIA	
Albany	Albany Municipal.
Athens	Athens Municipal.
Brunswick	Malcolm-McKinnon.
Moultrie	Moultrie-Thomasville.
Rome	Russell Field.
Waycross	Waycross-Ware County.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

Community	*Airport*
HAWAII	
Hana, Maui	Hana.
Kaunakakai	Molokai.
Kailua, Kona	Kona.
Kamuda, Hawaii	Kamuela.
Lanai City, Lanai	Lanai.
Lihue	Lihue.
IDAHO	
Burley	Burley Municipal.
Coeur d'Alene	Coeur d'Alene Air Terminal.
Hailey	Friedman Memorial.
Lewiston	Lewiston-Nez Perce.
Twin Falls	Twin Falls Municipal.
ILLINOIS	
Bloomington	Bloomington-Normal.
Danville	Vermilion County.
Galesburg	Galesburg Municipal.
Marion	Williamson County.
Mattoon-Charleston	Coles County Memorial.
Mount Vernon	Mount Vernon Outland.
Quincy	Quincy Municipal Baldwin Field.
Sterling-Rock Falls	Whiteside County.
INDIANA	
Bloomington	Monroe County.
Kokomo	Kokomo Municipal.
Lafayette	Purdue University.
Marion	Marion Municipal.
IOWA	
Burlington	Municipal.
Clinton	Clinton Municipal.
Dubuque	Dubuque Municipal.
Fort Dodge	Fort Dodge Municipal.
Iowa City	Municipal.
Mason City	Do.
Ottumwa	Ottumwa Industrial.
KANSAS	
Dodge City	Municipal.
Garden City	Garden City Municipal.
Goodland	Renner Field.
Great Bend	Municipal.
Hays	Hays Municipal.
Liberal	Liberal Municipal.
Manhattan	Municipal.
Parsons	Tri-City.
KENTUCKY	
Bowling Green	Bowling Green-Warren County.
London	Corbin-London Memorial.
Owensboro	Owensboro-Daviess County.
Paducah	Barkley Field.
LOUISIANA	
Alexandria	Esler Field.
Leesville	Fort Polk AAF.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

Community	*Airport*
MAINE	
Auburn-Lewiston	Auburn-Lewiston Municipal
Augusta	Augusta State
Bangor	Dow AFB
Bar Harbor	Bar Harbor
Presque Isle	Presque Isle Municipal
Rockland	Rockland Municipal
MARYLAND	
Hagerstown	Hagerstown Municipal
Salisbury	Salisbury-Wicomico
MASSACHUSETTS	
Martha's Vineyard	Martha's Vineyard
MICHIGAN	
Alpena	Phelps-Collins.
Benton Harbor	Ross Field.
Cadillac/Reed City	Municipal.
Detroit	Pontiac.
Escanaba	Escanaba Municipal.
Hancock	Houghton County Memorial.
Iron Mountain	Ford.
Ironwood	Gogebic County.
Manistee	Manistee-Blacker.
Marquette	Marquette County.
Menominee	Menominee County.
Pellston	Emmet County.
Sault Ste. Marie	Sault Ste. Marie Municipal.
Traverse City	Traverse City Municipal.
MINNESOTA	
Bemidji	Municipal.
Brainerd	Brainerd-Crow Wing County Municipal.
Fairmont	Municipal.
Hibbing	Chisholm-Hibbing.
International Falls	Falls International.
Mankato	Mankato Municipal.
Thief River Falls	Municipal.
Winona	Winona Municipal-Max Conrad Field.
Worthington	Municipal.
MISSISSIPPI	
Columbus	Columbus-Lowndes County.
Greenville	Greenville Municipal.
Greenwood	Municipal.
Hattiesburg	Do.
Laurel	Do.
Natchez	Hardy-Anders Field.
Oxford	University-Oxford.
Pascagoula	Jackson County.
Tupelo	Municipal.
Vicksburg	Vicksburg Municipal.
MISSOURI	
Cape Girardeau	Cape Girardeau Municipal.
Columbia	Municipal.
Jefferson City	Jefferson City Memorial.
Joplin	Joplin Municipal.
Kirksville	Clarence Cannon Memorial.
Moberly	Omar N. Bradley.
Tribune	Forney AAF.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

MONTANA

Community	*Airport*
Bozeman	Gallatin Field.
Butte	Silver Bow County.
Glasgow	Glasgow International.
Glendive	Glendive.
Havre	Havre City-County.
Kalispell	Flathead County.
Lewistown	Lewistown Municipal.
Miles City	Miles City.
Sidney	Sidney-Richland Municipal.
West Yellowstone	West Yellowstone.
Wolf Point	Wolf Point.

NEBRASKA

Alliance	Alliance Municipal.
Chadron	Municipal.
Columbus	Columbus Municipal.
Grand Island	Municipal.
Hastings	Do.
Kearney	Kearney Municipal.
McCook	Municipal.
Norfolk	Karl Stefan Memorial.
North Platte	Lee Bird Municipal.
Scottsbluff	Municipal.
Sidney	Do.

NEVADA

Elko	Elko Municipal.
Ely	Ely Yelland.

NEW HAMPSHIRE

Berlin	Berlin Municipal.
Keene	Dillant-Hopkins.
Laconia	Laconia Municipal.
Lebanon	Lebanon Regional.

NEW JERSEY

Wildwood	Cape May.

NEW MEXICO

Alamogordo	Alamogordo Municipal.
Carlsbad	Municipal.
Clovis	Clovis Municipal.
Gallup	Senator Clarke Field.
Silver City	Silver City-Grant County.

NEW YORK

Glens Falls	Warren County.
Ithaca	Tompkins County.
Jamestown	Jamestown Municipal.
Massena	Richards Field.
Ogdensburg	Ogdensburg Municipal.
Olean	Olean Municipal.
Plattsburgh	Municipal.
Poughkeepsie	Dutchess County.
Saranac Lake	Adirondack.
Watertown	Municipal.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

Community	*Airport*
NORTH CAROLINA	
Elizabeth City	CGAS.
Goldsboro	Seymour Johnson.
Hickory	Hickory Municipal.
Kinston	Stallings Field.
New Bern	Simmons Nott.
Rocky Mount	Rocky Mount Municipal.
Southern Pines	Pinehurst-Southern Pines.
NORTH DAKOTA	
Devils Lake	Devils Lake Municipal.
Grand Forks	Grand Forks International.
Jamestown	Jamestown.
Minot	Minot International.
Williston	Sloulin Field International.
OHIO	
Lima	Allen County.
Portsmouth	Scioto County.
Zanesville	Zanesville Municipal.
OKLAHOMA	
Bartlesville	Frank Phillips.
Duncan	Halliburton.
Enid	Woodring Field.
Guymon	Municipal.
McAlester	Do.
Muskogee	Davis Field.
Ponca City	Ponca City Municipal.
Stillwater	Searcy Field.
OREGON	
Astoria	Clatsop County.
Baker	Municipal.
Corvallis	Do.
North Bend	Do.
Ontario	Ontario Municipal.
Redmond	Roberts Field.
Roseburg	Roseburg Municipal.
Salem	McNary Field.
PENNSYLVANIA	
Bradford	Bradford-McKean County.
Du Bois	Du Bois-Jefferson County.
Franklin	Chess-Lamberton.
Hazleton	Hazelton Municipal.
Johnstown	Johnstown-Cambria County.
Martinsburg	Blair County.
Philipsburg	Mid-State.
PUERTO RICO	
Mayaguez	Mayaguez Airfield.
Ponce	Mercedita.
SOUTH CAROLINA	
Anderson	Anderson County.
Crescent Beach	Myrtle Beach.
Florence	Municipal.
Greenwood	Greenwood County.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

Community	*Airport*
SOUTH DAKOTA	
Aberdeen	Aberdeen Municipal.
Brookings	Brookings Municipal.
Huron	W. W. Howes Municipal.
Mitchell	Mitchell Municipal.
Pierre	Pierre Municipal.
Watertown	Watertown Municipal.
Yankton	Chan Gurney Municipal.
SOUTH PACIFIC	
Agana, Guam	Agana NAS.
TENNESSEE	
Clarksville	Outlaw Field.
Jackson	McKellar Field.
Shelbyville	Bomar Field.
TEXAS	
Big Spring	Howard County.
Borger	Hutchinson County.
Brownwood	Municipal.
Galveston	Scholes Field.
Harlingen	Harlingen Municipal.
Laredo	Laredo Municipal.
Lufkin	Angelina County.
Paris	Cox Field.
Temple	Draughon-Miller Municipal.
Victoria	Victoria County-Foster.
UTAH	
Cedar City	Cedar City Municipal.
Moab	Canyonlands Field.
Vernal	Vernal.
VERMONT	
Barre-Montpelier	Barre-Montpelier Municipal.
Newport	Newport Municipal.
Rutland	Rutland Municipal.
VIRGINIA	
Charlottesville	Charlottesville-Albemarle.
Danville	Danville Municipal.
Dublin	New River Valley.
Hot Springs	Ingalls Field.
Staunton	Shenandoah Valley.
WASHINGTON	
Ephrata	Ephrata Municipal.
Hoquiam	Bowerman.
Olympia	Olympia Municipal.
Pasco	Tri-Cities.
Port Angeles	Clallam County.
Pullman	Pullman Moscow Regional.
Tacoma	Tacoma Industrial.
Walla Walla	Walla Walla City-County.
Wenatchee	Pangborn Field.

2.—*Air carrier airports without an existing airport traffic control tower, calendar year 1966*—Continued

WEST VIRGINIA

Community	*Airport*
Beckley	Raleigh County Memorial.
Bluefield	Mercer County.
Clarksburg	Benedum.
Elkins	Elkins-Randolph County.
Martinsburg	Martinsburg Municipal.
Morgantown	Morgantown Municipal.
Parkersburg	Wood County.

WISCONSIN

Clintonville	Clintonville Municipal.
Eau Claire	Eau Claire Municipal.
La Crosse	La Crosse Municipal.
Land O'Lakes	King's Land O'Lakes Municipal.
Manitowoc	Manitowoc Municipal.
Rhinelander	Rhinelander-Oneida County.
Stevens Point	Stevens Point Municipal.
Wausau	Municipal.

WYOMING

Cody	Municipal.
Jackson	Jackson's Hole.
Laramie	General Brees Field.
Powell	Powell Municipal.
Riverton	Municipal.
Rock Springs	Do.
Sheridan	Sheridan County.
Worland	Municipal.

AMERICAN SAMOA

Pago Pago	Pago Pago International.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*

ALABAMA

Community	*Airport*
Anniston	Municipal.
Decatur	Pryor.
Dothan	Dothan.
Gadsden	Municipal.
Huntsville	Madison.
Muscle Shoals	Muscle Shoals.
Tuscaloosa	Van De Groff.

ALASKA

Clear	Clear AF Auxiliary.
Cordova	Cordova Mile No. 3.
Homer	Homer Municipal.
Juneau	Juneau Municipal.
Kenai	Kenai.
Kodiak	Kodiak NAS.
Kotzebue	Ralph Wein Municipal.
McGrath	McGrath FAA.
Nome	Nome.
Unalakleet	Unalaklett.
Yakutat	Yakutat.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
ARIZONA	
Flagstaff	Pulliam.
Grand Canyon	Grand Canyon National Park.
Kingman	Kingman Municipal.
Page	Glen Canyon.
Phoenix	Sky Harbor Municipal.
Prescott	Prescott Municipal.
Tucson	International.
Winslow	Municipal.
Yuma	Yuma MCAS/International.
ARKANSAS	
El Dorado	Goodwin Field.
Fayetteville	Fayetteville/Drake.
Harrison	Boone County.
Hot Springs	Memorial.
Jonesboro	Municipal.
Pine Bluff	Grider Field.
Texarkana	Municipal.
CALIFORNIA	
Blythe	Blythe.
Chico	Chico Municipal.
Crescent City	Jack McNamara Field.
Imperial	County.
Inyokern	Inyokern/Kern County.
Lancaster	Gen. William J. Fox.
Marysville	Yuba County.
Merced	Merced Municipal.
Modesto	City-County.
Oxnard	Ventura City.
Palm Springs	Municipal.
Pasco Robles	Paso Robles County.
Riverside	Municipal.
Redding	Do.
Santa Ana	Orange County.
Santa Maria	Santa Maria Public.
Santa Rosa	Sonoma County.
Tahoe Valley	Lake Tahoe.
Visalia	Municipal.
COLORADO	
Alamosa	Municipal.
Aspen	Aspen-Pitkin County.
Cortez	Cortez-Montezume.
Durango	Durango-LaPlata.
Gunnison	Gunnison County.
Hayden	Yampa Valley.
Lamar	Municipal.
Montrose	Montrose County.
CONNECTICUT	
Bridgeport	Municipal.
Groton	Trumbull.
New Haven	Tweed-New Haven.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
FLORIDA	
Fort Lauderdale	Fort Lauderdale/Hollywood.
Fort Myers	Page Field Municipal.
Gainesville	Municipal.
Key West	International.
Melbourne	Cape Kennedy Regional.
Ocala	Municipal.
Panama City	Bay County.
Sarasota	Sarasota-Bradenton.
Vero Beach	Municipal.
GEORGIA	
Albany	Municipal.
Athens	Do.
Brunswick	Malcolm McKinnon.
Moultrie	Moultrie-Thomasville.
Rome	Russell Field.
Valdosta	Municipal.
Waycross	Waycross-Ware City.
HAWAII	
Hana, Maui	Hana.
Hilo	General Lyman Field.
Kaunakakai (Hoolehua)	Malakai.
Kailua, Kona	Kona.
Kamuela	Kamuela.
Lanai City, Lanai	Lanai.
Lihue	Lihue.
IDAHO	
Burley	Burley Municipal.
Coeur d'Alene	Coeur d'Alene.
Hailey	Friedman Memorial.
Idaho Falls	Fanning Field.
Lewiston	Lewiston-Nez Perce County.
Twin Falls	Twin Falls Municipal.
ILLINOIS	
Bloomington	Bloomington-Normal.
Danville	Vermilion County.
Decatur	Municipal.
Galesburg	Galesburg Municipal.
Marion	Williamson County.
Mattoon-Charleston	Coles City Memorial.
Mount Vernon	Mount Vernon-Outlant.
Sterling-Rock Falls	Whiteside County.
INDIANA	
Bloomington	Monroe County.
Kokomo	Kokomo Municipal.
Lafayette [1]	Purdue University.
Marion	Marion Municipal.
Muncie	Delaware County-Johnson Field.

[1] Partial ILS.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
IOWA	
Burlington	Municipal.
Clinton	Clinton Municipal.
Dubuque	Municipal.
Fort Dodge	Do.
Iowa City	Do.
Mason City	Do.
Ottumwa	Ottumwa Industrial.
KANSAS	
Dodge City	Municipal.
Garden City	Do.
Goodland	Renner Field.
Great Bend	Municipal.
Hays	Do.
Liberal	Do.
Manhattan	Do.
Parsons	Tri-City.
KENTUCKY	
Bowling Green	Bowling Green-Warren.
London	Corbin London War Memorial.
Owensboro	Owensboro-Daviess County.
Paducah	Barkley Field.
LOUISIANA	
Alexandria	Esler Field.
Leesville	Fort Polk AAF.
MAINE	
Auburn-Lewiston	Municipal.
Augusta	Augusta State.
Bar Harbor	Bar Harbor.
Presque Isle	Municipal.
Rockland	Do.
MARYLAND	
Hagerstown	Municipal.
Salisbury	Salisbury-Wicomico.
MASSACHUSETTS	
Hyannis [1]	Barnstable-Municipal.
Martha's Vineyard	Martha's Vineyard.
MICHIGAN	
Alpena	Phelps-Collins.
Benton Harbor	Ross Field.
Escanaba	Municipal.
Hancock	Houghton County Memorial.
Iron Mountain	Ford.
Ironwood	Gegebic.
Jackson	Reynolds Municipal.
Manistee	Blacker.
Marquette	Marquette County.
Menominee	Menominee.
Pellston	Emmet County.
Saginaw	Tri-City.
Sault Ste. Marie	Municipal.
Traverse City	Do.

[1] Partial ILS.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
MINNESOTA	
Bemidji	Municipal.
Brainerd	Brainerd-Cow Wing.
Fairmont	Municipal.
Hibbing	Chisholm-Hibbing.
International Falls	Falls International.
Mankato	Municipal.
Thief River Falls	Do.
Winona	Max Conrad Field.
Worthington	Municipal.
MISSISSIPPI	
Columbus	Columbus-Lowndes County.
Greenville	Municipal.
Greenwood	Do.
Hattiesburg	Do.
Laurel	Do.
Natchez	Hardy-Anders.
Oxford	University-Oxford.
Pascagoula	Jackson County.
Tupelo	Municipal.
Vicksburg	Do.
MISSOURI	
Cape Girardeau	Municipal.
Columbia	Do.
Jefferson City	Memorial.
Kirksville	Clarence Cannon Memorial.
Moberly	Omar N. Bradley.
Tribune	Forney AAF.
MONTANA	
Bozeman	Gallatin Field.
Butte	Silver Bow County.
Glasgow	International.
Glendive	Glendive.
Harve	Harve City-County
Helena	Helena.
Kalispell	Flathead County.
Lewistown	Municipal.
Miles City	Miles City.
Missoula	County.
Sidney	Sidney-Richmond Municipal.
West Yellowstone	West Yellowstone.
Wolf Point	West Wolf Point.
NEBRASKA	
Alliance	Municipal.
Chadron	Do.
Columbus	Do.
Hastings	Do.
Kearney	Do.
McCook	Do.
Norfolk	Karl Stefan.
North Platte	Lee Bird Municipal.
Scottsbluff	Municipal.
Sidney	Do.
NEVADA	
Elko	Municipal.
Ely	Ely-Yelland.
Las Vegas	McCarran.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
NEW HAMPSHIRE	
Berlin	Municipal.
Keene	Dillant Hopkins.
Laconia	Municipal.
Lebanon	Lebanon Regional.
NEW JERSEY	
Wildwood	Cape May County.
NEW MEXICO	
Alamogordo	Municipal.
Carlsbad	Do.
Clovis	Do.
Farmington	Do.
Gallup	Senator Clarke Field.
Hobbs	Lea County.
Roswell	Municipal.
Santa Fe	Do.
Silver City	Silver City-Grant County.
NEW YORK	
Glens Falls	Warren County.
Ithaca	Tompkins County.
Jamestown	Municipal.
Massena	Richards Field.
Ogdensburg	Municipal.
Olean	Do.
Plattsburg	Do.
Poughkeepsie	Dutchess County.
Saranac Lake	Adirondack.
Watertown	Municipal.
NORTH CAROLINA	
Elizabeth City	Coast Guard Air Station.
Hickory	Municipal.
Kinston	Stallings Field.
New Bern	Simmons Nott.
Rocky Mount	Municipal.
Southern Pines	Pinehurst-Southern Pines.
NORTH DAKOTA	
Devils Lake	Municipal.
Grand Forks	International.
Jamestown	Jamestown.
Minot	International.
Williston	Sloulin International.
OHIO	
Lima	Allen County.
Portsmouth	Scioto County.
Zanesville	Municipal.
OKLAHOMA	
Bartlesville	Frank Phillips.
Duncan	Halli Burton.
Enid	Woodring Field.
Guymon	Municipal.
McAlester	Do.
Muskogee	Davis Field.
Ponca City	Municipal.
Stillwater	Searcy Field.
Lawton	Municipal.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
OREGON	
Asoria	Clatsop County.
Baker	Municipal.
Corvallis	Do.
North Bend	Do.
Ontario	Do.
Redmond	Roberts Field.
Roseburg	Municipal.
PENNSYLVANIA	
Bradford	Bradford-McKean County.
DuBois	DuBois-Jefferson County.
Franklin	Chess-Lamberton.
Hazleton	Municipal.
Johnstown	Johnstown-Cambria County.
Lancaster	Lancaster.
Martinsburg	Blair County.
Phillipsburg	Mid-State.
PUERTO RICO	
Mayaguez	Mayaguez Airfield.
Ponce	Mercedita.
San Juan	Puerto Rico International.
SOUTH CAROLINA	
Anderson	Anderson County.
Crescent Beach	Myrtle Beach.
Florence	Municipal.
Greenwood	Greenwood County.
SOUTH DAKOTA	
Aberdeen	Municipal.
Brookings	Do.
Mitchell	Do.
Pierre	Do.
Rapid City	Do.
Watertown	Do.
Yankton	Chan Gurney Municipal.
SOUTH PACIFIC	
Agana, Guam	Agana NAS.
Samoa	International.
Wake Island [1]	Wake Island.
TENNESSEE	
Clarksville	Outlaw Field.
Jackson	McKeller Field.
Shelbyville	Bomar Field.

[1] Partial ILS.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
TEXAS	
Big Spring	Howard County.
Borger	Hutchinson County.
Brownwood	Municipal.
Galveston	Scholes Field.
Harlinger	Municipal.
Houston	Intercontinental.
Laredo	Municipal.
Lufkin	Angelina County.
McAllen	Miller International.
Paris	Cox Field.
Temple	Draughon-Miller.
Victoria	Victoria County-Foster.
UTAH	
Cedar City	Municipal.
Moab	Canyonlands Field.
Vernal	Vernal.
VERMONT	
Barre-Montpelier	Barre-Montpelier.
Newport	Newport Municipal.
Rutland	Municipal.
VIRGIN ISLANDS	
Charlotte Amalie	Harry S Truman
Christiansted	Alexander Hamilton
VIRGINIA	
Charlottesville [1]	Charlottesville-Abeman.
Danville	Municipal.
Dublin	New River Valley.
Hot Springs	Ingalls Field.
Staunton	Shenandoah Valley.
Roanoke	Municipal.
WASHINGTON	
Ephrata	Municipal.
Hoquiam	Bowerman.
Olympia	Municipal.
Pasco	Tri-Cities.
Port Angeles	Challam County.
Pullman	Pullman Moscow Regional.
Tacoma	Industrial.
Walla Walla	Walla Walla City-County.
Wenatchee	Pangborn Field.
WEST VIRGINIA	
Beckley	Raleigh County Memorial.
Bluefield	Mercer County.
Clarksburg	Benedum.
Elkins	Elkins-Randolph.
Huntington [1]	Tri-State.
Martinsburg	Martinsburg Municipal.
Morgantown	Municipal.
Parkersburg	Wood County.

[1] Partial ILS.

3.—*Air carrier airports without instrument landing systems, calendar year 1966*—Continued

Community	*Airport*
WISCONSIN	
Eau Claire	Eau Claire Municipal.
Janesville	Rock County.
La Crosse	Municipal.
Land o' Lakes	King's Land o' Lakes Municipal.
Manitowoc	Manitowoc Municipal.
Rhinelander	Rhinelander-Oneida County.
Stevens Point	Stevens Point Municipal.
Wausau	Municipal.
WYOMING	
Cody	Municipal.
Jackson	Jackson's Hole.
Laramie	General Brees Field.
Powell	Powell Municipal.
Sheridan	Sheridan County.
Worland	Municipal.
AMERICAN SAMOA	
Pago Pago	Pago Pago International.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*

Community	*Airport*
ALABAMA	
Anniston	Municipal.
Decatur	Pryor.
Dothan	Dothan.
Gadsden	Municipal.
Huntsville	Madison.
Muscle Shoals	Muscle Shoals.
Tuscaloosa	Van De Groff.
ALASKA	
Clear	Clear AF Auxiliary.
Cordova	Cordova Mile No. 3.
Homer	Homer Municipal.
Kenai	Kenai.
Kodiak	Kodiak NAS.
Kotzebue	Ralph Wein Municipal.
McGrath	McGrath FAA.
Nome	Nome.
Unalakleet	Unalakleet.
Yakutat	Yakutat.
ARIZONA	
Flagstaff	Pulliam.
Grand Canyon	Grand Canyon National Park.
Kingman	Kingman Municipal.
Page	Glen Canyon.
Phoenix	Sky Harbor Municipal.
Prescott	Prescott Municipal.
Tuscon	International.
Winslow	Municipal.
Yuma	Yuma MCAS/International.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

Community	*Airport*
ARKANSAS	
El Dorado	Goodwin Field.
Fayetteville	Fayetteville/Drake.
Harrison	Boone County.
Hot Springs	Memorial.
Jonesboro	Municipal.
Pine Bluff	Grider Field.
Texarkana	Municipal.
CALIFORNIA	
Blythe	Blythe.
Chico	Chico Municipal.
Crescent City	Jack McNamara Field.
Imperial	County.
Inyokern	Inyokern/Kern County.
Lancaster	Gen. William J. Fox.
Marysville	Yuba County.
Merced	Merced Municipal.
Modesto	City-County.
Oxnard	Ventura City.
Palm Springs	Municipal.
Paso Robles	Paso Robles County.
Riverside	Municipal.
Redding	Do.
Santa Ana	Orange County.
Santa Maria	Santa Maria Public.
Santa Rosa	Sonoma County.
Tahoe Valley	Lake Tahoe.
Visalia	Municipal.
COLORADO	
Alamosa	Municipal.
Aspen	Aspen-Pitkin County.
Cortez	Cortez--Montezume.
Durango	Durango-La Plata.
Grand Junction	Walker Field.
Gunnison	Gunnison County.
Hayden	Yampa Valley.
Lamar	Municipal.
Montrose	Montrose County.
CONNECTICUT	
Brideport	Municipal.
Groton	Trumbull.
New Haven	Tweed-New Haven.
FLORIDA	
Fort Lauderdale	Fort Lauderdale/Hollywood.
Fort Myers	Page Field Municipal.
Gainesville	Municipal.
Key West	International.
Melbourne	Cape Kennedy Regional.
Ocala	Municipal.
Panama City	Bay County.
Sarasota	Sarasota-Brandenton.
Valpariso	Eglin AFB.
Vero Beach	Municipal.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

Community	*Airport*
GEORGIA	
Albany	Municipal.
Athens	Do.
Augusta	Bush Field.
Brunswick	Malcom-McKinnon.
Moultrie	Moultrie-Thomasville.
Rome	Russell Field.
Valdosta	Municipal.
Waycross	Waycross-Ware City.
HAWAII	
Hana, Maui	Hana.
Hilo	General Lyman Field.
Kaunakakai (Hoolehua)	Molokai.
Kahului, Maui	Kahului.
Kailua, Kona	Kona.
Kamuela	Kamuela
Lanai City, Lanai	Lanai.
Lihue	Lihue.
IDAHO	
Burley	Burley Municipal.
Coeur D'Alene	Cocur D'Alene.
Hailey	Friedman Memorial.
Idaho Falls	Fanning Field.
Lewiston	Lewiston-Nez-Perce County.
Twin Falls	Twin Falls Municipal.
ILLINOIS	
Bloomington	Bloomington-Normal.
Champaign	University of Illinois-Willard.
Danville	Vermilion County.
Decatur	Municipal.
Galesburg	Galesburg Municipal.
Marion	Williamson County.
Mattoon-Charleston	Coles City Memorial.
Mount Vernon	Mount Vernon-Outland.
Quincy	Quincy Municipal Baldwin.
Sterling-Rock Falls	Whiteside County.
INDIANA	
Bloomington	Monroe County.
Evansville	Dress Memorial.
Kokomo	Kokomo Municipal.
Lafayette [1]	Purdue University.
Marion	Marion Municipal.
Muncie	Delaware County-Johnson Field.
Terre Haute	Hulman Field.
IOWA	
Burlington	Municipal.
Clinton	Clinton Municipal.
Dubuque	Municipal.
Fort Dodge	Do.
Iowa City	Do.
Mason City	Do.
Ottumwa	Ottumwa Industrial.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

Community	*Airport*
KANSAS	
Dodge City	Municipal.
Garden City	Do.
Goodland	Renner Field.
Great Bend	Municipal.
Hays	Do.
Liberal	Do.
Manhattan	Do.
Parsons	Tri-City.
KENTUCKY	
Bowling Green	Bowling Green-Warren.
London	Corbin London War Memorial.
Owensboro	Owensboro-Daviess County.
Paducah	Barkley Field.
LOUISIANA	
Alexandria	Esler Field.
Baton Rouge	Ryan.
Leesville	Fort Polk AAF.
MAINE	
Auburn-Lewiston	Municipal.
Augusta	Augusta State.
Bangor	Dow AFB.
Bar Harbor	Bar Harbor Airport.
Presque Isle	Municipal.
Rockland	Do.
MARYLAND	
Hagerstown	Municipal.
Salisbury	Salisbury-Wicomico.
MASSACHUSETTS	
Hyannis	Barnstable-Municipal.
Martha's Vineyard	Martha's Vineyard.
Worcester	Municipal.
MICHIGAN	
Alpena	Phelps-Collins.
Benton Harbor	Ross Field.
Escanaba	Municipal.
Hancock	Houghton County Memorial.
Iron Mountain	Ford.
Ironwood	Gogebic.
Jackson	Reynolds Municipal.
Manistee	Blacker.
Marquette	Marquette County.
Menominee	Menominee.
Pellston	Emmet County.
Saginaw	Tri-City.
Sault Ste. Marie	Municipal.
Traverse City	Do.
MINNESOTA	
Bemidji	Municipal.
Brainerd	Brainerd-Crow Wing.
Fairmont	Municipal.
Hibbing	Chisholm-Hibbing.
International Falls	Falls International.
Mankato	Municipal.
Thief River Falls	Do.
Winona	Max Conrad Field.
Worthington	Municipal.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

Community	*Airport*
MISSISSIPPI	
Columbus	Columbus-Lowndes County.
Greenville	Municipal.
Greenwood	Do.
Hattiesburg	Do.
Laurel	Do.
Meridian	Key Field.
Natchez	Hardy-Anders.
Oxford	University-Oxford.
Pascagoula	Jackson County.
Tupelo	Municipal.
Vicksburg	Do.
MISSOURI	
Cape Girardeau	Municipal.
Columbia	Do.
Jefferson City	Memorial.
Joplin	Municipal.
Kirksville	Clarence Cannon Memorial.
Moberly	Omar N. Bradley.
Tribune	Forney AAF.
MONTANA	
Bozeman	Gallatin Field.
Butte	Silver Bow County.
Glasgow	International.
Glendive	Glendive.
Havre	Havre City-County.
Helena	Helena.
Kalispell	Flathead County.
Lewistown	Municipal.
Miles City	Miles City.
Missoula	County.
Sidney	Sidney-Richland Municipal.
West Yellowstone	West Yellowstone.
Wolf Point	West Wolf Point.
NEBRASKA	
Alliance	Municipal.
Chadron	Do.
Columbus	Do.
Hastings	Do.
Kearney	Do.
McCook	Do.
Norfolk	Karl Stefan.
North Platte	Less Bird Municipal.
Scottsbluff	Municipal.
Sidney	Do.
NEVADA	
Elko	Municipal.
Ely	Ely-Yelland.
Las Vegas	McCarran.
NEW HAMPSHIRE	
Berlin	Municipal.
Keene	Dillant Hopkins.
Laconia	Municipal.
Lebanon	Lebanon Regional.
Manchester	Grenier Field-Municipal.
NEW JERSEY	
Wildwood	Cape May County.

4.—*Air carrier airports without approach lighting systems, calendar year 1960*—Continued

Community	*Airport*
NEW MEXICO	
Alamogordo	Municipal.
Carlsbad	Do.
Clovis	Do.
Farmington	Do.
Gallup	Senator Clarke Field.
Hobbs	Lea County.
Roswell	Municipal.
Santa Fe	Do.
Silver City	Silver City-Grant County.
NEW YORK	
Glens Falls	Warren County.
Islip	Long Island McArthur.
Ithaca	Tompkins County.
Jamestown	Municipal.
Massena	Richards Field.
Ogdensburg	Municipal.
Olean	Do.
Plattsburgh	Do.
Poughkeepsie	Dutchess County.
Saranac Lake	Adirondack.
Watertown	Municipal.
NORTH CAROLINA	
Elizabeth City	Coast Guard Air Station.
Goldsboro	Seymour Johnson AFB.
Hickory	Municipal.
Kinston	Stallings Field.
New Bern	Simmons Nott.
Rocky Mount	Municipal.
Southern Pines	Pinehurst-Southern Pines.
NORTH DAKOTA	
Devils Lake	Municipal.
Grand Forks	International.
Jamestown	Jamestown.
Minot	International.
Williston	Sloulin International.
OHIO	
Lima	Allen County.
Portsmouth	Scioto County.
Zanesville	Municipal.
OKLAHOMA	
Bartlesville	Frank Phillips.
Duncan	Halli Burton.
Enid	Woodring Field.
Guymon	Municipal.
Lawton	Municipal.
McAlester	Municipal.
Muskogee	Davis Field.
Ponca City	Municipal.
Stillwater	Searcy Field.
OREGON	
Astoria	Clatsop County.
Baker	Municipal.
Corvallis	Municipal.
North Bend	Municipal.
Ontario	Municipal.
Redmond	Roberts Field.
Roseburg	Municipal.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

Community	*Airport*
PENNSYLVANIA	
Bradford	Bradford-McKean County.
Du Bois	Du Bois-Jefferson County.
Franklin	Chess-Lamberton.
Hazleton	Municipal.
Johnstown	Johnstown-Cambria County.
Lancaster	Lancaster.
Martinsburg	Blair County.
Philipsburg	Mid-State.
Reading	Gen. Carl Spaatz.
PUERTO RICO	
Mayaguez	Mayaguez Airfield.
Ponce	Mercedita.
San Juan	Puerto Rico International.
SOUTH CAROLINA	
Anderson	Anderson County.
Crescent Beach	Myrtle Beach.
Florence	Municipal.
Greenwood	Greenwood County.
SOUTH DAKOTA	
Aberdeen	Municipal.
Brookings	Municipal.
Huron	W. W. Howes Municipal.
Mitchell	Municipal.
Pierre	Municipal.
Rapid City	Municipal.
Watertown	Municipal.
Yankton	Chan Gurney Municipal.
SOUTH PACIFIC	
Agana, Guam	Agana NAS.
Samoa	International.
Wake Island [1]	Wake Island.
TENNESSEE	
Clarksville	Outlaw Field.
Jackson	McKeller Field.
Shelbyville	Bomar Field.
TEXAS	
Big Spring	Howard County.
Borger	Hutchinson County.
Brownsville	Rio Grande Valley International.
Brownwood	Municipal.
Fort Worth	Meacham.
Galveston	Scholes Field.
Harlinger	Municipal.
Houston	Intercontinental.
Laredo	Municipal.
Lufkin	Angelina County.
McAllen	Miller International.
Paris	Cox Field.
Temple	Draughon-Miller.
Victoria	Victoria County-Foster.
UTAH	
Cedar City	Municipal.
Moab	Canyonlands Field.
Vernal	Vernal.

[1] Partial ILS.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

Community	*Airport*
VERMONT	
Barre-Montpelier	Barre-Montpelier.
Newport	Newport Municipal.
Rutland	Municipal.
VIRGIN ISLAND	
Charlotte Amalie	Harry S. Truman.
Christiansted	Alexander Hamilton.
VIRGINIA	
Charlottesville [1]	Charlottesville-Abeman.
Danville	Municipal.
Dublin	New River Valley.
Hot Springs	Ingalls Field.
Staunton	Shenandoah Valley.
Roanoke	Municipal.
WASHINGTON	
Ephrata	Municipal.
Hoquiam	Bowerman.
Olympia	Municipal.
Pasco	Tri-Cities.
Port Angeles	Challam County.
Pullman	Pullman Moscow Regional.
Tacoma	Industrial.
Walla Walla	Walla Walla City-County.
Wenatchee	Pangborn Field.
WEST VIRGINIA	
Beckley	Raleigh County Memorial.
Bluefield	Mercer County.
Clarksburg	Benedum.
Elkins	Elkins-Randolph.
Huntington [1]	Tri-State.
Martinsburg	Martinsburg Municipal.
Morgantown	Municipal.
Parkersburg	Wood County.
WISCONSIN	
Eau Claire	Eau Claire Municipal.
Janesville	Rock County.
La Crosse	Municipal.
Land O' Lakes	King's Land O' Lakes.
Manitowoc	Manitowoc Municipal.
Rhinelander	Rhinelander-Oneida County.
Stevens Point	Stevens Point Municipal.
Wausau	Municipal.
WYOMING	
Cody	Municipal.
Jackson	Jackson's Hole.
Laramie	General Brees Field.
Powell	Powell Municipal.
Rock Springs	Municipal.
Sheridan	Sheridan County.
Worland	Municipal.

[1] Partial ILS.

4.—*Air carrier airports without approach lighting systems, calendar year 1966*—Continued

AMERICAN SAMOA

Community	*Airport*
Pago Pago	Pago Pago International.

5.—*Air carrier airports with traffic counts equal to or greater than the airport surveillance radar criteria establishment minimums*

ALABAMA

Community	*Airport*
Huntsville	Huntsville-Madison County.

CALIFORNIA

Monterey	Monterey Peninsula.

FLORIDA

West Palm Beach	Palm Beach International.

GEORGIA

Columbus	Muscogee County.

INDIANA

South Bend	St. Joseph County.

KENTUCKY

Lexington	Blue Grass.

NEVADA

Reno	Reno Municipal.

NEW YORK

White Plains	Westchester County.

SOUTH CAROLINA

Columbia	Columbia Metropolitan.

WISCONSIN

Madison	Truax Field.

6.—*Air carrier airports without towers which have met the criteria establishment minimums*

ALABAMA

Community	*Airport*
Dothan	Dothan.

ALASKA

Kenai	Kenai.

ARKANSAS

Fayetteville	Fayetteville-Drake Field.
Pine Bluff	Grider Field.
Texarkana	Municipal.

6.—*Air carrier airports without towers which have met the criteria establishment minimums*—Continued

Community	*Airport*
CALIFORNIA	
Imperial	Imperial County.
Marysville	Yuba County.
CONNECTICUT	
Groton	Trumbull.
New Haven	Tweed-New Haven.
FLORIDA	
Fort Myers	Page Field Municipal.
Gainesville	Municipal.
Panama City	Panama City-Bay County.
Vero Beach	Municipal.
GEORGIA	
Albany	Albany Municipal.
HAWAII	
Lihue	Lihue.
INDIANA	
Lafayette	Purdue University.
KENTUCKY	
Owensboro	Owensboro-Daviess County.
MAINE	
Bangor	Dow AFB.
MICHIGAN	
Benton Harbor	Ross Field.
MISSISSIPPI	
Greenville	Greenville Municipal.
MISSOURI	
Columbia	Municipal.
NEW YORK	
Poughkeepsie	Dutchess County.
NORTH CAROLINA	
Hickory	Hickory Municipal.
NORTH DAKOTA	
Grand Forks	Grand Forks International.
PUERTO RICO	
Ponce	Mercedita.
SOUTH CAROLINA	
Crescent Beach	Myrtle Beach.

6.—*Air carrier airports without towers which have met the criteria establishment minimums*.—Continued

WEST VIRGINIA

Community	*Airport*
Morgantown	Morgantown Municipal.
Parkersburg	Wood County.

WISCONSIN

La Crosse	La Crosse Municipal.

7.—*Air carrier airports without instrument landing systems but which meet the establishment criteria*

ALABAMA

Community	*Airport*
Dothan	Dothan.
Huntsville	Madison.
Muscle Shoals [1]	Muscle Shoals.

ALASKA

Juneau	Juneau Municipal.

ARIZONA

Tucson	International.

ARKANSAS

Hot Springs	Memorial.
Texarkana	Municipal.

CALIFORNIA

Palmdale	Edwards AFB.
Santa Ana	Orange County.

CONNECTICUT

Bridgeport	Municipal.
Groton	Trumbull.

GEORGIA

Albany	Municipal.

HAWAII

Hilo	General Lyman Field.

KENTUCKY

Louisville	Bowman.

MICHIGAN

Benton Harbor	Ross Field.
Jackson	Reynolds Field.
Pontiac	Municipal.
Saginaw	Tri-City.

MISSISSIPPI

Columbus [1]	Columbus-Lowndes County.
Gulfport	Municipal.

[1] Programed for a partial ILS.

7.—Air carrier airports without instrument landing systems but which meet the establishment criteria—Continued

Community	*Airport*
NEVADA	
Las Vegas	McCarran Field.
NORTH CAROLINA	
Hickory [1]	Municipal.
NORTH DAKOTA	
Grand Forks	International.
NEW YORK	
Farmingdale	Republic.
Ithaca	Tompkins County.
OREGON	
North Bend [1]	Municipal.
PENNSYLVANIA	
Bradford	Bradford-McKean County.
PUERTO RICO	
San Juan	Puerto Rico International.
SOUTH DAKOTA	
Rapid City	Municipal.
TEXAS	
Houston	Intercontinental.
VIRGINIA	
Roanoke	Municipal.
Staunton [1]	Shenandoah Valley.
WASHINGTON	
Tacoma	Industrial.
WEST VIRGINIA	
Clarksburg	Benedum.
Morgantown	Municipal.

8.—Air carrier airports without approach lighting system but meeting the establishment criteria

Community	*Airport*
ALABAMA	
Dothan	Dothan.
Huntsville	Madison.
Muscle Shoals	Muscle Shoals.
ALASKA	
Juneau	Juneau Municipal.
ARIZONA	
Tucson	International.

[1] Programed for a partial ILS.

8.—*Air carrier airports without approach lighting system but meeting the establishment criteria*—Continued

Community	*Airport*
ARKANSAS	
Hot Springs	Memorial.
Texarkana	Municipal.
CALIFORNIA	
Palmdale	Edwards AFB.
Santa Ana	Orange County.
Santa Maria	Public.
COLORADO	
Grand Junction	Walker Field.
CONNECTICUT	
Bridgeport	Municipal.
Groton	Trumbull.
FLORIDA	
Valpariso	Eglin AFB.
GEORGIA	
Albany	Municipal.
Augusta	Bush Field.
HAWAII	
Hilo	General Lyman Field.
Kahului, Maui	Kahului.
ILLINOIS	
Champaigne	University of Illinois-Willard.
Quincy	Quincy Municipal Baldwin.
INDIANA	
Evansville	Dress Memorial.
KENTUCKY	
Terre Haute	Hulman Field.
LOUISIANA	
Baton Rouge	Ryan.
MAINE	
Bangor	Dow Field.
MASSACHUSETTS	
Worcester	Municipal.
MICHIGAN	
Benton Harbor	Ross Field.
Jackson	Reynolds Field.
Pontiac	Municipal.
Saginaw	Tri-City.

8.—*Air carrier airports without approach lighting system but meeting the establishment criteria*—Continued

Community	*Airport*
MISSISSIPPI	
Columbus	Columbus-Lowndes Field.
Gulfport	Municipal.
Meridian	Key Field.
MISSOURI	
Joplin	Municipal.
NEVADA	
Las Vegas	McCarran Field.
NEW HAMPSHIRE	
Manchester	Grenier Field-Municipal.
NEW YORK	
Farmingdale	Republic.
Islip	Long Island-McArthur.
Ithaca	Tompkins.
NORTH CAROLINA	
Goldsboro	Seymour Johnson AFB.
Hickory	Municipal.
NORTH DAKOTA	
Grand Forks	International.
OREGON	
North Bend	Municipal.
PENNSYLVANIA	
Bradford	Bradford-McKean County.
Reading	Gen. Carl Spaatz.
PUERTO RICO	
San Juan	Puerto Rico International.
SOUTH DAKOTA	
Huron	Municipal.
Rapid City	Municipal.
TEXAS	
Brownsville	Rio Grande Valley International.
Fort Worth	Meacham.
Houston	Intercontinental.
VIRGINIA	
Roanoke	Municipal.
Staunton	Shenandoah Valley.
WASHINGTON	
Tacoma	Industrial.
WEST VIRGINIA	
Clarksburg	Benedum.
Morgantown	Municipal.
WYOMING	
Rock Springs	Municipal.

Mr. ROGERS. Thank you, Mr. Chairman.

The CHAIRMAN. Those have been requested before, but I am sure they will comply with that request. Some other members have requested it.

Mr. ROGERS. Thank you.

The CHAIRMAN. Mr. Devine.

Mr. DEVINE. Thank you, Mr. Chairman.

General McKee, I am not accusing you or your organization of dereliction of anything. I would join in your remarks of commendation, particularly for your air traffic controllers. I would ask you or any member on the panel right now if you wouldn't agree that in the interests of air safety, and the interests of the public, and of the public understanding, might be well served if we would have additional public hearings in which we gave the representatives of the Air Line Pilots' Association, Aircraft Owners & Pilots' Association, air traffic controllers, perhaps members of the public, an opportunity to testify and air this thing?

Do you think you could gain any information or insight by such hearings?

General MCKEE. Well, as you know, we certainly have no objection to any hearings the committee wants to hold. But as you know, we have frequent meetings with the Air Line Pilots' Association, and with all these associations, and I have urged, for example, the Air Traffic Controllers Association, these other associations, to give us their ideas, any ideas that they have on improving safety.

A lot of their recommendations we take, and some of them are just impracticable to take for one reason or another. They are beyond our capability.

Mr. DEVINE. Yes; but that is true of you as the Administrator and within your organiaztion; but I am concerned with the public image of commercial and general aviation. I think there are too many misunderstandings. I think if these things are aired, that maybe the public would have more confidence.

We are told every time there is an air crash, whether it is a midair collision, or something else, there are immediate cancellations of reservations, and then these people get courage again, and 2 or 3 days later, they start flying again.

General MCKEE. That is true; but then they pick up next week. The thing keeps on growing. I am concerned about the rapidity with which air traffic is growing. It is fantastic.

Mr. DEVINE. Again, talking about lack of facilities, when these jumbo jets like the 747 come in, I understand that you are not as concerned with the air safety problem as you are with how you are going to handle them when they get on the ground, with parking facilities, both for the aircraft, handling the bags, and things like that.

Isn't that a great problem?

General MCKEE. From the air safety point of view, we can handle the jumbo jet just as easily as we can handle present airplanes. Obviously, if you happen to be so unfortunate as to have an accident, in one accident, you obviously would kill more people; but the big problem confronting the aviation community and various communities in the country is providing the facilities at the airport to handle that many people.

You can imagine what would happen to New York if at 5 o'clock—and this is one of our problems, again—three jumbo jets came in from Paris or London. And this is a problem they have got.

Mr. DEVINE. That is true.

Let me put an unrelated question to that. Is drinking by pilots in general aviation at this time considered a major air safety hazard? Has it grown to any proportions that you have great concern about this problem?

General MCKEE. I don't think, Mr. Devine, that it is major, but we do have a problem there, and I think that everybody recognizes it, and that it is the reason that we are conducting, and so are the various associations, a very vigorous educational campaign as to what is involved when a pilot takes a drink before he takes off, or a few hours before he takes off. We do consider it a problem.

Mr. DEVINE. Not a major one at this time?

General MCKEE. I will say it is a significant problem. I wouldn't call it a major problem.

Mr. DEVINE. Finally, recognizing that these two recent midair collisions, one at Urbana, Ohio, the other one down here at North Carolina, did not occur in a highly congested area—I think the last one that I recall was United and TWA met over Brooklyn, which was approaching JFK—what one thing would you or any member of your panel suggest or recommend as a key thing that would help in eliminating midair collisions? Is there one particular thing?

General MCKEE. The one particular thing is the one we discussed this morning, and I think it is really the key to the solution of this problem, an effective, anticollision device.

Mr. DEVINE. On the aircraft.

General MCKEE. On the aircraft.

Mr. DEVINE. Thank you, Mr. Chairman.

General MCKEE. And I think we have to drive as fast as we can to get it. First on all the commercial airliners, airplanes carrying passengers; and then we have got to drive at getting some kind of a device that is economically feasible for all the general aviation aircraft.

It would be the biggest breakthrough we could get.

Mr. DEVINE. Thank you.

General MCKEE. And we need the help of all of the industry in getting this done.

Mr. DEVINE. That is in a public hearing, maybe with all good intents, that might show up here.

General MCKEE. I would sure like to see them.

The CHAIRMAN. Mr. Kornegay.

Mr. KORNEGAY. Thank you, Mr. Chairman.

Mr. McKee, is it an FAA rule that small passenger commercial aircraft have been equipped with radar on the plane?

General MCKEE. Will you answer Mr. Moore?

Mr. GEORGE S. MOORE (Associate Administrator for Operations, FAA). All aircraft that were certificated after a certain date. To give you an example, the DC–3, or C–46, being manufactured sometime back, do not have to have airborne radar; but all of your modern equipment today, your turboprops and your jets are required to have airborne radar.

Mr. KORNEGAY. A lot of planes do have it now. Is that radar equipped to aid the pilot in determining altitude, weather, other aircraft, or what?

What can he see on that radar, in other words?

Mr. MOORE. It is primarily a weather avoidance device. In other words, it keeps him from flying into——

Mr. KORNEGAY. In other words, he can see a thunderstorm up ahead.

Mr. MOORE. Yes, sir.

Mr. KORNEGAY. Now, could he see any aircraft out there, 10 miles, 5 miles?

Mr. MOORE. No; it is not designed for that, sir.

Mr. KORNEGAY. In other words, insofar as collision, air collisions are concerned, this is not any real help to the navigator or the pilot.

Mr. MOORE. It is primarily a weather avoidance device and you can, of course, use it for picking up land masses, and things like that, when you are approaching a mountain, or something of that sort, yes, sir.

Mr. KORNEGAY. A mountain. Do you foresee now an instrument, radar instrument that could be used, adapted to pick up other aircraft?

Mr. MOORE. No, sir; as General McKee pointed out, the way it looks to us the collision avoidance device as such, as a separate unit, is the best hope for avoiding other aircraft.

Mr. KORNEGAY. Now does that collision avoidance system send a signal out 360 degrees, in other words, in all directions; or will it be funneled out as a radar beam goes?

Mr. MOORE. As Mr. Thomas mentioned this morning, it is a time frequency proposition, using what is known as an atomic clock. It is a cooperative system. It would require all aircraft to be so equipped, be on exactly the same time and, in that way, be able to exchange intelligence with those equipments on aircraft in the system.

Mr. THOMAS. It does cover the complete volume, there is an antenna on top, and an antenna on the bottom. For all practical purposes, it is like a basketball, complete volume around it. In all directions.

Mr. KORNEGAY. In all directions. Now, I noted in the press that they speak particularly of the collision at Hendersonville, N.C., that the Cessna 310 was 12 miles off course.

Now, has your investigation got to the point where any statement could be made with reference to why that airplane was that far off course, and if anyone in the system knew that it was off course?

Mr. ALLEN. Sir, I don't think that we have said that the aircraft was off course.

Mr. KORNEGAY. No, sir; I didn't say. I said it was reported in the newspaper, and it was not according to the FAA officials.

Mr. ALLEN. Well, going back to the transcript I read this morning, I think that the following summary could be made in that transcript.

The information, from the information, we determined that 3121 Sierra was under radar surveillance from the time of departure from Charlotte to within 10 miles of Asheville VOR. And the clearance was to the Asheville VOR, and Nan 3121 Sierra reported "21 Sierra just passed over the VOR. We are headed for—uh—the Asheville now." And that time was at 1558 hours and 19 seconds.

Mr. KORNEGAY. Well, that was some 3 minutes before the collision.

Mr. ALLEN. Yes, sir; the collision occurred at 1601 and approximately 15 seconds. We know that the Piedmont flight 22 departed Asheville airport approximately 1558 and 40 seconds, and shortly thereafter, was observed by two control towers about 5, approximately 5 miles south on the southeast heading.

Now, after impact, the aircraft came to rest on the ground at a point approximately 10 miles southwest of the Asheville VOR or about 10 miles out on the 230° radial of the VOR.

Now, after collision, your aircraft becomes a free-falling object. We do not know at this time whether impact occurred precisely over the impact spot or not. I think that during the course of the investigation, we will run a trajectory analysis, and this will tell us more precisely at what point displaced from the VOR, such as the case where the actual midair collision occurred.

Mr. KORNEGAY. Thank you very much.

The CHAIRMAN. Mr. Broyhill.

Mr. BROYHILL. Thank you, Mr. Chairman.

General McKee, has the FAA considered, and if so, would it be practical to require that all aircraft who operate under IFR conditions be equipped with transponders?

General MCKEE. I don't think so. I would like to ask Mr. Thomas. He has been into this at some length. I asked him the same question.

Mr. THOMAS. No, sir; we do not. In the so-called positive control air space, air space high altitudes occupied by the fast aircraft and the heavy aircraft, we do require it.

At the present time, we do not find it necessary for all aircraft operating IFR to be so equipped. The cheapest installed version now is about $5,500, and much of the IFR operation occurs in areas where it would not normally be considered necessary.

We may at some time require this for operations in very high density areas, but we have come to no such conclusion yet.

Mr. BROYHILL. I want to ask one other question, concerning the procedures of your controller. Now, Mr. Allen, read the transcript. I don't remember which controller it was, gave the pilot of 3121 Sierra an instruction, and then said "Correction," and made a correction in this instruction, and as I recall in reading this transcript, the pilot acknowledged that with his number.

Now, is it usually the procedure followed that he acknowledges his instruction this way, or would he be required to repeat this instruction, or make sure that he has it correctly?

Mr. THOMAS. He normally would read it back.

Mr. BROYHILL. But there is no——

Mr. THOMAS. They are encouraged to read back. There is no absolute requirement to read back.

Mr. BROYHILL. Would this——

Mr. THOMAS. That is, repeat the clearance instruction he has been given.

Mr. BROYHILL. Would this be something that could be done, to require that they read such instructions back, clearances?

Mr. THOMAS. Mr. Broyhill, the problem that we have had, and we have discussed this at quite some length, in the very busy locations, such as Chicago, or New York, we could completely congest the radio

frequencies, and if there is any requirement to read back, it would be more urgent in those locations than any other locations. It is normally a better thing to read back, because then there is some assurance that the pilot and the controller have the same ideas in mind.

Mr. BROYHILL. I might ask one other question. Your agency, the FAA are both in the Department of Transportation. Your agency has the responsibility for investigating air accidents. Is your agency independent of the FAA, or do you have, are you under the FAA control, or what is the exact status?

Mr. O'CONNELL. Well, we are very pointedly made independent by virtue of the statute under which we operate. We inherited the Civil Aeronautics Board function of investigating aircraft accidents, but in the Transportation Act which created the National Transportation Safety Board, there is specific provision requiring that we exercise our responsibility and duties independent of the Secretary of Transportation, or any of the administrators, so that we are directed to operate independent of General McKee and of the Department as a whole, in our responsibilities of investigating accidents.

That is a continuation of the longstanding separation that existed between CAB and FAA in the same area.

Mr. BROYHILL. You also have authority to investigate the near-misses which we have been talking about today?

Mr. O'CONNELL. Yes, yes; we do.

Mr. BROYHILL. I yield to the gentleman from Tennessee.

Mr. KUYKENDALL. General McKee, I want to follow just for a moment the line of questioning of Mr. Devine, in the matter of holding extensive public hearings. In my very short tenure on this committee, it seems that in the witnesses from the various technical, and I believe three or four gentlemen have described your function as primarily technical, it seems to me that the function of the committee, among many other things, has been largely one of, should I say, translation from technical into more layman's terms.

I find that many times, the supposed superficial misunderstanding between you and one of us is only a matter of the difference between your technical terminology and our layman's terminology.

I know this discourse between you and Mr. Springer a few moments ago, pretty well brought this out.

Would you not think, if for no other reason except to bring this whole problem out into the public into the language which we as Congressmen speak, which obviously, has to be the language of the general public, if for no other reason, don't you think that would be advantageous?

General MCKEE. I am not sure whether it would or not. Lots of times, in these things, a lot of misconceptions and misunderstandings occur, but we have nothing to hide, and before any hearing that this committee wants to hold, we will sit up here and tell you the truth the best we know it, as long as you want to hear it.

Mr. KUYKENDALL. I realize this, but I know that—I am not even going to ask you the question, I will make the statement—you are not impervious to public opinion. I know that.

General MCKEE. Oh, no, no.

Mr. KUYKENDALL. And I was just suggesting an idea. I know that the few times I have heard you testify, there are cases where the public

had misunderstood you, and this committee did understand you, and I think it would have been better off if there had been this understanding all along.

This was my only statement. I know you feel the same way.

General McKee. I certainly do.

The Chairman. Mr. Ottinger.

Mr. Ottinger. Mr. Chairman, I think our last exchange generated perhaps more heat than light, and I wonder if you could answer a few of the specifics that I raised. I will just pick out two or three that I think are of most concern that haven't been covered by the committee.

I am told it would increase safety substantially in the northeast corridor from Washington to Boston, if planes were under continuous control of the towers. I understand they are not, at the present time. What are the disadvantages or difficulties in instituting that kind of control?

Second, is there a three-dimensional radar available at less than $2 million as Electronics magazine states?

General McKee. This question of three-dimensional radar has come up a number of times, and I believe this committee, I am no expert in three-dimensional radar, but I have asked that this be looked into, because it has been raised a number of times, and I would like for Mr. Thomas to talk to the three-dimensional radar, and maybe shed a little light on this great thing that is supposed to solve all the problems.

Would you talk to the three-dimensional radar, Dave?

Mr. Thomas. Mr. Chairman, Mr. Ottinger mentioned the Maxon, Hughes and I.T. & T. efforts. We have a 3–D Maxon up at Atlantic City. I have seen the Hughes system with the Navy, and I am familiar with the I.T. & T. system. The object of all so-called three-dimensional radars is to get altitude information into the air traffic picture.

The military services obviously deal with a noncooperating type target, so they do employ height finders quite extensively. These height finders, narrow beam, seek out a particular target, get an estimate of its height, and this information is passed on to an interceptor, who uses its airborne radar which intercepts and gets a very precise estimate of the height.

The problems here is one of just geometry. In the air traffic control system, we use in the lower air space 1,000 feet of vertical separation as the standard, and in areas close to the radar antenna, we use 3 miles, and if we are more than 40 miles from the radar antenna, we use 5 miles as the lateral separation standard; that is, two airplanes would not be closer than 5 miles, not because the wing tips would hit, but because this is the resolution of the radar. If we took our best resolution in the horizontal plane and put it on end in the vertical plane, then we would deal very well with airplanes that had 15,000-foot separation at 40 miles and 25,000-foot separation at more than 40 miles, if we used the same standards.

There have been attempts to do something about this, and in the case of Maxon, since this is the one we bought, it was a series of antennas, one stacked upon the other, varying from each other by a fraction of a degree, and then the radar will look at all these antennas, select the ones that it thought had the strongest return, make a calculation on where the centroid would be, and then estimate this as the height.

This works pretty good, within very short ranges, but it is a complicated sort of device. We had a Presidential committee look at this whole problem, about 5 or 6 years ago, its name was Project Beacon, and they came up with a contrary recommendation, and we have been embarked on its recommendation since.

And that is, we would like a rather constant measurement of altitude, and not dependent upon a fraction of a degree resolution of radar, which is not available either in military or civil. And the simplest thing would be, since the altimeter measures altitude regardless of its distance from an antenna, is simply to have it broadcast what that altitude information is.

We had another fortuitous circumstance going for us, because we were then using, as was mentioned earlier, the grandson of the old World War II IFF in the radar beacon, which would reinforce the target.

This was susceptible of giving out quite a number of codes, so each one could positively identify itself, so we went the route of having the radar sweep the target. This would trigger off a beacon on the airplane. It then would give up two bits of information, one a positive and discrete identify, "I am American 376," "I am Piedmont flight 22" and read the altimeter, and say "I am at 6,100."

Then this has no angular deviations in it. It gives us a constant vertical separation device that we can use, and is infinitely cheaper.

If we put in enough 3–D radar to cover the whole country, I did know at one time what it would cost, we would have to put them at 40-, 50-mile intervals in order to get the accuracy that is usable.

Now, the military have quite a different problem. We are dealing with a cooperative environment, one where you want to avoid a collision, one that wants to cooperate with us, so we don't need either the expense or the relative inaccuracies of the other.

It is much more interesting to know that an enemy bomber is coming in plus or minus some distance from—the actual distance is classified, but let us say, plus or minus 1,000 feet, and then a missile or an interceptor could precisely determine that altitude, and go in and get the kill.

But that is of no interest at all to us, because plus or minus 1,000 feet would involve collisions, so we have to know it much more precisely.

Mr. OTTINGER. Can I continue?

The CHAIRMAN. Yes, go ahead.

Mr. OTTINGER. I understand from the people that I have talked to around these small airports that a great many of the private aircraft equipment is very expensive, and not very reliable, and that a large percentage of the time your small private planes don't have radios functioning, for instance.

Is the FAA planning any action to tighten up these requirements? How does it view this situation in terms of safety?

Mr. THOMAS. It obviously has a bearing on safety, because if you have a transmitter that is difficult to read, or doesn't operate at all, obviously, you can't have communication. An altimeter that gives the wrong information is a lot worse than none at all. Our approach is to write technical standards on the type of equipment being employed; as a matter of fact, there has been more progress in the elec-

tronics industry in this area than with almost any other thing in the past few years.

And much of the general aviation equipment now coming off the line is of excellent quality. But we do have minimum standards for the performance of the aircraft.

This is not how you build it. That is their problem. But how it operates, within the system.

Mr. OTTINGER. What is the situation with respect to air taxi?

Why don't you have the same kind of severe controls on them as you do on carriers?

Mr. THOMAS. There is confusion over the air taxis, even in our statistics. We categorized them as general aviation, but as a matter of fact, they are common carriers. I would suspect the air taxi operators would tell you we have quite severe controls over them. We have even tighter controls under a notice of proposed rulemaking that is out for public comment right now, but we have some real differences in the operation that we must recognize. Many of them are small, three, four, five place aircraft, operating with a single pilot under visual flight rules, that is good weather conditions, and never under instruments.

Some of them actually operate heavier aircraft with two pilots, and essentially under the same type of rules. But fundamentally there are differences in their operating environment, there is a difference in their capacity as to where they go, and we try to apply the most rigid safety regulations that we can to them, but obviously, we do not want to destroy that industry.

If we required them to have dispatchers, two-way radio ground stations, two pilots, this sort of thing, we could put them out of business, real quick.

Mr. OTTINGER. You are sure it would put them out of business? They are in the business of carrying people for pay. That is the basis.

General MCKEE. Well, we wouldn't mind putting them out of business, if we thought it was necessary from a safety point of view, but we are trying to get the equivalent safety with the requirements that we do put on them without it being identical to the same requirements for the big airplane going between New York and Paris.

Mr. OTTINGER. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Brotzman.

Mr. BROTZMAN. Thank you.

Having listened to about 4 or 5 hours of testimony, I am impressed by the fact that you have some very great problems, and I say, I think we have some very great problems.

I certainly look charitably upon the comments of the gentleman from Ohio, Mr. Devine. I think a broad gage type of inquiry would help to resolve some of these problems. When I say that, I don't believe we can resolve these matters by turning the faucet on and off, and I think that we in the Congress have a need for more expertise and knowledgeability about the specifics of these problems to enable us to work with you and carriers, and the pilot's association and the various people that are concerned with air traffic safety, in the interests of the general public. I certainly feel this has been a very beneficial day, to hear these matters discussed, but I don't think it has gone far enough.

I might say one thing, General. That my closest association with your agency happens to be with the group of people that operate the air traffic control center, the Longmont, Colo., and I would be remiss if I didn't say publicly that they are a dedicated, hard-working group of people, and I think they do an excellent job.

Certainly, all of us can improve in the performance of the tasks we assume for this Government, but I want to clearly be on record that I think they are doing a good job there. I have taken the time to go and inspect their operation, and to find out what kind of people they really are.

If you will recollect, the last time we really got together which unfortunately, once again, was at the time of the major catastrophe in New Orleans, and I think we ought to be getting together in between times.

General McKee. I agree.

Mr. Brotzman. We get together after something tragic has happened, but I think there should be continuity of purpose here, on all of our parts, and certainly, when I say that, I am talking about our committee, but if you will recall, as a result of the Delta crash at New Orleans, I made a suggestion relative to your checking upon the possibility of acquiring surplus Air Force bases in remote areas, as sites for emergency training exercises.

I think you made some progress on it. Is that not correct?

General McKee. Some. Not as much as we would like, but as you remember this morning, we covered what we had done as a result of that accident, to try to ensure that we didn't have a similar recurrence in terms of maneuvers, where they would be conducted, and as I said, we went into some detail, in a letter to the committee as to just what we had done.

I pointed out in a letter to you what is being done at surplus airfields, or airfields that are becoming surplus.

Mr. Brotzman. The reason I suggested that, of course, was that often in this Government, one hand doesn't know what the other hand is doing. We have surplus Air Force bases that might be in a good spot, to augment training exercises, taking them out of areas of congestion. I think we should be moving on that, prior to the time that we dispose of them.

General McKee. Well, we are certainly aware of anything that is surplus that comes up through GSA. We work very closely with GSA. Obviously, Mr. Brotzman, you have a problem. You take a huge military installation that becomes surplus, just to operate that military installation costs a tremendous amount of money, and then you are asked to settle the question, "Well, would you like to use this for training purposes?" Who is going to pay for it? The Federal Government is not going to pay for it. There is nothing in our funds to provide for training bases, and so you go to the airlines, and they say, "We are going to do our training down in New Mexico, because we have a base down there, and we can't afford to do this."

On the other hand, we try to encourage the airlines, and we are doing it in a couple of cases right now, where there are facilities that have become available, to use them, and some of them are.

For example, Pan American is very interested in training at one

of the bases in the southwestern part of the United States that is becoming surplus, that has fine runways and fine facilities.

Mr. BROTZMAN. Well, these are practical things that must be considered.

General MCKEE. I think that if you look——

Mr. BROTZMAN. And we would understand the whole situation.

General MCKEE. If you look over the record of this particular committee over the years, I think this committee has made an outstanding and significant contribution to the advance of commercial aviation in this country.

And I agree with you. I would like to get together more frequently. We need help in lots of areas. We do need understanding.

Mr. BROTZMAN. Thank you.

The CHAIRMAN. Mr. Van Deerlin?

Mr. VAN DEERLIN. Thank you.

You testified, General, that the utilization of Bolling and Anacostia strips would relieve the congestion at National Airport, but it really wouldn't do anything, would it, to relieve the congestion and the backup airspace overhead? Wouldn't the problems—wouldn't the major problems that you have in parking space remain with the use of those nearby fields?

General MCKEE. This is true, Mr. Van Deerlin. Actually, we could have used Anacostia on a limited basis, as we said, but that is not the solution for the Washington area. Washington needs, I am not prepared to state how many, but at least several well-located general aviation airports. And I would hope someday we will be able to get them.

Mr. VAN DEERLIN. But they should be——

General MCKEE. Anacostia, even if it were to be used, is a poor solution to the problem.

Mr. VAN DEERLIN. So I take it your overall recommendations would be against their utilization for as an adjunct to National Airport.

General MCKEE. Well, certainly not as an adjunct. The only purpose it would serve would be to take some of the light airplanes off of Washington National.

And we suggested it last year, when we were having the crisis in congestion, as one action that might tend to some extent to relieve the congestion at Washington National. But for a sensible, long-term answer, we needed adequate, general aviation airports in the Washington area, to handle not only these light airplanes I was talking about, but also the tremendous amount of business aircraft that come in, heavy piston-planes, turboprops, and jets. They are going more and more and more to jets, so this whole fleet of business aircraft is very rapidly changing into a jet fleet, and if you could take those airplanes into a convenient airport, other than National, I think we would be that much better off.

Mr. VAN DEERLIN. Thank you.

The CHAIRMAN. Mr. Keith.

Mr. KEITH. Thank you, Mr. Chairman.

I am sorry that I haven't been able to be here, General, for most of your testimony. Over the weekend, I had occasion to enter into a discussion with somebody about the overall safety of flying, and particularly commercial flying.

There is a Government statistics book dealing with the whole broad range of information that might be of value to Government and industry. The individual with whom I talked pointed out to me that according to the statistics in 1 year, there were only a few commercial aircraft accidents, and that in the national flying, there were extraordinarily small numbers of lives lost, making it about one-tenth of 1 percent for every 100 million miles of traffic—or some such extraordinary figure—so that generally speaking, the record is quite commendable.

On the other hand, as you know, we discussed these near misses, in which I have been involved, and there is ample justification for our continuing our efforts to eliminate the occasional ones that do occur.

But my question is, how does our record compare with that of other countries? Was that discussed earlier?

General McKee. Well, it is a matter of record, and without going into comparisons between any particular country, the record of the United States, civil aviation, is significantly better than any other country in the world, and we are, as a matter of fact, Mr. Thomas, what is the figure you have got?

I know it is significantly better, and I think the country has reason to be proud of our air traffic control system and the safety record, as regrettable as these accidents are, extraordinarily regrettable.

Mr. Thomas. We get our information from the International Civil Aviation Organization which publishes comparable statistics to the ones that you just read, and if you look at the average of all the other countries, the accident record and the U.S. fatality rate is one-third or less of the international average. An individual country on any given year may have no accidents at all, have a perfect record, but if you look at the average number of all countries for the year, then we run significantly better. Some of them have a small volume of operations, and may go a year without any accidents at all, and therefore, have, on an individual basis, a better one.

General McKee. I would like to say, Mr. Keith, that we are far from satisfied with that record, even though it is significantly better than any other country.

Mr. Keith. I am far from satisfied, too, because not long ago, I was in a plane that had a near miss. I was disappointed that no information was made public at that time. Nevertheless, I still use the airlines, and I do so with great confidence—much more confidence than I have when I am driving to Washington to attend a session of Congress.

Did you furnish to the committee the number of midair collisions in recent years?

General McKee. We promised to furnish that for the record.

Mr. O'Connell. Mr. Congressman, I submitted at the beginning of the afternoon session a summary of midair collisions since 1956, 1956 through 1967, number of various types of midair collisions and the total, divided up into classes, and then a summary of each individual accident involved, and they all have been submitted for the record.

Mr. Keith. Thank you.

Thank you, Mr. Chairman.

The Chairman. Mr. Brown.

Mr. Brown. Mr. Allen, on page 3 of your testimony, you listed the various parties at interest in the Asheville crash who were invited to participate in the investigation, and then you listed the assignment

of your personnel into various areas of study, including structures, systems, powerplants, flight recorder, maintenance records, operations, air traffic control, and these human factors.

Now I would like to ask you a similar question to one that was asked earlier this afternoon, and that is, don't you feel that this committee would benefit from testimony from those organizations which you have listed as being invited to participate in the investigation, and perhaps some others, manufacturers, and so forth, relating to structures, systems, and the like, to see if they might have anything to contribute to this question of air traffic safety, or air safety?

Mr. ALLEN. Mr. Brown, I would not be so presumptuous as to predict what benefit might accrue to the committee. I make it a practice to visit safety forums wherever they are conducted, and I have attended them in the past from various organizations and industries.

Mr. BROWN. Well, I would hope that the committee and the FAA would both benefit from this kind of testimony, and as the general has testified, the FAA has the opportunity to hear from these people from time to time.

However, we don't always have that opportunity, so I think that some benefit might accrue to us.

Let me ask you, Mr. Allen, again with reference to the human factors involved here, do you do any psychological evaluation after an accident of the air traffic control personnel, as you do with the pilots involved in an accident?

Mr. ALLEN. I can't recall of an instance where we have conducted psychological tests.

Mr. BROWN. I mean that, when you said that you did an evaluation of psychological factors, I would presume this would include whether or not the pilot had some reason to be less than safe in flying his airplane.

Mr. ALLEN. What I had reference to in that particular instance, Mr. Brown, was the number of accidents in the past; it has come to our attention that the pilot was receiving psychiatric treatment, and we proceeded to that phase of investigation.

Mr. BROWN. My question includes air traffic control personnel and the other personnel involved in this whole fabric of air safety. Do you do any evaluation of the air traffic control personnel, whether the guy was at an all-night party before, or anything of that nature?

Mr. ALLEN. We have not.

Mr. BROWN. And I make no implication, general, because I have great admiration for the air traffic control personnel, too, but they are part of this scheme, and in some instances have greater control over the circumstances than the individual pilots might have.

Mr. ALLEN. I think, sir, that I would respond to that by saying that we go where the investigation leads us. If, during the course of an investigation, we find evidence that this factor might be involved, we would pursue it.

Mr. BROWN. Let me ask you one other question related to a question asked earlier, and that is on the matter of alcohol. In the case of the Hendersonville or Asheville crash, how are you going to find out if alcohol was a factor? Does this——

Mr. ALLEN. Are you relating this to crew members, sir?

Mr. BROWN. I am relating it to anybody who might be involved in the significant safety aspects of this accident.

Mr. ALLEN. The only time that we conduct tests for alcohol is in the case of a deceased pilot, crew member, and we do not obtain blood samples from people who survived an accident.

Mr. BROWN. Is there any way that in the policing of FAA regulations, that such factors are checked on a regular or intermittent or spot-check basis?

Mr. ALLEN. I am not sure I understand your question.

Mr. BROWN. Such factors as the health factor, possibility of flying while under the influence, and so forth? Are there regulations which prohibit this?

Mr. ALLEN. Well, the regulation, I think, as Mr. Thomas pointed out earlier, is prohibition against flying under the influence.

Mr. BROWN. That is right. Now, how does anyone know whether there are any pilots in the air at the moment flying under the influence, unless they have a crash?

Mr. ALLEN. I don't think that you would know, sir.

Mr. BROWN. There is no way of policing this problem?

Mr. ALLEN. Policing of that particular type of regulation would be a tremendous task.

Mr. BROWN. The health factor?

Mr. ALLEN. Their health factor, too; yes, sir.

Mr. BROWN. That is a precheck or a postcheck. In other words, that is the pilot's certification program in commercial airlines, but not in the noncommercial, or the general aviation.

Mr. ALLEN. Well, if I understand your question correctly, sir, we have had accidents in the past where pilots have successfully concealed medical deficiencies during the course of their periodic medical examination, and as I understand it, they are as such, that these deficiencies can't be detected, and unless the pilot reveals it, you would have no way of knowing, and the pilot will continue to fly with that deficiency, until something happens to him.

Mr. BROWN. Well, I would like to return to General McKee with that same question, but before I leave Mr. Allen, I would like to ask structural factors. Is there a way we can build airplanes safer?

For instance, when a small plane hits one of these jets that is carrying, however many people we are going to have in the maximum size jet, is there any way we can build that big plane so that it will not explode in the air, or will not completely consume itself in flames, when it crashes?

Mr. ALLEN. Mr. Brown, you have posed a very difficult question. I suppose you could say that you could build an airplane like an anvil and it wouldn't disintegrate, but then I doubt very seriously that it would get off the ground.

Mr. BROWN. Well, I don't want to build one like an anvil, but I would like one that isn't going to be an incinerator when it lands.

Mr. ALLEN. I misunderstood your question. I thought that you had reference to midair collisions rather than emergency evacuations.

Mr. BROWN. I do have reference to midair collisions, to this extent: If a small plane brushes a big plane, I would hope that perhaps the skin of that plane might be such that the small plane might not make it, but that the big one would, but I am talking about such accidents as we have had in the aircraft, or the airlines in recent years, where

perhaps the plane burns faster, or to a greater extent than it might, if we made some structural changes in it.

Mr. ALLEN. Sir, I don't know how you could increase the structural integrity of the present-day aircraft that would withstand the mass of a Cessna 310, for example. I just don't believe that it is within the state of the art, when you consider that if the small aircraft brushed the control surfaces of the large aircraft, chances are that the large aircraft would then lose its control ability, and then it is rather academic whether it crashes as a result of fuselage bursting or because it is out of control and crashes into the ground.

I just don't believe it is within the state of the art to do that.

Mr. BROWN. Now we have had some accidents where planes lost an engine, and so forth, and a rather phenomenal job done by the pilot, bringing the plane into a safe landing.

My question is, is there any way, any case like that where the likelihood of the plane bursting into flames and consuming all the passengers can be reduced by any structural changes?

I only mentioned this because you mentioned structures in the investigation.

Mr. ALLEN. Yes, sir. Well, I think that the primary task of the structures group in this particular accident is to determine whether or not there was a malfunction within the control system, or systems that would have prevented the aircraft from taking evasive maneuvers.

Mr. BROWN. Well, I am not sure you have answered my question on that, as to whether they can build planes safer, just as we are trying to build automobiles safer.

General McKee, I would like to get a comment from you on this question of policing airplane crews, both commercial and general aviation crews.

General MCKEE. Well, first I would like to address the one, the importance of the aircraft controller and the very important role that he plays in the whole scheme of safety, and they have, all our aircraft controllers, have a yearly physical.

We have also given them, as you have read, psychological tests, for which we, I might add, have been very severely criticized, on the grounds of invasion of privacy.

I don't see any invasion of privacy in the examination, but nevertheless, we have been subjected to very severe criticism in this area, but we are very concerned about the health and the mental attitude and the mental well-being of our controllers, because of the great importance they have in the whole aircraft system. And unless directed otherwise by higher authority, I don't propose to change the present health program for the aircraft controllers.

With respect to the airline pilot, as you know, they have to have rigid physical examinations, and have to meet very high standards. We also have a very extensive program of certificating general aviation pilots, and they have to pass a medical examination.

Now, when you get into the subject of alcohol, which is a problem, I just don't know how to police it. We do have occasional reports from people that this rule has been violated, and upon getting reports, we immediately make an investigation, but it is a very hard thing to control.

Mr. BROWN. Some effort was apparently made to police the two Navy planes, to find out about the two Navy planes, but there is no spot check done of general aviation.

General MCKEE. You mean, when we have an accident?

Mr. BROWN. No; under normal conditions, routine procedures, occasional spot check of either.

General MCKEE. Go up to, say, Mr. Brown flying a private airplane from Dayton, Ohio, to Washington, and what do you think would happen if I sent an aviation inspector out to find out if Mr. Brown had been drinking before flying his airplane?

Mr. BROWN. You do on an airline pilot, don't you?

General MCKEE. No, we don't.

Mr. BROWN. I thought you had FAA inspectors occasionally ride planes?

General MCKEE. Yes, occasionally ride planes; but we don't go up and give them an alcohol test.

The CHAIRMAN. Gentlemen, this completes this phase of the hearings.

General McKee and Mr. Thomas, I believe that you have served the requirements of this committee well, and of the Congress, and the general public. I think that every once in a while, that we need to have the agencies up here. It happens that there was a crash in North Carolina and this brought you on a little more quickly, probably, but you know, we as Members of Congress have to go back and give an accounting to our constituents.

I think it has served well, and I want to thank you for your patience in answering the questions. I, for one, want to say that in my mind, there is no question about your devotion to duty, and that of all your employees, regardless of any article that has come out, I have been associated with many FAA employees, and I have found them always to be very cooperative, and very busy, and I sometimes wonder how they do their jobs.

An ordinary individual couldn't do a lot of them, I know, and I don't see how they get to sleep at nighttime, sometimes, when they get home, with all the activity they have to do in a day's tasks.

Chairman O'Connell and Mr. Allen, I want to thank you for your important contribution to the hearing. I think you have helped set the record straight on what has happened, and is happening, and the procedures that you go through.

Also, to the other members of National Transportation Safety Board: You have a great challenge before you now, you and your staff, and this committee and I, as chairman, wish you well in your job.

I again go back to the article. I say to General McKee that you have served this Nation well in war and in peace, and I think that you are doing your very best to serve in your capacity, and I know of no better man better qualified to do the job, so we are happy to have had all of you with us.

This does not end our complete inquiry into this. I am hoping that sometime in the future we will have other segments of the aviation world either before this full committee or a subcommittee, to give us further feelings in the matter, but I think that you have done an excellent job. It has been 5 hours and 5 minutes now that you have testified, and I think that is quite a bit, so I, for one, and on behalf

of the committee want to thank all of you, and say that I think you have done an excellent job.

General McKee. Thank you.

Mr. O'Connell. Thank you very much, sir.

The Chairman. That ends this phase of the hearings. Tomorrow morning, this committee will begin executive sessions on other business.

Mr. Brown. Mr. Chairman, will we have a chance to resume with other witnesses at a later date on this subject?

The Chairman. I will talk to you about that.

The committee will stand adjourned at this point.

(Whereupon, at 4:35 p.m. the committee adjourned.)

AVIATION SAFETY

MONDAY, AUGUST 28, 1967

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON TRANSPORTATION AND AERONAUTICS,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in room 2123, Rayburn House Office Building, Hon. Samuel N. Friedel (chairman of the subcommittee) presiding.

Mr. FRIEDEL. The subcommittee will be in order. Today the Subcommittee on Transportation and Aeronautics of the Committee on Interstate and Foreign Commerce resumes hearings on aviation safety. These hearings commenced earlier in the session by Chairman Staggers, before the full committee.

From the list of organizations and persons who have indicated their interest in these hearings, it is apparent that there is a great deal of concern and effort in the pursuit of maximum aviation safety. The unachievable goal is a 100-percent assurance of safety in flight. The closest realization of that goal is the desire of each one of us who has an interest and responsibility in aviation.

We have earlier heard from the Administrator of the Federal Aviation Administration, Gen. William F. McKee; his deputy; and other experts in the FAA. We have also received testimony from Chairman Joseph J. O'Connell, Jr., of the National Transportation Safety Board and the Director of the Board's Bureau of Aviation Safety.

The National Transportation Safety Board and the Federal Aviation Administration are the two Federal agencies primarily responsible for aviation safety. Safety is their duty every day. It is the function of the Committee on Interstate and Foreign Commerce, and this subcommittee, to consider proposed legislation in the field of aviation safety. It is also our function to make certain that the Federal Aviation Administration and the National Transportation Safety Board are carrying out their present legislative duties in complete accordance with their mandate under the Federal Aviation Act and the regulations issued pursuant to that act.

It is apparent that the numerous organizations with interests in aviation safety can lead to some duplication and controversy. Just from the witness list that we have for Monday and Tuesday of this week, it is obvious that there are many separate interests in aviation which have given rise to associations and organizations to foster sometimes conflicting programs. But, I believe that all of these and the numerous other ones would do well to coordinate their safety efforts.

An increased communication between industry and private organizations and the Federal agencies should be encouraged. An example

of this came out when changes in flight training procedures were effected, by the prompt cooperation of the air carriers, the airline pilots, and the FAA as a direct result of the earlier hearings held by this committee. As we proceed, I would like all of the responsible parties to consider furthering their efforts to attain a higher degree of safety through cooperative efforts rather than through any single-minded approach to the problem.

The organizations which will appear as we carry these proceedings forward should cover the entire spectrum of aviation interests in safety. I would hope and expect that individuals who have similar interests would communicate their interests through responsible representative organizations. I will have to guard against undue repetition in order to complete the record in a reasonble time period.

Our first witness this morning will be Mr. Charles Ruby, president, Air Line Pilots Association.

Mr. Ruby, I see that you have a lengthy statement and some charts. If you wish, you may summarize it, and your full statement will be included in the record.

STATEMENTS OF CHARLES RUBY, PRESIDENT, AIR LINE PILOTS ASSOCIATION; TED LINNERT, DIRECTOR, ENGINEERING AND SAFETY DEPARTMENT; AND IRIS PETERSON, VICE PRESIDENT, STEWARD AND STEWARDESS DIVISION

Mr. RUBY. Thank you, Mr. Chairman and committee members.

Mr. FRIEDEL. Will you introduce those with you at the witness table?

Mr. RUBY. Yes. On my left is Ted Linnert, director of ALPA Engineering and Safety Department, and on my right is Miss Iris Peterson of the Air Line Pilots Association, Steward and Stewardess Division and also region 1 vice president.

Also we have a sizable contingent of working pilots present in the room. If anyone has any questions that he would like to ask of those who are flying these airplanes today, I think we have a complete cross section, those of us who are staff: Mr. Linnert and Miss Peterson, and myself and a group of working pilots. Miss Peterson is a working stewardess.

I also would like to apologize for not having delivered this material some 3 or 4 days in advance. Unfortunately, with the short notice we only completed the printing on Saturday.

On the front page there are eight items listed. Rather than read this entire report, which is some 14 pages, I will attempt to highlight what amounts to an index of the eight items, and then we will be glad to answer any questions that we are capable of answering, if anyone has such questions.

I would also like to further state that the Air Line Pilots Association has no quarrel with any other segment of the industry. We do, from time to time, have differing viewpoints on how we get an accomplishment on a particular subject.

A pressing problem that faces us today is the airport, and we have had the problem developing for many years. The question now arises, How can we finance the construction or the modification of both new and present airports? The best estimate from people who are knowl-

edgeable on this subject is that it will take better than $2 billion to update the airports that are needed to handle the traffic volume that is involved today. We, of course, do not believe that it will be possible to obtain $2 billion plus from any one source. We do not pretend that we are experts on financing, but we do know from actual experience that it is going to be necessary to update these airports and, in some cases, build new ones.

The delays that are developing in major terminals today are almost unbelievable, unless you actually experience them. I had one pilot tell me this morning that a couple of days ago he sat on the ground approximately 2 hours and 40 minutes at Kennedy to fly to Chicago. Well, the ground time at Kennedy exceeded the flying time between Kennedy and Chicago.

Why has this come about? On page 3 of our summary you will find the listing of examples of rail, bus, and air schedules and costs. And this is, in my judgment, self-evident as to why the number of people who are traveling by air today are doing just that. For example, Chicago-Miami by train is 31 hours; by bus, it is 35 hours; and by air, it is 2½ hours. From Washington to Los Angeles, by train is 53½ hours' train time plus 6 hours' connection at Chicago; and New York-San Francisco is 62½ hours plus 6 hours' connection time in Chicago.

I remember several years ago Robert R. Young put an advertisement in a newspaper and said: "A hog can travel on the same freight car from New York to Los Angeles without changing trains, why cannot a passenger do this?" This has been the situation for years, and still is today.

By bus, we are talking about approximately 75 hours, both in the case of Washington to Los Angeles and New York to San Francisco; and the fares range from $42.90 on the bus between Chicago and Miami to a maximum of $88.35 from New York to San Francisco. These are all coach fares.

By air from Washington to Los Angeles is 4 hours 48 minutes; New York to San Francisco is 5 hours, 37 minutes. There are only two ways most people go any more. Because of the reduction in total train services and the reduced utilization by people for long-haul bus transportation, you either drive your own automobile, or you fly. Obviously this is creating a traffic crisis the likes of which we have not seen the ultimate yet, because the stretched DC–8 than can accommodate up to 250 passengers, and the 747 that can accommodate up to 480, are going to create a great problem in our terminal building space alone. This is something that we must see to believe. We have to prepare for this. This is just one element of the problem.

Now the air traffic control situation, which is item 2 indicated on page 1, is another link in this chain that is of no small consideration; because, in the past, we have merely increased the number of personnel who are operating in the air traffic control system. There has been considerable research and development done in an attempt to somewhat mechanize this process. It is not installed yet. For example, the alphanumerics arrangement, we feel that in real high-density traffic the blips on the scope with associated numbers and identifiers are going to overlap each other to the point where they will obliterate information that should be forthcoming.

We are not opposed to advancement. All we are saying is that with the apparent increase in total aviation traffic, we must come up with a better mousetrap. It is going to take time to do it. The total flow requirements far exceed our capacity now in the high-density areas. It will get worse, gentlemen, before it gets better.

Now we have also got an overlapping situation in terms of collision avoidance equipment as opposed to the air traffic control system. We and no one else that I know of advocate that the collision-avoidance system will displace the air traffic control system. Collision avoidance would simply be a supplement to the air traffic control system. So we cannot under any circumstances consider that we can rest on our oars with the present air traffic control system and depend on a collision-avoidance device to make up for the deficiencies.

Now the collision-avoidance system, which is item 3 on the index on page 1, the present estimates are that this system after it is developed and is proven safe will cost approximately $30,000 to $50,000 per aircraft. Now the airlines and some of the business aviation can probably afford this cost. This dissertation is found on page 7. However, to make this system really do the job that it must do, we must talk about all aircraft being so equipment—military, general aviation, and commercial airlines.

It goes without saying that general aviation cannot afford a device that costs $30,000 to $50,000. A man could buy two or three airplanes for that kind of money. So, we must provide some means of developing a collision avoidance system that is either from a cost standpoint acceptable to general aviation or provide some means of a lease for the equipment per flight-hour on an as-needed basis. I do not profess to state which is the more likely or possible solution to the problem, but I am saying that you cannot have a portion of the aircraft equipped with collision avoidance system and have full effectiveness from the standpoint of its total utilization and maximum results in terms of safety. We must exert enough effort to develop this system to have it work. This is one of our big problems today. There is no question about it. I think every pilot sitting in this room can verify this, probably with experience of his own and in many cases of rather recent origin.

Also on page 7, referring to the transport aircraft crew requirements, we have made a presentation to the Federal Aviation Administration on this subject. We have delivered a copy of a book with a blue cover.

(The publication referred to, "The Need for a Three-Man Crew on Jet Transports," has been placed in the committee files.)

Mr. RUBY. We have delivered copies to the Air Transport Association and the Aircraft Industry Association; we are making no secret of our viewpoints. We do not contend that a three-man crew can eliminate all accidents, midair collisions. We are making no such contention. We are, however, stating that we do believe that a three-man crew is an essential element to help minimize this exposure. Why is this so? As we get into high-speed airplanes that operate short distances, the major portion of the operating life of this airplane will be consumed in takeoff, climb, descent, and landing. We do not have a displacement yet for the see-and-be-seen principle, even though that

is a poor crutch. Somebody has got to be looking outside when the weather is such that you can see other airplanes. With a two-man crew, you simply cannot attend to the inside of the airplane including the checklist items and look out at the same time.

We are not stating that positive control is a possibility at this time, because in our judgment the air traffic control system simply could not take on this total requirement because they simply don't have the capacity. So, you are going to have to depend on the see-and-be-seen principle for some time to come. This is only one link of the total chain. We fully expect other segments of the industry to disagree with us, either in whole or in part, but we are prepared to stand up and be counted with respect to the problem.

Now on page 8 you will find a heading entitled, "Communication Facilities and Equipment." This also ties in very directly with the air traffic control requirements in this particular aspect. At the busy terminal today the utilization of time on the communications frequencies are such that you simply cannot handle the communications requirements for the total number of airplanes that are trying to use them and complete the communication. For example, many clearances will be issued and the receiving pilot will not be able to repeat back the clearance to assure the traffic controller that the proper airplane has received the clearance and, if he has, that he has received it correctly.

What we are stating is that there must be a considerable reduction in voice communications. This will require some additional research and development to reduce the voice communications, and it will require the implementation of facilities and equipment that will provide certain information to the ground controller and to the pilot in the air that does not require voice communication on the radio.

Now the evolution of this industry started back in the days when the radio communication was handled by Morse code. You can readily understand that if today we were trying to handle communications with Morse code we couldn't handle one-tenth, probably not even one-hundredth of the traffic that we do with voice communications today. What I am now saying is that the voice communications have reached the saturation point in the high-density areas, so we must develop a system to impart certain information that does not require voice communications. We simply must do this, if we are going to accommodate the traffic demand that exists today.

On page 9, the heading entitled "Weather Minimums," you will find a position taken by the membership of this association with respect to the reduction in operating minimums. They have taken a stand that they do not wish to go to 100-foot decision height and 1,200-foot runway visual range at this time. They take the strong position that we should stay with the 150-foot decision height and the 1,600-foot runway visual range until we have acquired enough experience and competence at that set of minimums to then consider going lower.

Now why is this a situation that takes considerable time? Gentlemen, the answer is really quite simple. Up to this point we do not have simulation that accurately simulates these restrictions in visibility. I think this is coming, but it is not here as of this instant. Secondly, the actual experience is quite limited, because there are very few times that any sizable number of crews can actually operate the airplane with this

kind of ceiling and visibility limitation. So the total amount of practice that the crew gets is quite limited. We must be sure that we are going to do the job accurately and safely before we go even lower.

That is the substance of that commentary.

Now on page 10 you will find a statement that involves pilot training. I am sure that this committee is aware that as the result of a meeting that developed between the Air Transport Association, the Pilots Association, and the FAA, a system has been worked out which is on a trial basis for the time being, and in our judgment that was one of the most constructive things that has been accomplished. It was done on an industry basis. The record indicates so far that what has been done is a proper path. In my judgment, we should continue this kind of effort within the industry and, in all probability, if we can continue this type of program we will solve a lot of problems before they happen rather than waiting until after they happen. Gentlemen, we are interested in a solution before rather than after the accident. This is one of the most important steps that this whole industry can make today.

Now the record so far, and admittedly it is of relatively short duration, indicates that the revised training methods that are in use, wherein the training and the type ratings that are involved with half of the powerplants out on one side, has proven extremely successful without exposing either the aircraft, the crew aboard, or people on the ground. This is the substance of what I am saying, that in this case an ounce of prevention really amounts to a billion dollars of cure before we ever have the disease in the first place. So what we need is to do more of this on a cooperative basis. I think we are then beginning to get the show on the road.

Now to cap this thing off, we recognize that the Congress cannot take into consideration every specific detail; but you do have the requirement to have some basic background of the problems, what the possible solutions are and, probably of greater importance, how much does it cost to get these solutions in terms of accomplishment.

If you turn to page 12 under the title "The Systems Approach," this is really what we are leading to. In the past this industry, like many others, has simply grown like Topsy. This means that there has been a considerable lack of coordination and cooperation, not only between various segments of the industry, but also the Government agencies and, to a degree, the Congress.

To give you an example of a case in point, when we start talking about airports, if they are not geographically spaced with some logic you can sink a mint of money in the construction or the modification of an airport, and its proximity to another airport in fact makes that expenditure a complete nullity; because the inefficency that exists between the two airports and the accident exposure rate becomes ridiculously high.

To cite one airport as one example, Floyd Bennett Field in New York and Kennedy are so close together geographically that they are incompatible from a local traffic standpoint alone, to say nothing of the air traffic control situation. Someday, somehow we have got

to become federalists rather than States righters in terms of the aviation business. Now if you drive an automobile today cross-country you probably violate a hundred laws a day. Why? Because every hamlet, county, city, State has some variation in its traffic rules. We simply cannot permit this to develop in the aviation business because, unless we have one total system to operate under, one set of rules and one entire philosophy, all we are doing is building complete chaos; and we are also going to develop a built-in accident system the likes of which no one will be able to overcome.

Now I have talked to some of the people who operate in Western Europe and the individual countries there are spaced geographically as close or closer than many of our States, and the conglomerate rules that apply in Europe are one of the greatest headaches. They have finally come up with a device called "Eurocontrol," which is a common air traffic control system which is going to be implemented, that will cover the Western European countries.

The problem really is this: With the jet transport or jet fighter you can cross some of these countries in less than 2 minutes, others in 5 to 10 minutes. It is obvious you cannot have a different set of rules for an operation of this kind, or a different air traffic control system.

What I am saying, gentlemen, is that we must have standardization and the same rules apply all over. If we do not, we are missing the entire boat. Now this will take a pretty bold approach; but if we are unwilling to take the bull by the horns, all we have done is perpetuated a bad situation which will become worse. So, let us develop a system that applies to everything from an airport on up.

We no doubt are going to have to depend on the individual cities to handle their ground transportation problems. That is a little difficult for the Federal Government to get into, but you will find a copy of a map (see p. 165) right behind the page numbered 13 entitled "Conclusions," which shows the Interstate Highway System which is a 90-percent Federal and 10-percent local government. Gentlemen, this is something that we are for and for 100 percent. If this had not been started 10 years ago and the accomplishment as it is today, we would have chaos on the ground much worse than we have now.

What we are really saying is, that the airport system is going to have to get into the same bailiwick but more so. The Interstate Highway System is a shining example of what you are going to have to do for a system for aviation, and if we do not do it this way we are destined for more trouble than we can solve.

Essentially that covers the high spots of the conclusion portion. We could spend a week on this subject. I do not expect to take your time or the other's here in going into greater detail, but we will be pleased to answer any questions that we possibly can.

We have included two previous appearances that deal with this same general subject, and they are attached, so that your reference material will be readily available to you and you won't have to hunt it up.

(The material referred to has been placed in committee files.)

(Mr. Ruby's prepared statement, with attachments, follows:)

STATEMENT OF CHARLES H. RUBY, PRESIDENT, AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

The Air Line Pilots Association is grateful for the opportunity to appear before you to express our views on matters involving air safety which we strongly feel must be considered if all areas of flight safety are to be improved.

We believe ALPA's interest in air safety is well known. It has existed since our organization was first formed which is somewhere in excess of 36 years ago.

To coordinate the air line pilots' activities to increase air safety, the Association employs a professional staff in its Engineering and Air Safety Department. We believe "ALPA's Organization for Safety" is well-known on the Congressional level and, in order to save time, therefore, will not go into further detail, although additional information can be readily supplied if it is desired.

In the past, we have appeared numerous times before various Congressional Committees on essentially the same subject matter. The statement we are presenting today is essentially an updating of our previously expressed views and covers the following subject matter:

1. The Airport.
2. Air Traffic Control.
3. Collision Avoidance Systems.
4. Transport Aircraft Crew Requirements.
5. Communications Facilities and Equipment.
6. Weather Minimums.
7. Pilot Training.
8. The Systems Approach.

THE AIRPORT

The Nation's airports have not kept pace with the public demand for air transportation, be it private or corporate flying, or commercial public carriage. It has been estimated that approximately $2 billion would be required to enable this important link in the chain to just adequately meet present requirement and current demands.

Obviously this sum of money cannot all come from the United States Treasury nor can it come entirely from private sources or local governments. To further substantiate our comments on the need for airport improvement, there is attached a copy of our statement to the Senate Aviation Sub-Committee on May 3, 1966. We are convinced of the continued validity of that testimony.

(The material referred to has been placed in committee files.)

The funding for the airport and its related facilities in all probability will have to come from a number of combined sources, but it is essential that an adequate system for this funding must be found very promptly if we are to avoid complete chaos. Positive action was required to realize the U.S. highway and road building program. Ninety percent of this program is funded by the Federal Government as approved by Congress. As attached map (attachment A) illustrates the extent and importance of our highway system which at times required ruthless action for successful implementation. A similar approach is needed if an adequate safety updating of the airport system is to be realized.

The airports of this nation must have runways that will accommodate the largest and heaviest type of aircraft that will be using the facility in both fair weather and foul within the foreseeable future. This means adequate weight-bearing strength of the runway surface itself, adequate length with compacted underrun and overrun area that will extend beyond the runway ends for a distance of at least a thousand feet. It also means that instrument landing systems, including appropriate approach lighting, must be provided. In addition, there must also be suitable terminal facilities to accommodate passengers as well as cargo and mail. And last but not least, there must also be ground transportation capable of handling the traffic to and from the airport to one or more city centers and their environs.

This is all urgently necessary because of the increasing reliance being placed on air transportation as the primary means of moving people and things from place to place. Long-haul passenger trains are diminishing at a rapid rate and the demand for medium to long-haul bus service is not what is once was. This leaves essentially two methods of passenger transport: personal automobiles or airplanes, with the time element creating a public preference for flying. The fol-

lowing is a representative comparison between train, bus and air travel times and costs:

TRAIN

	1-way fare (coach)	Approximate time
Chicago-Miami	$48.32	31 hours.
Washington, D.C.-Los Angeles	108.14	53½ hours plus 6 hours connecting time=59½ hours.
New York-San Francisco	114.55	62½ hours plus 6 hours connecting time=68½ hours.

BUS

	1-way fare	Approximate time
Chicago-Miami	$42.90	35 hours.
Washington, D.C.-Los Angeles	84.65	73 hours.
New York-San Francisco	88.35	73 hours.

AIR

	1-way (jet coach)	Approximate time
Chicago-Miami	$78.44	2½ hours.
Washington, D.C.-Los Angeles	144.11	4 hours 48 minutes.
New York-San Francisco	152.36	5 hours 37 minutes.

International surface transportation has lost its attraction for passengers who are turning to flying as witness the fact that the Cunard Line is removing the Queen Mary and Queen Elizabeth from passenger service by the end of this year.

Air freight likewise faces a rapid growth because many items that in times past were normally warehoused are now shipped by air with overnight delivery in many cases. As the aircraft manufacturers develop aircraft that are more attractive from a ton mile cost standpoint, the growth of air freight can be expected to multiply at a rapidly increasing rate.

This all boils down to the fact that an explosive growth in air transportation is not something that is still on the horizon, but is something that we must recognize as being with us now. If this nation is to continue its progress, we must gear our services to the demand which is already an accepted fact.

AIR TRAFFIC CONTROL

Air traffic control is the second aspect in this over-all requirement for expansion of services if any acceptable semblance of air safety is to be maintained.

The noise abatement procedures are still with us around certain airports and contribute materially to the problems of air traffic control. Only recently have the Federal Aviation Administration, the Air Transport Association and the Air Line Pilots Association reached tentative agreement on a standardized noise abatement take-off procedure calculated to produce the least possible amount of objectionable noise to communities on the ground. It will, however, probably create some problems in the air traffic control system in terms of routing flexibilities and the efficient utilization of limited airspace.

Present requirements for 5,000 feet minimum separation between parallel runways where simultaneous instrument approaches and landings are occurring create certain restrictions from an air traffic control standpoint, but this too is the best that can be done at the present time. This all means that the location of airports must be geographically compatible with airspace limitations and navigational facilities for aircraft using that specific airport as well as those over flying it.

Much research and development has been done but much more will be required if we are to attain an efficient and safer air traffic control system.

With the advent of total radar coverage, the enroute portion of the air traffic control system has shown some improvement over the past few years. However, in many areas of the country this system is now reaching its peak load capacity

and, if the forecast of aircraft utilization is anywhere near accurate, will soon be in a saturated condition. The most critical areas of the enroute functions now appear to be in the hand-off from one facility to another. Although many others will disagree, we do not believe that the addition of the alpha numerics and altitude reporting beacon can provide as much relief as is necessary by the time it is implemented. These systems to give a perhaps overly simplified explanation of the reasons for this belief, produce on the controller's radar scope light, small block numbers and signals which identify the aircraft radar target. At the root of the problem is the fact that radar scopes are actually cathode ray tubes very similar to your television screens with the aircraft target being a source of light as is the alpha numerics grouping. In high-density areas, these sources of light tend to conflict with one another and may, in fact, obliterate necessary intelligence.

There is little doubt that in the future the demand for air service by the citizens of the country will, in and of itself, create pressure for some reduction in separation between aircraft being flown under instrument flight rules. In fact, such pressures have already been created but the air line pilots have successfully resisted efforts by some segments of the industry to reduce separation until adequate safety devices are available. One example of this was the effort to reduce lateral separation over the North Atlantic last year. Another example is the current effort to reduce separation between aircraft approaching parallel runways during low visibility conditions in the same airport. The speed of today's aircraft, to say nothing of the future supersonics, is such that it just isn't possible to make significant reductions in IFR radar separation and still be able to avoid collisions should something untoward occur. This is due to the physical aspects of the current radar program under which a controller on the ground must first observe some deviation, then evaluate it and transmit information to the pilot of the aircraft who in turn must evaluate it and take appropriate action. When we are operating airplanes a mile or so apart at 150 knots, there simply is not time for two independent minds to assimilate information and take appropriate action. The Air Line Pilots Association has, therefore, concluded that we must have an electronic or other automatic device which is able to perform the function of extending the pilot's normal vision to a point where an aircraft on a potential collision course can be noted in time to execute an avoiding maneuver. The device must provide warning sufficiently in advance to avoid injuring passengers through abrupt maneuvers or entering the vortices wake of the other aircraft.

In addition to the preceding, the Association has long recommended increasing the safety and efficiency of air traffic control by more installations and commissioning of facilities such as: (a) ILS's, (b) control zones, (c) control towers, (d) other approach facilities.

The foregoing are broad areas each of which could be gone into in considerable detail. No research is required to gain the safety provided by the preceding items, but additional funds are vitally needed to expedite action for installing them.

We do not feel that we can stress too strongly that with the increased use of the common airspace by transport and military aircraft, as well as all types of general aviation aircraft, it is clear that air traffic control problems and the collision threat are on the increase.

Again, funding to make immediate use of all *known* ways and means to improve air traffic control will help, but funding for research and development is also required to complete the job of providing safe air traffic control.

The foregoing draws only a broad general picture of the over-all air traffic control problem. We have not attempted to set forth specifically detailed solutions to all aspects of it for the simple reason that no one knows all of the answers necessary to provide the solutions. Advancements must come necessarily through evolutionary rather than revolutionary processes.

COLLISION AVOIDANCE

The industry has spent considerable time, money and effort to try to develop a collision avoidance system. It appears that such a system can bear fruit in the foreseeable future (approximately three to five years) for those who fly and can afford equipment costs that are estimated to range from $30,000 to $50,000 per aircraft. Obviously, such a system is beyond the reach of the general aviation segment of the industry with the possible exception of some corporate users of the airspace. Much more development is required—first, to prove the system and second, to develop a system that will meet the economic level for general aviation. It may be possible, once a collision avoidance system is developed and proved satisfactory to wire all aircraft to utilize the system and then rent the

"black boxes" to general aviation at so much per flight hour on an "as needed" basis.

It goes without saying that a collision avoidance system must be available and in use for all aircraft if we are to really accomplish the ultimate in air safety. Such a system though must be considered as supplementary to an efficient and competent air traffic control system and not a replacement for it.

TRANSPORT AIRCRAFT CREW REQUIREMENT

The Air Line Pilots Association at its November, 1966 Board of Directors Meeting adopted a resolution which in the main stipulated that a minimum of three flight crew members are needed for flying twin-engine jet airline aircraft in order to assure safe operation. One of the greatest areas of safety concern is the workload *within* the flight compartment distracting the pilot and preventing him from scanning the skies through the windshield to minimize the possibility of mid-air collision.

In its evaluation of flight crew workload the Association has pointed out that the new twin-engine jet airplanes have essentially the same number of flight controls, instruments, systems, switches, etc. as the three and four-engine jets which have a minimum crew of three pilots. Furthermore, these twin-engine jets have approximately the same cruising speed and maneuvering speed. Believing the Committee will benefit from ALPA research which resulted in the Board of Directors' resolution on the minimum flight crew complement, a copy is submitted as attachment B for ready reference.

Another concern relating to flying twin-engine jets with only two pilots is incapacitation of a pilot due to a number of known causes not necessarily either fatal or of long duration, none of which can be forecast by the medical profession. In the event of incapacitation of one of the two pilots on a twin-engine jet, the remaining pilot *may not* be able to safely operate the aircraft, particularly when pilot incapacitation may occur *undetected* close to the ground during a take-off or landing. How to prevent a human being from becoming suddenly incapacitated is something which is not known and which is not likely to ever be. Proper crew complement requirements, flight compartment design and operational procedures, can in combination minimize or eliminate this hazard.

Flying as a mode of public transportation which operates in the third dimension and at high speed requires "fail safe" human and mechanical redundancy to provide for an acceptable level of public safety, both in the air and while the airplane is in motion on the ground.

On June 29, 1967, and August 8, 1967, the Association made a presentation to the Federal Aviation Administration on this subject. This presentation, in book form, is supplied and considered a part of this statement. We think you will find this to be of more than passing interest.

(The publication referred to, "The Need for a Three Man Crew on Jet Transports," has been placed in committee file.)

COMMUNICATIONS FACILITIES AND EQUIPMENT

With the rapid expansion in flying, voice communications have overloaded the available frequencies to the point where it is practically impossible to assure timely communications requirements being accomplished between the pilot and the air traffic controller. The foregoing, it should be pointed out, is not true in low density operational areas but is a glaring fact in high density areas. It is essential that considerable research and development be instituted immediately to provide other means of displaying information, both in the cockpit and on the ground, which will reduce demands for voice communications and operational control can be maintained on a safe level by direct reading information air-to-ground as well as ground-to-air. This would leave the voice communications channels open for the operational areas that require clearance modifications or changes associated with traffic conflicts, changes in altitudes, weather detouring and for those occasions when radar vectoring may become a necessity. As I pointed out in respect to some of the previous subjects, the foregoing does not represent the entire scope of the subject but does point out some examples.

Taking this industry back to the day when Morse Code was used as the communications medium, imagine, if you will what would have been the state of things if it hadn't been replaced by voice communications. If we were still obliged to conduct our communications by Morse Code, we could not accommodate one-tenth of the traffic that is now being handled. Relatively speaking, we're about at the stage we were when Morse Code became automoded only now it is voice communications which are becoming too laborious and slow. It is, therefore, obvious that imagination, associated with serious research and development, must be used immediately.

WEATHER MINIMUMS

ALPA representatives and All-Weather Flying Committee have worked diligently over the years with industry to help establish safe procedures for establishing lower minimums.

We strongly recommend that approving operations to the lowest Category II minimums be delayed until the interim CAT II minimums of 150' ceiling 1600 RVR have been in effect for an extended period of time to gain service experience. The present FAA minimum required period of six months is considered totally inadequate. A more realistic requirement would be approximately two years—or more. In this way public safety would be served. At its Fourteenth Air Safety Forum ALPA safety representatives adopted this resolution:

Whereas several air carriers have been approved for operations as low as a decision height of 150 feet and an RVR 1600 feet for over a year; and

Whereas the number of actual approaches at these minima have been very few, and little practical exposure and operational experience has been gained in this low visibility environment; and

Whereas these carriers contemplate further reduction of these minima as low as a decision height of 100 feet and RVR 1200 feet; and

Whereas, in addition to flight operation problems, there exist many serious unsolved problems, such as ATC, training, communications, simulation, human factors, etc., Therefore, be it

Resolved, That it is the consensus of the delegates to the Fourteenth ALPA Air Safety Forum, that landing operations with less than a decision height of 150 feet and an RVR of 1600 feet would be premature at this time; therefore be it further

Resolved, That the delegates to this Forum strongly recommend that no ALPA member shall conduct any approach to minima lower than a decision height of 150' and an RVR at 1600 feet, at this time.

There are extreme hazards associated with premature operations at low minimums which makes it prudent not to hurry the acceptance of lower minimums until everyone is entirely comfortable, confident, and ready to use them. This will assure progress while the use of the available improved aids at present weather minimums for an extended period of time will assure safety and schedule reliability.

Probing into the Category II area must be done with *more* safety than heretofore, not less. We must have *fewer*, not more, missed approaches in Category II weather. If equipment and aids will not provide this safety factor, we should not be conducting the approaches.

PILOT TRAINING

ALPA has long stressed the concept of "training to proficiency rather than checking for proficiency". Apparently we are not in accord on this matter with the FAA who regards recurrent assessment of an airline pilot's proficiency as being in the public interest and essential to the proper discharge of FAA's statutory responsibility. We do not disagree with this in principle, but rather in the manner it is implemented. FAA's function is to assure safety in the public interest and this can be assured by spot-checking and monitoring of the airlines' flight and ground school training programs. We contend that this is the FAA and the air carriers' responsibility by regulation.

Most professional people in a certain field of endeavor attend formal academic courses in preparation for their final examination or "check", and sucessful completion will terminate their exposure to any additional type of "checking during the remainder of their professional career. They are never *required* to again demonstrate the level of knowledge and skill which they had attained at the completion of their training. The professional pilot is unique in that he is constantly *required*, by current regulatory language, to successfully complete the equivalent of another "check" or final examination every 6 months for the

captain and 12 months for the copilot. The regulatory language should be revised in a manner which will eliminate the adverse psychological effect created by such a "check". Consideration *must* be given to the number of times an airline pilot is required to successfully complete this "check" during his career. For example, assume a pilot joints an airline at age 23 and is advanced to Captain status at age 30. If he is only qualified on *one* type of equipment he will have completed 97 "checks" during his career.

We point out that funds are greatly needed to improve other areas of aviation safety and that the public interest would best be served by so utilizing the money *now* spent on excessive and unnecessary FAA air carrier flight inspection activities. We stress this because the next ten years will indeed see great expansion in airline operations and certainly it is not necessary or in the public interest to increase FAA *flight* inspection activities commensurate with such airline industry expansion. We emphasize that the industry requires *only* that FAA provide surveillance and monitoring to assure that regulations are complied with by the airlines. This procedure is approved by FAA and is satisfactorily practiced by using FAA designees in many other critical areas of FAA responsibility for safety of airline operation, as well as airplane manufacturing and maintenance.

Our position on this matter is shared by other segments of the industry.

Another problem which must be faced is that accidents continue to occur during pilot training which shows the need for an immediate review to assure that this training is realistic, meaningful and conducted without undue exposure to hazard by occupants in the airplane or people and property on the ground.

Over the years the ALPA has participated with the industry to provide the airline pilots' contribution in regard to training requirements and to assure that the pilot can cope with normal and expected emergencies.

Some progress has been made in updating pilot training regulations recently. However, further and continuous review is in the public interest.

The state of the art of flight simulators has progressed to the point where virtually all in-flight emergencies can be practiced and demonstrated in this ground installed training aid. The maneuver to a landing with 50 percent of the airplane's engines inoperative can be safely practiced in an approved flight simulator and several airlines are proving this during the current 6-month moratorium on the two engine out asymmetrical landing maneuver on 4-engine airplanes.

THE SYSTEMS APPROACH

If you were to drive your automobile from New York to San Francisco or Chicago to Miami before the interstate highway system was developed, you could probably have broken a hundred laws a day for several days. Why? Because every Village, Hamlet, State and County had a sizable variance in their local traffic laws. Highway design was not necessarily realistic from the standpoint of accommodating low-speed, automotive traffic, much less high speed. Intersections were loaded with obstructions, the surface construction may have been extremely slick when wet, now warning signs existed in most instances, turns were sometimes flat or banked away from the turn rather than into it. It was not uncommon to come around a sharp turn obstructed by hills or buildings and immediately cross one or more railroad tracks, bridges were commonly narrower than the highway itself, and we could go on and on.

To a degree, our airports and related aviation facilites have grown like Topsy, too. This cannot be permitted to continue unless we wish to build-in accidents, inefficiency, general chaos and delay.

The entire aviation system must be just that: A SYSTEM. This runs the entire gamut of the industry, starting with the airport, followed by the navigational facilities and equipment, the air traffic control system, registration and licensing of aircraft, registration and licensing of airmen, and, above all, standardized traffic rules of the air, the latter of which, incidentally, should be international in scope by agreement with the other States of the world.

The foregoing may sound quite Utopian and it is. On the other hand, if we are unwilling to think, act, plan, construct and implement realistically, then we are, in fact, preparing for calculated chaos and not too well calculated risks from here on out.

CONCLUSION

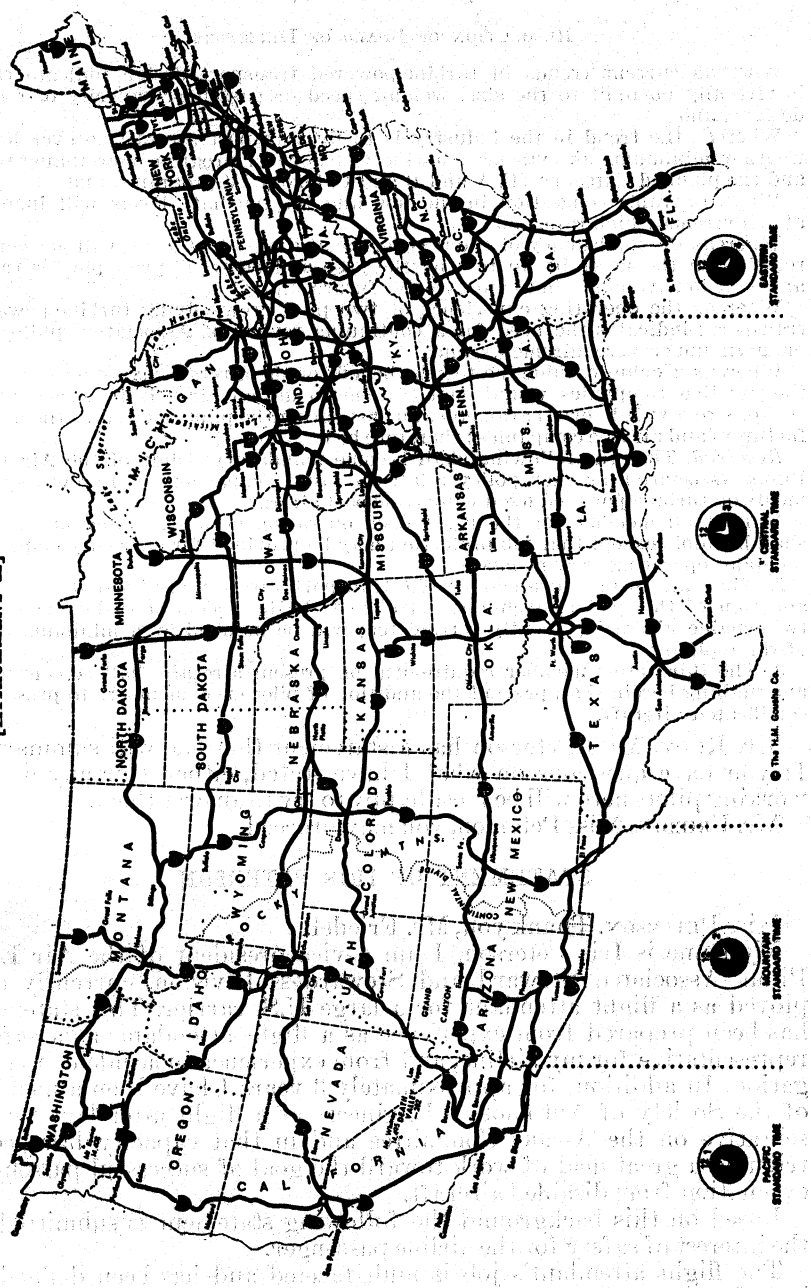
The foregoing remarks constitute a cursory evaluation of a few of the safety problems we and the industry face in an era of growth which is staggering to the imagination. There are many problems which this Association has docu-

mented for FAA and Congress over the years. Problems in airworthiness, performance, crashworthiness, rescue and fire, aeromedical, flight time/duty time, aircraft instruments, fuel explosion, fire protection and powerplants are a few that affect the overall safety of pilots and the flying public. Of all of the problems, prevention of the mid-air collision is foremost in the minds of the air line pilot as well as other pilots and the industry. Expeditious solution of this problem must not be hampered by lack of funds. At ALPHA's 1967 Air Safety Forum in Washington June 20–21, mid-air collision prevention, airport development and pilot training were featured panels. Panelists were the most knowledgeable and experienced representatives of industry and ALPHA.

ALPHA shall continue to press for improvements in all these areas. Many of them do not require research or development. The solutions are well known and can be attained at a minimum cost. Several subjects referred to in this statement fall in this category.

Air Safety is the primary responsibility of every air line pilot and is therefore a principal concern of the Air Line Pilots Association. The air line pilots by the very nature of their continuous "user" experience, provide an input of knowledge to the aviation industry which cannot be duplicated. We offer this knowledge and experience to your Committee and will be pleased to support or assist you in any manner that will accelerate implementation of the many safety programs we have strived to attain.

[ATTACHMENT A]



[ATTACHMENT B]

RESOLUTION OF BOARD OF DIRECTORS

Whereas current trends in turbine-powered transport design indicate there is virtually no limit to the size, weight, speed or passenger capacity of future designs, and

Whereas the trend in the industry is to fly transport aircraft to ever lower weather minimums as evidenced by the Category II program now inaugurated and the planned Category III A and B and Category IV programs, and

Whereas traffic congestion in the low and intermediate levels will increase at an extremely high rate, and

Whereas the inadequacy of radar coverage at these flight levels will not permit relief from the necessity to rely on the "see and be seen" principle for traffic and collision avoidance in the foreseeable future, and

Whereas the operating experience of two pilot crews flying turbine-powered transports indicates the need for a continuing review of Association philosphy on minimum crew requirements, and

Whereas a definite guideline for the benefit of the aircraft manufacturers and the air line companies would enable them to design aircraft and specifically cockpits to a well-known parameter thus benefiting the pilots as well as the manufacturers and air line companies; therefore be it

Resolved, That the following shall become mandatory policy of the Air Line Pilots Association as such policy relates to crew complement and crew requirements on turbine-powered fixed wing transport aircraft:

1. That all members of the flight deck operating crew excluding navigators shall be pilots except that job protection may be provided for currently employed non-pilot operating crew members;

2. That all future turbine-powered transport aircraft certificated after the adoption of this policy, excluding "stretched" basic models of turbine-powered, twin-engine aircraft presently certificated, will be manned by a minimum crew of three pilots;

3. The third crew member requirement on present aircraft shall be continued and nothing herein shall prevent the addition of pilot crew members to presently certificated aircraft.

Mr. RUBY. Miss Peterson has a statement that she will summarize. If you have questions on what I have stated, either I or any of the working pilots here will be most happy to try to answer them.

Mr. FRIEDEL. Miss Peterson, you may proceed.

STATEMENT OF IRIS PETERSON

Miss PETERSON. Thank you, Mr. Friedel.

My name is Iris Peterson. I am a vice president of the Air Line Pilots Associated Steward and Stewardess Division, currently employed as a flight attendant for a large U.S. carrier. This statement has been prepared from experience as a flight attendant, as a safety representative for my airline, and from experience in accident investigation. In addition, for approximately 3 years I have been a member of the Society of Automotive Engineers as a flight attendant representative on the A–20C Committee and in that capacity have contributed a great deal of work toward the goal of successful passenger evacuation from disabled aircraft.

Based on this background the following statement is submitted in the interest of safety for the airline passenger.

The flight attendant's job is multifaceted and has been defined to include responsibility for the comfort, enjoyment, and safety of the passenger. Of the three, the most important element is that of passenger safety. Toward this goal the training of the flight attendant is focused and during conditions of emergency, if lives are to be saved,

not only must procedures be known, but the means must be provided for their immediate and effective implementation. Successful handling of an emergency and successful evacuation depends upon many facets. Among others it depends on fire and toxic fumes being kept at a minimum, and there being sufficient lighting so that crewmembers can properly use emergency gear. Sufficient lighting is also necessary to permit the passenger to orient himself both in terms of danger and in terms of lifesaving equipment.

Historically, approximately 80 to 90 percent of all aircraft accidents occur without warning during either takeoff or landing, with no time for the crewmembers to prepare the passengers to survive impact. Yet, surprisingly, most of the passengers do survive impact, with the vast majority of loss of life occurring from other accident-associated causes.

This paper is directed toward care of passenger and crew during times of emergency and for simplification of the overall aspects of accident survival which has been divided basically into three categories:

(1) Cabin lighting and electrical equipment;
(2) Cabin environment as it applies to safety; and
(3) Emergency evacuation.

Lighting during normal flight can be categorized as the general overall illumination within the confines of the cabin, including illumination of emergency equipment location areas. Light during an emergency can be categorized as the amount of light that is "necessary" to permit the flight crew to perform required functions in the implementation of egress systems, to permit the passenger to orient himself with means of egress from disabled aircraft, and that amount of light that would be required to adequately illuminate the emergency equipment, emergency equipment location, and emergency equipment instruction placarding in order that rapid and efficient passenger evacuation would be possible.

General cabin lighting needs in the primary areas of the cabin and the secondary areas of the small enclosures or semienclosures such as the galley, closet, and lavatories, should provide sufficient candlepower to permit the reading of instruction placards and to permit visual aids in the handling of unlocking devices on all emergency equipment located in these areas.

Emphasis is placed on adequate lighting of the exit areas with special attention given to increasing that light should an emergency arise. This aspect of cabin lighting will be discussed in more detail later.

Area locations for emergency equipment such as the slides, fire extinguishers, axes, toggle switches for the main oxygen supply, lifevests, liferafts, liferaft compartment lock, and first aid kits should be illuminated sufficiently to permit rapid handling and use. The surrounding area should be well lighted without the light shining directly into the eyes of the passenger attempting to use these items. Yet it should be located between the item and the person so as to avoid causing either crewmember or passenger to be working in his own shadow. There should be sufficient brightness to permit visual aid in handling as well as in reading the operational instructions.

Regular or normal lighting of the cabin during a routine flight does not provide sufficient lighting for an emergency. Because of the proba-

bility of heavy smoke within the cabin during an other-than-normal landing, it is felt that consideration should also be given to a low-level mounted dual or multidirectional type of light, one that is both self-actuating upon failure of the main power supply and one that can be manually controlled from either the cockpit or flight attendant area. The light might also be operated from a self-sustaining rechargeable power unit or battery of a type similar to the present-day rechargeable-type flashlight. This low-level location of light could come from under the seats and could be either of the type mentioned above or it might be the new much higher light level radioactive type of light that will be visible at all times. The location of the light under the seat would definitely aid passengers who would be either bending over or crawling along the aisles toward an exit area through dense smoke. These lights, if they are to serve any useful purpose, must survive impact and operate during emergency.

These lights should be armed to an "on" position prior to each takeoff and landing regardless of time of day. They should be so designed that they will operate in spite of cabin breakup. The light available from this source might or might not be used as part of the general overall cabin lighting. However, because of the necessity of light during an emergency, it should be available.

Because of the importance of being able to locate exits in an emergency, it is suggested that action be taken to provide additional light in the exit areas so that the exit will be visible during an emergency in which smoke is present in the cabin. This would mean that there be sufficient light so that the directions for operation of the doors and slides will be readable and that the handles on the doors and the activation levers on the slides would be visible. In addition to the regular light, it is suggested that a chemical light stripping be installed as an outline around each exit.

Additionally, as a further means of identification of the exit area, the strobe or flashing light should be used in conjunction with a constant light located at the exit and focused outside the plane when the door is open. It is believed that the passenger, once within visual range of the light, would be drawn in that direction. The function of these lights is not only to guide the passenger once outside, away from the plane, but to serve as a beacon for would-be rescuers.

Because of its intended dual function, the light placement should be such that it would not be submerged in a water landing and such that it would be above the general mud and dirt spatter level during a ground emergency. Because of the second aspect of serving as a guide to rescue teams, the light should have a life expectancy of no less than 36 hours in order to cover two nighttime periods. These lights could be armed on a block-to-block basis so that if any landing or takeoff were other than normal, the light would be actuated simply by the cabin attendant opening the door or exit. If the plane is carrying an automatic radio direction finder, then perhaps a 36-hour light life is not necessary.

Further, it is possible, upon requirement, that the strobe light can be equipped with a sonar sounding device that will operate if the plane is completely submerged during a water emergency.

The ground area at the bottom of the slide should be well lighted to prevent passengers from stumbling on rough terrain and to enable

them to get away from smoke and fire danger zones. This can be accomplished partially by the strobe and constant light, and partially by the use of a chemical light stripping on the slides. All slides should be securely, but not permanently, anchored to the exits, as they float and can be used in water emergencies as liferafts. If the design of the slides is such that it has to be inverted to be used as a raft, then the chemical stripping should be visible on both the underside and the top. As a matter of standardization, each emergency equipment item, including the slides, that is designed for passenger use in a water landing should be equipped with both a battery-sustained light and the chemical stripping. These items include the liferaft, baby bassinet, seat and seat cushion. Having two systems of light would provide means of backup in case one or the other failed. If the plane does not carry a radio directional finder, then these lights, too, should have a 36-hour life.

In addition to the above, the cabin environment must be such that both passengers and crewmembers can survive the rather violent kinematics leading to impact and immediate postcrash circumstances. The following suggestions are made:

All fabrics in the cabin area should be of the most fire-resistant material available. All lighting and electrical circuits used in equipment storage areas, passenger coatroom, and overhead bin should be so installed as to prevent them from coming in contact with the garment bags, clothing, and other fabric items.

There should be a lifejacket under each seat with a supply of infant jackets on board. These infant lifejackets should be given to the mothers prior to takeoff.

It is recommended that a built-in container be installed under each seat constructed in such a manner that the passenger may enclose his baggage under the seat in front of him. Baggage that will not fit into this space or other specific contained areas should not be in the cabin. Presently, hand baggage is so excessive that it might easily block evacuation.

It is suggested that there be no overhead rack baggage storage, as twisting of the fuselage can snap restraining bars and break locks, thus causing heavy cases to fall from the racks onto the passengers with resultant serious injuries.

It is recommended that a study be made to determine a realistic width of cabin aisles in order that there be a steady flow of passengers to each exist. A great deal of effort has gone into the production and installation of the 42- by 76-inch exit to promote rapid evacuation without an equal amount of concern being given to the provision of aisles that would permit sufficient traffic to fully and effectively utilize the large exit. A suggestion is made for a minimum aisle width of 24 inches; however, it is suggested that some realistic planning be done.

It is further suggested that partial seat rows not be installed adjacent to the large exits, thus reducing the value of such exits.

Engineers are busily engaged in trying to design the fuselage of tomorrow's aircraft in such a manner that even at maximum altitudes a pressure leak will not develop to such magnitude that the cabin pressure would rise above 12,000 feet before descent would be made to a livable level of oxygen in the atmosphere. Should this prove possible and hence result in such fuselage structure, then there is no need for

the elaborate oxygen system used in the present-day jet, although first aid oxygen—for medical purposes—would still be required. However, until such time that the fuselage structure fulfilling the above specifications has become a reality and as long as there can be decompression that would result in oxygen loss below a livable level, the following is submitted for consideration:

There be an oxygen system in all future aircraft similar to that carried on the present-day jets with the addition of a light located in each oxygen housing compartment that will be automatically actuated by the opening of the compartment. This light would serve to get the attention of the passenger and would also aid him in getting the mask into operation.

It is suggested that a design of overhead racks be such that they will contain items stowed therein during the unusual motion of the aircraft during an emergency landing. Present racks are so designed that blankets and coats fall from them, covering the passengers, thus causing unnecessary and perhaps fatal delays in evacuation.

The large exits are extremely heavy and it is suggested that a power type of gear be installed in the opening mechanism—one that is similar to the power steering of an automobile. Without a power unit to assist in the opening of these exits, it is quite conceivable that valuable time needed for evacuation will be used in the opening of the exit.

The aircraft manufacturers report that numerous exits or openings in the fuselage weaken the structure. A means of obtaining the necessary exits may be the explosively created passenger egress system. It can be armed by the cockpit, activated by the cabin crew, works with almost 100-percent reliability, deploys a slide as it is activated, can be replaced by a simple and foolproof method, and does not compromise structural or aerodynamic integrity. An explosive-powered implement cuts an exit in a prescribed area, following a prescribed outline, and as the newly cut out exit falls to the ground, the slide is activated. This system would seem to be worthy of investigation and study.

It is suggested that fabrics used for crews' uniforms, both pilot and flight attendant, be made of the clothing fabric that is the most fire resistant obtainable. This is important not only for the crew survival, but for passenger survival, as the passengers must look to the crewmembers for directions. Additionally, such items as fireproof gloves for the crewmembers should be considered, as well as other late developments in this area. It is felt that crew uniform fabric is so important that if need be perhaps uniform fabrics should be regulated to the same degree as cabin interior fabrics.

Based on the following, suggestions are made for more realistic evacuation plans and crew coordination:

Currently, plans are to have 10 exits 42 by 76 on a large aircraft that is soon to be in operation. Also, current plans are that the plane will carry a maximum of approximately 490 passengers plus a crew of 15 to 20. Based on present thinking and past experience, during an emergency approximately one-half of the exits will be unusable. Considering this craft and the probable availability of exits, this sets a probable number of evacuees from each exit at somewhere over 100 people in 90 seconds. The 90 seconds must include slide inflation time—maximum of 10 seconds, plus an allowable time of 5 to 8 seconds for the flight attendant to get out of her seat, open the door and activate the

inflation mechanism. This allowable time will appreciably increase if the slides are not hooked up on a block-to-block basis. Depending on where the slide is located, it would take an additional 5 to 15 seconds to get it into operation. This would leave a maximum of 75 seconds for the actual evacuation, and a minimum of 60 seconds, necessitating an average rate of evacuation of 1⅓ passengers to 1⅔ passengers per slide per second in order to meet the 90-second standard. This does not seem possible.

The doors and slides on this aircraft are designed to accommodate two rows of passengers at the same time, which possibly may reduce the number of exits needed, provided the aisle width will permit the steady and rapid flow of passengers to the exits. It should also be borne in mind in attempting an evacuation in this area, that it will be almost an impossibility for one flight attendant at one exit to keep two rows of passengers evacuating at a time. As a further consideration, evacuation based on DC–8 tests have shown that it takes approximately 90 seconds overall to evacuate 122 passengers from four exits.

As it is possible for aircraft to burn through in from 10 to 12 seconds up to 60 to 70 seconds, it seems that the 90 seconds allowable for evacuation should not be extended for a longer period of time. Perhaps consideration should be based on a more realistic evaluation and thought should be given to getting the passenger load evacuated in even less time than the 90 seconds if our goal is to prevent loss of life and serious injury. It is suggested, however, that before final approval for the number of exits being made on any type of aircraft, a series of evacuations should be conducted using the FAA recommended percentages of an old-young, male-female simulated passenger group. It is further recommended that no employee be used of either an airframe manufacturer, an airline—except the crew members—or any Government employees who might be more knowledgeable as to aircraft nomenclature and egress systems than the average passengers of an average passenger load. Perhaps in this group there might be consideration given to using some simulated incapacitated passengers or foreign-speaking passengers who do not understand English. If we do not run realistic demonstrations, we prove only that a healthy group of industry-knowledgeable people who are ready to go and are aware of all facets of the experiment can, on a partial load basis, evacuate the aircraft in 90 seconds or less from partial allowable number of exits. This proves little other than that perhaps we have devised a paper-approved way of permitting circumstances to exist that would possibly result in unnecessary injury or death. It does not promote rapid nor efficient actual passenger evacuation during serious emergencies.

As a point of further consideration, may I here note that during all evacuation tests that are run to evaluate the plane and the potential for evacuation, the entire flight crew—both pilots and cabin attendants—are alerted to swing into action at a given signal and the entire crew complement is used to run the evacuation proceeding. This is far from fact in an actual emergency evacuation. By fact, part of the crew may be completely incapacitated and be in need of assistance themselves. It is also possible—and has happened on a number of occasions in the past—that far from being alerted to act simultaneously, the entire crew was not even aware of the existence of an emergency nor

of the need for immediate implementation of the evacuation procedures.

On the larger aircraft of the future, picture if you will, a plane the length of a football field, though some will be longer, with a wing span equal to the approximate width of the football field, while the fuselage is 20 feet or more in diameter. Then compartmentize this 20-foot wide and 200-foot length and you can perhaps have some idea of crew communication problems once the main power supply has been cut, should they try to coordinate evacuation procedures from exit and off the wing tail assembly.

Emergencies have arisen on the comparatively small present-day jet equipment where only a part of the flightcrew knew of the need to evacuate the plane. On the larger aircraft, the possibility, and more specifically probability, that a similar condition of emergency might arise in one area without being known to all flightcrew members simultaneously increases in direct proportion to the increase in size of the aircraft. Because of the probability of a situation of this type, it is suggested that a crew emergency signal be installed on all future aircraft. It can be any type of sound the Government, airframe manufacturer, or air carrier should want.

A signal serving the above function can be and has been developed. It can be triggered from any crew station to sound an alarm at all crew points. It can be radio controlled, sonar controlled, or operate on an interconnection 28-volt closed line that when broken actuates the signal. Disruption of power due to plane breakup would also activate it. It can be operated independently on any of the systems described above on it can be tied into the passenger alarm system and be either battery operated or operated from a self-sustaining power unit, rechargeable from the main powerplant. A signal of this type would operate instantaneously under conditions of emergency when the main powerplant is inactivated, though it could be tripped by the pilot so that it would not activate except by manual tripping. One of the two main functions of this signal would be to alert the entire crew that an emergency had arisen and that everyone was to leave the aircraft.

As a second function, this signal could further be tied into the opening of the exits along with the strobe and constant light and with an amplification of tone would then serve as an important means of furthering passenger exit awareness. The signal would automatically stop at those exits that were not open.

A signal of this description should, in the opinion of this witness, be a standard part of all types of future aircraft and should be considered as a "no-go" item meaning that if, on the preflight check of the aircraft it did not work, the trip would be delayed until the malfunction was corrected. The signal should be armed or set in the ready position on a block-to-block basis on each flight segment.

Signals fitting the above description are available and unless the aircraft of the future are equipped with just such a warning signal to alert all crew members simultaneously of immediate danger, it is almost a foregone conclusion that the aircraft of the future will never be successfully evacuated. Because of the size of future aircraft and the complications of getting passengers from the fuselage on to the ground, this signal is considered an absolute must.

You will note that no specifics of evacuation for the supersonic have been given. Due to the structure of the plane and particularly of the wing tail area, and due to the height of the fuselage from the ground, the subject has proven to be too complicated to develop in a statement such as this. However, extensive work should be done and comprehensive procedures established while remaining practicable of accomplishment.

In summary, the aircraft needs from the flight attendants' point of view are:

1. Provision of adequate and dependable lighting sufficient for implementation of an effective emergency evacuation system.
2. Passengers must be given effective orientation prior to each takeoff with possible use of placarding in the cabin interior.
3. The interior design of the cabin and exits must be such that passenger egress to and through the exists is not in any way hampered.
4. Cabin environment should be given careful consideration. Currently much emphasis is put on kindness to the passenger to the extent that he is permitted to practice many hazardous pursuits.
5. Cabins must be kept free of potential baggage missiles.
6. Endeavors directed at keeping fire, toxic fumes, and superheated air at a minimum should be implemented.
7. Flight crews must be adequately protected from physical harm or death—no one else can direct effective evacuation.
8. A crew signal such as described herein should be a standard part of each plane.

I offer my sincere thanks in having been given the opportunity of presenting this statement.

Mr. FRIEDEL. Thank you, Miss Peterson, for a very fine statement.

Mr. Ruby, you mentioned in-flight training procedures and the use of simulators in some detail. You said that has been greatly improved. Was that at the direction of this committee?

Mr. RUBY. I can't answer whether or not it was at the direction of this committee. The FAA, the Air Transport Association, and the respective pilots associations had several meetings in which a working group was set up to try to establish a solution to this problem, and in fact a working group is still functioning and will continue to review and set out solutions to the problems.

So, I can't tell you personally whether or not what occurred between this committee and the FAA, because I don't know.

Mr. FRIEDEL. You remember the hearings we had after the Delta accident in New Orleans, I think it was at that hearing that we suggested it and later it became effective.

The other thing mentioned was that this was on a trial basis. What is the basis of the trial? What time do they have on it?

Mr. RUBY. It was set up to run for a 6-month period in which each carrier would develop a training program that was to be used in the case of the two engines out on a side or a 50-percent power loss on a side, so that this would either be done in a simulator or would be done at altitude, and that during the transition training for a pilot that is coming from one type of aircraft to another, then the instructor would be permitted the latitude of selecting the airport he was going to use, the wind conditions of the particular day, in order for the instructor to have the pilot make at least one such approach and landing.

But the purpose of this was so that you would not, through the press of time, be confronted with attempting to do this for type-rating purposes in the most adverse possible condition, because if the pilot encounters this kind of situation he is going to select the airport in which he is going to attempt to land, which is going to be something better than the poorest possible conditions, such as low ceilings, slick runway surfaces, crosswinds, et cetera.

Mr. FRIEDEL. Wasn't one recommendation a proposed requirement that training flights be kept away from heavily populated areas?

Mr. RUBY. Yes. However, again one of the purposes in going to simulators is because you can do this in heavy populated centers close to the ground and in fact on the ground, and it creates no risk to anybody. Those who are equipped to do this with simulators can, in my judgment at least, do a better job; they expose nobody in the air, and in a total concept of this thing they have removed a lot of traffic from any airport area in terms of training.

Now those who don't have simulation capability obviously are going to have to do this in the actual airplane and at airports that can more or less accommodate training operations.

Mr. FRIEDEL. I have one other question. As you mentioned, the collision avoidance systems are under active discussion. Can any substantial improvement be made in this area at this time?

Mr. RUBY. Not on an instantaneous basis, no; because the research and development work has been done to a point. Now the actual breadboard hardware is going to have to be built and put on a few airplanes to determine if this thing can actually work under high-density conditions, after which then you can start building the hardware, that is as an available product. And the best guess estimate is 3 to 4 or 5 years before you have any appreciable segment of the equipment installed in airline aircraft and military aircraft.

Mr. FRIEDEL. I know for a fact we have been studying this for over 7 years. They were experimenting on it 7 years ago in Atlantic City. I think they have been slow and lax on this.

Mr. RUBY. To be honest with you, some of the best brains in the electronic field started researching the so-called proximity warning system, and their conclusion was that you could not build such a device and have it work. Then we got into the space business and we can get to the moon, but we still can't land under zero-zero conditions.

So, there are a lot of things that don't really make sense as far as research and development is concerned. On the other hand, with enough perseverence we can finally accomplish it, I believe. As I said, the best brains in the electronic industry stated no less than 10 years ago that you couldn't build a proximity warning system that would be successful. Now, there is a device that at least looks like it has the capability of handling collision avoidance. I think at least the airline pilots are much more interested in a collision avoidance system than they are in a proximity warning indicator. The difference is that the proximity warning indicator can light a light or start a klacker going, or buzzer, and tell you that you have a risk of an accident or a conflict with another airplane. The collision avoidance system is designed for the purpose of being able to have an arrow show you turn right, turn left, climb or descend. This calculation is then supposed to eliminate your conflict with the other traffic, whereas the proximity warn-

ing system just tell you there is a potential accident or conflict. It does not tell you what direction or which way to go. This is why I say the airline pilot would prefer the avoidance system rather than the proximity warning indication.

Mr. FRIEDEL. What about the cockpit? Do they have enough visibility in the present planes?

Mr. RUBY. No. We do not at this moment know how to do much better. You cannot even see the hemisphere in front of you. You can see nothing behind you. The cockpit cutoff is a fairly narrow range of vision. It is almost a physical impossibility to improve this to any great degree.

Now there has been some slow evolution in this and the cockpit visibility is better today, at least on some airplanes, than it was on an earlier vintage, but you still are quite limited in the angles of vision that you have available to you.

Mr. FRIEDEL. I want to say that we have our chairman of the full committee with us, and I know of no one who is more interested in air safety. I would like to know if he wishes to say anything at this time.

Mr. STAGGERS. No, Mr. Friedel, except to thank Mr. Ruby. I remember when he was before our committee previously that he is a very good witness. I agree with him on the use of training simulators. I remember during the Second World War the use of Link trainers; and having had some training in them myself in navigation and flying, I know they were exceptionally good.

I certainly agree with you on that. As I understand your testimony, and Miss Peterson's, there is nothing the matter that money, research, and training won't cure.

Mr. RUBY. Almost this is true. The cockpit visibility, I don't know how to cure that one, I will be perfectly honest about it. We can stress improvement, but to get full spherical vision is almost a physical impossibility. On the other hand, it is true that research, development, and money will handle many of these things in a complete fashion. For example, we know, ourselves, that the airport has not up to now kept up with the design of the airplane. We know that if we had enough runway and enough navigation facility we would eliminate a good bit of the incidents and accidents that occur by overruns, underruns, and drifting off the sides of the runways. We think that the collision avoidance system can certainly be developed.

While it is extremely expensive at its outset, sooner or later we will come up with one that works and does the job. This means money, research, and development. I agree with you a hundred percent.

Mr. STAGGERS. I remember that following your last appearance before the committee some changes were made in flight training.

Mr. RUBY. Yes.

Mr. STAGGERS. That was a help at least. We hope that these hearings—that is the reason they are being held—we hope they will increase safety for all the people. We are not experts ourselves. We are here to get suggestions from experts and to see that they are doing their job. I think the FAA is trying to do the job as all the other agencies are, but they need help and we need to get more money for the airports and for the research and all the other things that need to be done.

It is a hard thing right now, but we realize the importance of air safety for the entire public.

We thank you, Mr. Ruby and Miss Peterson.

Thank you, Mr. Chairman.

Mr. FRIEDEL. I am going to have to invoke the 5-minute rule because we have three other witnesses that we want to hear before 12 o'clock.

Mr. PICKLE. Mr. Chairman, I appreciate being recognized under those conditions, but I do understand and will not impose on the time.

I would like to ask either Mr. Ruby or Miss Peterson this question, in view of the fine testimony you have given and very thorough recommendations, whether you think that either the commercial airlines, operators, manufacturers, or FAA, are being derelict in the recommendations they are making? Do you have a defference of opinion in what you have recommended than what we are trying to do now?

Mr. RUBY. That is a fairly broad scope. Of course, I do not know what their statements are going to be at this hearing, so I would not be in a position to judge whether we differed or agreed, or what. I would say that in the past there has been what I would classify as probably 80 percent agreement on even how to go from A to B, and in some cases we will differ on how to get there. But generally the objectives are either similar or the same.

Mr. PICKLE. You are saying then that perhaps 80 percent of what you are recommending will be probably what they would recognize as our problems and that they will recommend?

Mr. RUBY. I would guess this is probably true, yes.

Mr. PICKLE. Are either one of you saying that the lighting in the present cabins of commercial airlines is totally inadequate?

Miss PETERSON. I would not say they were totally inadequate, but I would like to see a great deal of improvement in that area.

Mr. PICKLE. If we were to improve our road systems to the airports, and I think this is desirable, what would be your feeling—this would be a congressional determination—if we were to earmark funds under our legislation that would require certain preferences given to roads to airports? Sort of a "trust fund."

Mr. RUBY. In my judgment, this is going to be a matter of absolute necessity. I know of at least one personal exposure and another which has been brought to my attention, which is the Los Angeles situation prior to a football game, where the traffic was backed up for miles. I myself, out here at Washington National a year ago got out of a cab about a half mile from the terminal building and walked the rest of the way so that I would not miss the flight.

So, in substance we still have to look at this thing as an entire system, and the ground ingress and egress is just as important as the airborne. If we don't have the whole thing, we have a complete breakdown. So all links of the chain have to haul the same load.

Mr. PICKLE. I assume, Miss Peterson, that when you say that 90 seconds is needed for evacuation is not enough in the jumbo plane—is that what you were saying?

Miss PETERSON. No, sir; I was saying if possible we should reduce the 90 seconds because of the fire and the smoke and the toxic fumes being around the aircraft.

Mr. PICKLE. This is to be desired, but aren't we almost getting to the point where it is impossible when we are talking in terms of four hundred people?

Miss PETERSON. I am sorry, I did not hear what you are saying.

Mr. PICKLE. Aren't we reaching the point where it will be difficult to reduce below that period of time, when we are flying some four hundred people in a single plane.

Miss PETERSON. Perhaps it would; but I think if we are going to get the people out, it is almost necessary.

Mr. PICKLE. I agree with that. Perhaps I missed part of your testimony. Did you tell us how we could do that?

Miss PETERSON. By increasing the number of exits per number of passengers. I think trying to evacuate 100 passengers from one exit in 90 seconds when this 90 seconds must include operational time, is not a very realistic number to attempt. I did mention this, you perhaps will recall it, explosive exits.

I haven't delved into it too much, but I do think it has lots of potentials. You could cut out as many sections of the airplane as you like and have your slide inflated with the cutting of the exit.

Mr. PICKLE. In that connection, when you say sliding doors, you are trying to avoid this sliding aspect and would prefer an explosive type of mechanism that would open up an exit?

Miss PETERSON. There is a need for a number of prescribed exists or exits to be precut in the fuselage for entry and exit and servicing, and so on. However, if it would weaken the structure of the fuselage too much to have an adequate number to let the passengers out, then this could be an alternative.

Mr. PICKLE. Thank you.

Mr. FRIEDEL. Mr. Devine?

Mr. DEVINE. Thank you, Mr. Chairman.

Mr. Ruby, I noticed that you had an air safety forum here in June, your organization did, and you suggested you would make available to the committee the results of the forum, especially on midair collisions. How soon do you anticipate that will be in our hands?

Mr. RUBY. That is a fairly thick book. It takes considerable time to assemble it and print it. Maybe Mr. Linnert can give you an intelligent guess when it will be available.

Mr. LINNERT. It is in our printshop now. I think we can break it loose in about 2 weeks.

Mr. DEVINE. Fine. I am sure you recognize these hearings today and those we had a month or so ago were pretty well triggered by recent midair collisions, not only over Hendersonville, N.C., but in Ohio. Our purpose, of course, is to receive the benefit of the knowledge of these people who sit in the cockpits, and other knowledgeable people in the air safety field, including the air traffic controllers.

Now you suggest that something over $2 billion, Mr. Ruby, will be necessary to update the airports to handle today's traffic. In your more recent remarks, I think in response to Mr. Pickle, you suggested that would include the overall picture of the airports, such as the roads leading to and from, and I suppose baggage handling facilities, and everything else.

Mr. RUBY. No, it would not include the ingress and egress roads or rail systems. If I got his question correctly, I thought he was referring to the highway program; have certain parts of it earmarked for this type of installation, such as highway ingress to the airport or rail or whatever means can be developed to reduce that bottleneck.

If I read his question correctly, at least that is the way I answered it.

Mr. DEVINE. When we talk about congestion, say at Washington National, I know we have planes stacked, considering weather and other things of that nature, but the congestion is also in the terminal building, the airline ticket counter, at the baggage area and ramp. As president of ALPA and as a pilot, do you consider Washington National Airport an area of high danger?

Mr. RUBY. That is a hard question to answer with a true sense of balance, because there was a period of time in which the traffic congestion on the ground was worse than it was in the air. By the same token, the Washington National Airport by size alone limits the type airplane that can operate into and out of this airport. Now the real answer to this question goes beyond any specific airport in this respect. There is a day coming, and it is certainly here in a few places now, where someone is going to have to limit the number of operations per hour that any particular airport can accommodate.

Mr. DEVINE. This is your system plan, to federalize rather than "States rights"?

Mr. RUBY. That is right.

Mr. DEVINE. Let me put it this way. Would you consider the safety situation in Washington National more critical or less critical than that, say, at John F. Kennedy, O'Hare, Los Angeles, or Atlanta?

Mr. RUBY. I think one of these pilots flying in and out of this airport can come closer to answering that on a current basis than I can.

Does anyone of you gentlemen operate in and out of this airport? I know there is one that lives here.

STATEMENT OF DAVID JONES, UNITED AIR LINES PILOT

Mr. JONES. I will be glad to make comment. My name is Dave Jones. I am a United pilot based here at Washington, fly 727's out of Washington National.

My comment on the airport, to answer your question, would be that the airport is somewhat unique in its traffic pattern, because we do have the proximity problem of the city of Washington and the Government buildings, and the restrictions that are imposed thereon, and that this imposes an operational problem with certain weather conditions.

As far as the overall safety of the airport, I have no doubt in my mind that it meets the minimum safety requirements as prescribed by FAA and the air carriers.

Mr. FRIEDEL. Will the gentleman yield?

Mr. DEVINE. Yes.

Mr. FRIEDEL. How does it compare with Friendship Airport and Dulles?

Mr. JONES. That is an easy comparison. I think Dulles is undoubtedly one of the finest airports in the country, operationwise and facilities, and so forth.

Mr. FRIEDEL. What about Friendship?

Mr. JONES. I enjoy flying out of Friendship and from a professional standpoint it is a very fine operational airport.

Mr. DEVINE. As a pilot I know you fly into O'Hare and also JFK.

Would you consider those two facilities more "hairy" from a pilot standpoint than coming into DCA?

Mr. JONES. Did you say more hairy?

Mr. DEVINE. Yes. Use your own term.

Mr. JONES. Air traffic controlwise and approach controlwise, the high-density problems are very similar in all these operations. You have an extremely rapid movement of events in the coordination between the air traffic control and operating your own flight, so I think they are very similar in that respect.

Mr. DEVINE. I wanted to touch on one other aspect very briefly.

Mr. Ruby, under your three-man crew concept of course I understand the position of your organization. I also understand this is the subject of rather intense labor relations negotiations. I don't think this subcommittee should be used as a forum to settle labor-management matters. So, I am not going into that problem.

Mr. RUBY. I can state without eqivocation that this is not the intent, because normally the crew requirement is established by the FAA. The mere fact that this particular airplane is coming up for certification now, and we are not limiting it to any one airplane, we are simply stating, and I stated this to the FAA, first we have absolutely no desire or intention to, what some people refer to as, featherbed the cockpit. The professional pride of the pilot is that he does not want somebody in his way that he does not have to have.

We are stating flatly that a three-man crew is not going to eliminate all midair collisions. We are convinced that it will help eliminate some, not all.

Mr. DEVINE. You made that in your formal statement. Of course, I don't think we should get into that too deeply. I know the 727 at Hendersonville did have the third pilot in it. The BAC–111 and DC–9's, two engine jets similar to the 737 coming up, are not equipped to handle other than two-pilot operations.

Again, this is something that is subject to your negotiation on one particular type of aircraft.

Thank you.

Mr. FRIEDEL. Mr. Kuykendall?

Mr. KUYKENDALL. For the sake of the record, the answer to a question that relates to the New Orleans accident and as relates to the simulator in the high hazard area of training, how long have we had four-engine jet aircraft on the airlines now?

Mr. RUBY. They started in 1958 or 1959.

Mr. KUYKENDALL. Eight to nine years?

Mr. RUBY. Yes.

Mr. KUYKENDALL. As to your knowledge, and I might ask every pilot to join in on the answer if he likes, to your knowledge has there ever been a landing of an actual four-engine jet aircraft with two engines out, both of them on the same side; actual airline landing?

Mr. RUBY. Yes. In fact, I can think of one right off the top of my head that occurred less than 2 years ago in which one engine started disintegrating and it threw bits and pieces into the other engine and of course knocked it out, with the end result that the pilot or in fact the crew got the airplane around the field and landed. And, at least so I am told, the manufacturer could not understand how this was done, because the speeds involved at the time the engines began to disintegrate were below what they considered capable of accomplishment.

I guess, like the hummingbird, not knowing he has insufficient wing area to fly, flies anyway.

Mr. KUYKENDALL. I had occasion to go out in a B–25 and have an engine go out while 10 feet in the air and we circled the field and landed on one, and it was not supposed to be possible. I was an air cadet at the time. I did not know it was possible.

Would you classify this particular training procedure in the area of an event that is so rare that the danger of training is much greater than the danger of the event actually happening.

Mr. RUBY. I would say that is a correct statement, but I do believe that in the present sophisticated design of airplanes that it well behooves the carrier to invest his money in simulators that will do a good job of fidelity and then he can train people in things that he would not dare do in the airplane, and you have an end result of a better performing crew. They are then prepared to handle emergencies that you could not possibly train for in the airplane, because in most cases you have used the crew in the airplane up trying to train them.

Mr. KUYKENDALL. I would like to ask you, if you will, to help us and this committee in discussing matters of priority. I don't think you have suggested an area here of concern that we don't agree on with you, but certainly here in Government we have to recognize priorities.

Now you mentioned two broad areas, one of safety and one of convenience. Personally, I am not going to be greatly concerned about convenience before safety is taken care of. At least the guys who didn't make the airplane because of crowded traffic to the airport are alive. They may have been late, but they are alive. So we have a definite matter of priority.

In the collision avoidance, is any work being done on a collision avoidance system that is not reciprocative? In other words, one airplane reacting on the other without the other airplane having the collision avoidance?

Mr. RUBY. Yes; some work is being done in this area, but a great portion of the development that is being done now deals with the so-called compatible system, which means both airplanes have to be equipped. Now the other problem is a much more serious problem in terms of trying to do the job, because if you, for example, use a radar principle, or laser, or infrared, the other airplane has got to produce a reflection of the transmitted signal for the one transmitting the signal to receive the reflection back. There are some airplanes that simply don't produce a reflective target. This is true even with ground radar today. I am speaking of the smaller airplanes that in some cases have fabric covering. They don't present much of a radar target.

Mr. KUYKENDALL. You are certainly aware of the fact that recently Orly and Le Bourget have closed both airports to aircraft other than those that have two pilots and compatible electronics, but by the time they got ready to make this decision they had satellite fields equipped with ILS, and so forth.

I think we must recognize the fact that private aircraft, at least the smaller ones, are going to be a long time coming with any kind of collision avoidancee device. For this reason, I was hoping when you said there is work being done, that one of our goals would be a collision avoidance device that would not require reciprocation. Because,

after all, if you have two airplanes, only one of them has to avoid the collision, only one of them has to turn to avoid a collision. I would hope this would be in this area.

Would you get for us, for the record, the total amount of ticket revenue in the United States for domestic flights? Could you get that figure for the record?

Mr. RUBY. I don't know, but I think the ATA would have this more ready available than we would.

Mr. KUYKENDALL. I want to be sure we have this. I think we all recognize the fact that this system similar to the trust fund of the Interstate Highway System is probably going to be our only answer, and some sort of revenue production from ticket sales would have to be probably the answer to it.

Mr. FRIEDEL. I want to thank you——

Mr. DEVINE. Mr. Chairman, Mr. Brown came back here for these hearings. If we are going to sacrifice the meetings for a 5-minute rule, there is no use having any hearing. Mr. Brown came by. He is not a member of the subcommittee, but he is a member of the full committee.

Mr. BROWN. Mr. Chairman, do I understand, then, that my trip to Washington was futile in terms of participation in any way in this hearing?

Mr. FRIEDEL. I don't think your trip is futile.

Mr. BROWN. I certainly came back for this purpose and this purpose only.

Mr. FRIEDEL. This is a subcommittee hearing and only members of the subcommittee and the two ranking majority and minority members are allowed to ask questions. Otherwise, it would be the full committee.

Mr. DEVINE. We are here for one purpose.

Mr. FRIEDEL. If you have any questions, you may present it to one of the members.

Mr. BROWN. I have three pages of questions written down so far.

Mr. FRIEDEL. We have many witnesses and we are going to meet this afternoon and we are going to meet again tomorrow morning.

Mr. BROWN. With these particular witnesses, Mr. Chairman?

Mr. FRIEDEL. No other than subcommittee members can be heard in asking questions.

Mr. DEVINE. Let us not sacrifice the witnesses. Let us keep on with Mr. Ruby until we have exhausted our own questions.

Mr. PICKLE. Mr. Chairman, I yield to the gentleman from Ohio.

Mr. FRIEDEL. You can't do that, I am sorry.

Mr. BROWN. Mr. Chairman, may I ask questions through you or another member of the subcommittee?

Mr. FRIEDEL. You can ask questions in writing and we will submit them to the witnesses and let them answer them for the record.

Mr. BROWN. But they can't be followed up.

Mr. FRIEDEL. We don't have time for it. We have other witnesses. The meetings are only this morning, this afternoon, and tomorrow.

Mr. BROWN. You have no objection to my listening to what they say?

Mr. FRIEDEL. None whatsoever. That is why I suggested your trip was not futile. If you want to submit the questions in writing, I will submit them and have them included in the record. Do you want to be heard again?

Mr. DEVINE. Yes.

Mr. FRIEDEL. I have one question. You were speaking about the federal system approach. You would like to see a federal system instead of States rights. Do you find different limitations as to approaches to different airports? Doesn't Washington National have only two corridors? Is there any restriction at Washington National? That is the first question?

Mr. RUBY. Yes, there are restrictions at Washington National, as there are differing restrictions at other airports, some of which at least are set up by local authorities. It has only been recently that the Federal Aviation Administration and the Air Transport Association and the Pilot Associations have reached an agreement for a standardized noise abatement take off procedure where noise abatement takeoff proceduers are required. Now this, if we finally accomplish this, will be a great step in the right direction, because we won't be having pilots trying to accommodate to a different rule at each airport which involves a different type of flight technique, either on takeoff or landing. If we do not standardize these things, we are simply building in trouble that there is no solution for.

If each town or each State or—as I say in Western Europe, each country—has a different set of rules, you finally bog it down where you can't operate or, if you do, operate with a risk element that is far too high. What I am rally saying is the necessity for standardization. I don't see how this can be done on a State-by-State basis; that is what I am saying, from a practical standpoint.

Mr. FRIEDEL. This is done for safety reasons?

Mr. RUBY. Right.

Mr. FRIEDEL. And for noise abatement. Do you find any different regulations in takeoff and landing at the New York airports?

Mr. RUBY. Yes, because where the Port Authority, for example, in New York deals with Kennedy, La Guardia, and Newark, they can establish what is required by them at those airports. Then we will assume that some particular city has an airport someplace else, whether it is Los Angeles or San Francisco, they can set up rules that they want to apply to their airport. If they then tell the air carrier, "We are going to cancel your lease if you do not do as we say," then what is the air carrier to do? He has no alternative but to continue operation and say to the pilot, "You do it this way or we get thrown out."

This is a place where we rebel in no small fashion, because we simply are not going to go out and take undue risks to accommodate a local situation if in fact their proposal as to how to do it gets into the undue risk level. This is why I am saying we must have some standardization on an overall basis. Gentlemen, by negotiations this is going to have to apply worldwide, as I personally have been shook up a couple of times on a takeoff out of London, I suppose because I know enough to know when to be scared and I was a bit shook up. I just don't go for this.

Mr. FRIEDEL. Are the restrictions severe in London?

Mr. RUBY. Yes; they are. They are quite ridiculuous in some particular directions. You take off with an airplane that is loaded to the gunwales because it is going across the North Atlantic, and you are supposed to take the airplane off, make an abrupt turn, reduce power

and still fly this monster with all this load. You simply cannot defy the laws of gravitation to that extent and expect to survive.

Mr. FRIEDEL. Those restrictions evidently are for noise abatement, not for safety.

Mr. RUBY. That is exactly it; they are anything but safe. All I am saying is that we simply are not going to buy this; we are not going to be out here in the business of killing ourselves and people who ride with us, plus those on the ground.

Mr. FRIEDEL. Do you have any restrictions over Friendship that you know of?

Mr. RUBY. No.

Mr. FRIEDEL. Do you have any restrictions over Dulles?

Mr. RUBY. No; not to my knowledge. These gentlemen who are flying out of there can verify this.

Mr. JONES. No restrictions at Dulles or Friendship.

Mr. FRIEDEL. Mr. Pickle?

Mr. PICKLE. Thank you, Mr. Chairman. I would like to ask the pilot in the audience, Mr. Jones, this question.

I have had different pilots on occasion make the statement to me that we ought to have a national campaign that says "Don't fly to New York." I know my friends from New York would not like this advertisement, because New York is one of our great cities and it is the heart of a great amount of our business and our recreational visitation. The point was that most of our airport congestion, a lot of it, is caused by the fact that congestion is created at either Kennedy or La Guardia, that once it bogs up there, there is a natural flow all over the United States and you never catch up.

In my judgment, most of the congestion is caused by the fact it is so intense in New York that this affects Washington, this affects Atlanta, this affects Dallas, Chicago, and so forth. Is there substance to this? I am not being critical in asking the question, but is this not a fundamental problem?

Mr. JONES. I think it is definitely a problem. I think it relates to a comment made earlier by Mr. Ruby on the proximity of airports and getting the over-all plan, the system plan. Of course, the three-airport operation at New York City is a part of this, and it undoubtedly is a large contributing factor. As to how it affects the air traffic out of Washington or Cleveland or any other traffic going toward New York, your observation is correct in that. An overflight from Washington to Boston would be affected by it. I believe it relates to the over-all system problem as Mr. Ruby pointed out.

Mr. PICKLE. Thank you. I would like to ask one more question to anyone. I believe under present regulations a pilot coming into a regular airport can land under VFR conditions. This rule was established, as I understand it, in earlier days primarily for pilots who could not land on instruments and it was an accommodation to them as much as anything else.

Now we have reached a rather sophisticated stage in our flying. Should we abolish VFR and require that a pilot must come in on IFR?

Mr. RUBY. You can't do it for one reason at least. The air traffic control system cannot accommodate the demand. If you had every airplane that was available to fly today that wanted to fly, the air traffic control system simply could not accommodate them.

Again, we should not be classified as having conflicts with general aviation. We don't. General aviation wants to fly in any airport. You can't blame them for that. All we are saying is that you should not put a student driver out on the expressway at 5 o'clock in the afternoon with an automobile that has not got all the acoutrements it takes to drive on an expressway.

Mr. PICKLE. Are you saying that the plane should have IFR equipment even though you permit them to land VFR?

Mr. RUBY. If you are going into high density operation, then you should operate all of them under the same rules. That is what we are saying, under control.

Mr. PICKLE. I won't ask further questions in deference to time. It seems to me when we are faced with the problem of determining what aircraft can use the big airports that are so congested now, at what level you cut them off, what level you let them come in, it seems to me their ability to meet a minimum safety requirement is probably the best test we could use.

Mr. RUBY. I would not disagree with that, because this is probably the only rule of thumb you are going to be able to start out with to develop it.

Mr. DEVINE. Mr. Ruby, we can't lose sight of the fact that there are over 100,000 general aviation aircraft and less than 2500 commercial aircraft. We of course can't exclude all the folks for a benefit of a few that make money in an operation.

Mr. RUBY. I am not proposing that.

Mr. DEVINE. Again we must weigh whether all airports may be involved in this.

I would like to get into a specific case. I have no intention to embarrass anyone. The pilot I make reference to did a magnificent job. I would like to ask you as representatives of your association how this situation developed. I refer to what happened in my own community in Columbus, Ohio, on the Fourth of July when a TWA 707 pilot brought down his aircraft with a load of passengers at Don Scott Field with a 4,400-foot runway, thinking he was landing at the Columbus International Airport with a 10,700 foot runway. He landed and did a beautiful job.

Now with all the sophisticated electronic devices and equipment in aircraft and on the ground, how could a situation like this occur?

Mr. RUBY. It occurs in rare instances. Unfortunately there are certain geographical situations in which an airport can look identical to another airport. I must confess that in years past I have had to look twice, myself, to keep from getting on a wrong airport where they were not geographically spread a great distance apart.

In recent times those who are equipped with ILS that is operative can easily avoid this. But I flatly state it can happen although it happens very rarely. That is not the only time it has happened either.

Mr. DEVINE. Do any of the pilots here have a comment on a situation such as this? This particular pilot brought it in in good shape and had some runway left. Theoretically, I think a 707 is not supposed to stop in 4,400 feet.

Mr. RUBY. It is about the maximum or I should say the minimum length runway you can get away with, if everything is done up to snuff.

Does any one have a comment?

Mr. FRIEDEL. They don't want to try it.

Mr. DEVINE. Let us get into another area. Mr. Kuykendall touched on this. A lot of people have the mistaken belief that the black nose on the front of the aircraft is radar for everything and not just confined to weather radar. Is your answer to Mr. Kuykendall the fact that it will not pick up other approaching aircraft or objects because it is not equipped to do so, that they don't throw enough target back? What is the answer to that?

Mr. RUBY. There are two answers to it. One, it is a weather radar. That is its primary purpose. But the energy cone that is transmitted by C band radar is a 7½ degree cone. On X band radar, it is a 3½ degree energy cone. As the antenna rotates it is sweeping with either 7½ or 3½ degree cone. Any airplane that is any distance away, the slight tilt of the antenna can completely miss that airplane. So it will not show up as a blip on your radar scope unless perchance you have your antenna tilt set where it will pick up this other airplane, and then the blip is mighty small.

You have almost got to know what you are getting a blip from before you know you are getting it from another airplane.

Mr. DEVINE. Do you know whether radar research is moving in that direction where they will have a cone type that will detect other aircraft in the area? I recognize the closing speed of the jets.

Mr. RUBY. Unfortunately there is not much point in going into this type of collision avoidance system, because you are vulnerable to collision from aircraft below you, above you, behind you, on the sides, and the nose type of antenna system simply cannot deal with anything that is behind you or below and behind or above and behind.

So there is no point in spending money on researching that for collision avoidance purposes, because you have to cover practically a sphere instead of a limited hemisphere in front of you.

Mr. DEVINE. I have one other question. Again maybe some of the pilots here can answer this. Do you consider the noise abatement regulations at Washington National to be a safety hazard?

Mr. RUBY. They were. These boys that fly out of here are certainly better qualified than I to answer it. I state at least on climbout, to try to follow the river, with a nose that has the entire ground mass hidden from view, this is a tricky operation.

If any of you fellows would like to comment on that, you may.

Mr. DEVINE. They fly the river course both north and south to 1,500 and level off until they are 10 miles out. What is the regulation here?

Mr. JONES. There has been a recent change in it. One of the things that we the pilots were glad to see was an ability to clean up the airplane and get it into flying speed rather than keep the airplane dirty, so to speak. This was a large improvement.

My criticism of the system now would be that we have to loaf for 10 miles under the present policy, regardless of the altitude attained, we are to fly at reduced thrust until 10 miles from the airport. We may have attained 5,000 feet, but we are going to keep it quiet out over the woods out there anyhow.

Mr. DEVINE. Do you consider this a safety hazard?

Mr. JONES. It is not a safety hazard per se, but generally speaking any reduction in thrust is going to reduce the performance of the aircraft.

If you take off, as I did the night before last, with thunderstorms and potential turbulence facing you immediately after takeoff, it could be a hazard because of the speed.

Mr. FRIEDEL. Mr. Kuykendall.

Mr. KUYKENDALL. For the sake of the record—and this is to Miss Peterson—may I suggest that the recorder check carefully her use of the word "possibility" throughout her testimony when the transcript said "probability." You interchanged these two words throughout your testimony. This can make considerable difference in our reading the testimony. There is a lot of difference between possibility and probability. I believe you interchanged the two words throughout your testimony.

So, will you and the reporter check this out to be sure that your meaning is clear here?

Miss PETERSON. Yes.

Mr. KUYKENDALL. Following up on the radar, Mr. Ruby, what is the timing of a revolution of a typical radar weather cone?

Mr. RUBY. At the moment I have forgotten.

Mr. KUYKENDALL. Approximately?

Mr. RUBY. If I remember right, it is somewhere in the order of 15 to 18 revolutions per minutes for the entire rotation and, of course, the insulation blanket on the bulkhead blocks off a portion of it, so there is nothing happening.

Mr. KUYKENDALL. So we are saying now at a closing speed of two head-on aircraft at 1,200 miles per hour, which is about 1½ miles in 5 seconds, it means these airplanes from the time you left him on the sweep until you got back to him on the sweep, you could very well have gone 3 miles toward each other?

Mr. RUBY. Yes, because in the first place the weather radar is not a continuous energy flow; No. 1, it is pulsed at the rate of 400 pulses per second in order to get high-energy output. This is a constant 400 pulses per second flow out of the antenna, but it is in a rotational sweep at the same time.

Mr. KUYKENDALL. The point I am making here is to show, by taking your testimony, that the typical old-fashioned-type radar simply would not serve at all at the rate of closure and time, and that is one typical reason it will not serve.

Mr. RUBY. It will not.

Mr. KUYKENDALL. The typical old-fashioned radar operation will not serve this purpose?

Mr. RUBY. No.

Mr. KUYKENDALL. Second—I have called it profile radar which would give the elevation—what is your term for the new gadget that will give not only the location but the altitude? What is your descriptive term for this system? Alphanumeric system?

Mr. RUBY. The alphanumerics by itself is not technically what we are talking about today because the altitude encoder is taking a transmitted signal from the airplane that is read off the altimeter and it is printing that on the videoscope in terms of altitude that that airplane is flying.

Mr. KUYKENDALL. You said something a while ago that really leads us here to take a new look at a lot of the testimony that we have had. We have been led to believe by a lot of the former testimony that this system of the altitude on the radarscope was an answer to a lot of questions.

I had questioned in my own mind something you brought up a few moments ago, and that is that in the Kennedy area, let us say, this screen would be so cluttered that you could not read any of it.

Mr. RUBY. This is exactly what I had reference to. The size of the scope face, which is the video tube, has to keep increasing in size in order to accommodate the total number of airplanes that can be providing the alphanumerics information on the scope.

Now if you get so many together, they will begin to overlay each other so that you cannot read any of them. There is only one solution to that. That is a huge scope. And those get a little hard to handle from a technical standpoint. But a small scope can clutter so badly that you cannot read anything.

Mr. FRIEDEL. Don't they have large scopes in the towers?

Mr. RUBY. They are installing larger scopes. What I am really saying is if you take New York, for example, three airports, brother, you are going to have some trouble keeping this stuff sorted out where you have radars picking up this stuff for the whole area short of encoding, so that the receiver, for example, that is picking up Kennedy information is not picking up Newark and also La Guardia. But then when you do that, you run the risk of getting conflicts that are unacceptable because the man who is dealing with the Kennedy scope is not aware of an overfly of a fellow from the La Guardia or Newark scope.

What I am saying is that in a multiairport system, to keep them sorted out and separated, you have to have one scope that covers the whole area.

Mr. KUYKENDALL. We have gotten the illusion here of a slight panacea that maybe we are too optimistic on.

Mr. RUBY. All I am trying to do is put in a word of caution and let us not be overly optimistic on something that will not do the job with real high-density traffic.

Mr. KUYKENDALL. Do all of the major airports such as Washington National have backup power sources and backup facilities or equipment for their radar? We have had a couple of instances, I believe just this year, of radar failure in the Washington area.

Mr. RUBY. I can't answer that per se, airport by airport. I think most of the FAA facilities, and they are better prepared to answer this question than I, do have backup power sources. For example, if an antenna system becomes inoperative, there is not a standby antenna system, at least not to my knowledge.

Mr. KUYKENDALL. Lastly, the North Carolina accident, of course, from what we know about it we know they were outside the surveillance radar coverage, and I was told by a gentleman from FAA, either General McKee or one of his assistants, that the surveillance radar installations are now down to airports of approximately 65 transactions a day.

Would you feel that the lowering of this appreciably down to maybe 25 transactions a day for the installation of surveillance radar would be an appreciable addition to safety?

Mr. RUBY. I can't answer that off the top of my head except in a speculative way. This is really not total speculation. Anything that we do that will afford radar surveillance will help.

But bear in mind again some of the small airplanes do not present a good radar target. So without a transponder, it is possible to have certain airplanes in the air that the ground radar won't see.

Mr. KUYKENDALL. Mr. Ruby, as the good politician that you are, and we try to be, we seemingly, all of us, continually skirt around this business of general aviation because of the numbers that Mr. Devine mentioned.

I am wondering if you are not going to have to face up to some alternative to accommodate this problem and yet recognize the fact that the vast majority of our aircraft are in the field of general aviation.

Mr. RUBY. Yes, there is a large number, there is no question about that.

In a discussion with the Administrator the other day we were posing the question, should we not try to again institute a research program to see if we could find some device that can be cheaply installed on general aviation aircraft that will make them a good reflective radar target without their having to go to the expense of buying transponders.

We realize that they can't afford transponders. But if there were some development that could be forthcoming that would provide a reflection capability that was relatively cheap to buy, then this would serve the purpose of making them easily detectable on the ground radarscope which they are not now.

So, I am not now really classifying myself as much of a politician.

Mr. KUYKENDALL. I classified you as a pretty good one.

Mr. RUBY. On the technical side we have to find a better mousetrap.

Mr. KUYKENDALL. Thank you.

Mr. FRIEDEL. Thank you, Mr. Ruby and Miss Peterson.

The meeting is recessed until 2 p.m. today at which time we will hear first Mr. Victor J. Kayne, vice president, policy and technical planning, Aircraft Owners & Pilots Association.

Then the next witness will be Mr. Stuart G. Tipton, president of the Air Transport Association.

(Whereupon, at 12:05 p.m., the subcommittee recessed, to reconvene at 2 p.m., the same day.)

AFTER RECESS

(The subcommittee reconvened at 2 p.m., Hon. Samuel N. Friedel, chairman of the subcommittee, presiding.)

Mr. FRIEDEL. The subcommittee will be in order.

This is a continuation of the hearings we had this morning with reference to air safety.

Our first witness this afternoon will be Mr. Victor J. Kayne, vice president, policy and technical planning, Aircraft Owners & Pilots Association.

Mr. Kayne.

STATEMENT OF VICTOR J. KAYNE, VICE PRESIDENT, POLICY AND TECHNICAL PLANNING, AIRCRAFT OWNERS & PILOTS ASSOCIATION; ACCOMPANIED BY ROYS C. JONES, DIRECTOR, AIR TRAFFIC CONTROL DEPARTMENT

Mr. FRIEDEL. Mr. Kayne, I understand you have a lengthy statement and we have quite a few more witnesses. If you could try to condense or summarize it, your full statement would be included in the record.

Mr. KAYNE. Thank you, Mr. Chairman. I will endeavor to do that.

I am accompanied by Mr. Roys C. Jones, director, air traffic control department. I might state that Mr. Jones and I both are active pilots. We both are ex-air traffic controllers having spent some years with the Federal Aviation Agency and its predecessors before going with AOPA.

Also, Mr. Chairman, I wish to apologize for the fact that we were not able to furnish the committee with advance copies of our statement due to the short notice. We just finished them up Friday night or early Saturday morning. Somewhat to our embarrassment, I have just discovered that some of the copies that were made available here were improperly collated. I think we have a sufficient quantity so that if you do find a deficient copy, there are others available. We did find some that had a page missing or others with extra pages in them. I do apologize for that.

Mr. FRIEDEL. Be certain that the statement for the reporter is complete.

Mr. KAYNE. Yes, sir. I checked his first.

Mr. Chairman, before I started into AOPA's statement, I want to say that after listening to Captain Ruby's statement on behalf of the Air Line Pilots Association this morning, I think that Captain Ruby made a fine statement, and he made a number of points that emphasized the fact that all pilots, whether airline pilots or general aviation pilots, have safety as a common objective.

I want you to know that AOPA would support the majority of the statements made here by Captain Ruby this morning on behalf of the Air Line Pilots Association.

I am going to skip over the first part of my written testimony in the interest of expediency, which details the nature and scope of general aviation, how many airplanes we have, how many pilots and how many hours we fly, and how many airports we use. That will show in the record, I am sure. So I will just pass that, to help conserve time.

I would like to proceed to page 3 of our testimony. This deals with accidents and the safety record. This is a safety hearing.

General aviation last year suffered over 5,000 accidents, according to the figures of the CAB. We did want to point out that the so-called accident is something that causes $300 or more worth of damage to the aircraft, and for airplanes that cost $30,000 and upward quite frequently this is nothing more than a minor mishap that you could compare to a dented fender on an automobile.

It is quite true that, of the total number of accidents, we had 538 fatal accidents. These resulted in the deaths of 1,069 people. That included passengers and crew fatalities.

Frequently we do find the general aviation fatality record being compared with that of the airlines. But also quite frequently we find that the airline figure includes only passengers. It does not include crews, training flights, people killed on the ground and so on. So when you take the total figure for each, you will find, I believe, that the comparison is not a bad one.

The total general aviation rate for accidents in 1966 was roughly 25 per 100,000 flying hours. This is the best record to date for general aviation and compares with higher rates running up to 45 per 100,000 flying hours in 1951.

Also, we have computed, based on the figures provided by the CAB, our fatality rate for each 100,000 flying hours, the number of people killed per 100,000 flying hours, and we find that for general aviation this again was at an alltime low in 1966 with 5.085 per 100,000 flying hours and was lower than the 5.323 of the U.S. scheduled airlines, based on CAB figures.

On pages 3 and 4 we detail some information about AOPA's training programs having to do with upgrade training of pilots in the courses we sponsor. That speaks for itself. To date we have trained over 18,000 pilots in these courses.

We made a number of recommendations to the Administrator of the Federal Aviation Administration, on August 23, just last week, dealing with prevention of collision. I want to review a few of those briefly for you here today, Mr. Chairman.

Over the years there have been a number of collisions between various combinations of airline, military, and general aviation traffic. These last two collisions brought what we think is undue emphasis on the general aviation-airliner type of collisions, although past history shows that this kind of collision has not been particularly disastrous to the airlines, prior to this time, with respect to passenger fatalities.

To think back, the most disastrous collisions that we have had have been between the airlines themselves. For example, the Grand Canyon and the New York collisions between TWA and United killed more people in each case than the last two collisions at Urbana and Hendersonville combined.

To review briefly, starting on page 6, our recommendations that we forwarded last week to the FAA Administrator, the first was to rigidly enforce present general standards for cockpit visibility and establish more detailed and definitive minimum standards for cockpit visibility for *all* civil aircraft.

I emphasize *all* because we are talking here not only of the new jets and the airline aircraft but also general aviation aircraft. We want to be able to see better out of the front of those airplanes.

Briefly, the background on this goes back a long time. I have attached as an annex to this statement a copy of a petition that AOPA filed with the Civil Aeronautics Board in March 1956 for the establishment of better cockpit visibility standards. To date we do not have those, Mr. Chairman. We have only general standards.

We make these recommendations in the face of a fairly substantial number of our aircraft today flying under IFR rules or under the control of the ground system, if you want to put it that way. Much of this is done in good weather. But regardless of how much of the traffic operates under the IFR rules, the great majority of flying is still done in VFR weather, and even the IFR flight plan traffic must fall back on visual observation of other traffic during certain phases of their operation.

Most States will not license an automobile that has an obstruction to the driver's vision. The District of Columbia, for example, goes so far as to reject a car that has any small decal or sticker on one of its windows, the windshield, or the rear window.

Yet the Federal Government continues to certificate aircraft with much higher speeds, with greatly reduced vision from within the cockpit.

Our second recommendation is to institute rulemaking to require specifically a lookout for other traffic when flying in VFR weather conditions.

Mr. Chairman, at one time there was just such a requirement in the civil air regulations, but it was dropped out somewhere along the line as they were revised over the years. The last time I could find it was about 1949. We do not have this now, although it is implied in several parts of the regulations. We think this should be reinstituted, just as we have a requirement for a lookout on ships at sea.

Our third recommendation is to impose a speed limit of 250 knots in the airspace below 10,000 feet MSL. We also think that a study should be initiated with regard to limiting vertical speeds, climb and descent, in this airspace, and also in connection with the present regulation regarding the 250-knots speed limit below 10,000 feet within 30 miles of destination.

I may point out that departing and en route aircraft are not covered by the latter regulation.

As background for this, Mr. Chairman, we have supported the present speed limits. According to the best figures that we can assemble, approximately 96 percent of all general aviation aircraft flying is done below 10,000 feet. This includes aircraft that are in slow flight configuration for arrival and departure from airports.

Many thousands of airports do not have airport traffic areas which automatically impose a speed limit. We think that it makes no sense to permit aircraft that are designed for operating at higher speeds at the higher altitudes to be operated down in the area where you find aircraft landing and taking off and where the slower traffic usually must operate.

Our next recommendation is to raise the VFR flight visibility requirements to 5 miles for aircraft operating above 10,000 feet at speeds in excess of 250 knots.

Currently we do have this 5-mile limit above 14,500 feet, but it is not connected to a speed factor. We think that 3 miles remains an adequate visibility requirement for the slower speeds, and below 10,000 feet in the context of this recommendation.

Our next recommendation to the Administrator was to establish climb and descent corridors for high-performance aircraft and require such aircraft to use these corridors unless adhering to the speed limits recommended in three above.

Not more than two corridors would be required for any major airport, and the rules would be essentially the same as those we find in the current military climb corridors. There would be no speed restrictions in these corridors. This would permit the airlines and the operators of general aviation turbine-powered equipment to utilize the maximum capability of those aircraft for unrestricted climb and descent which they now are not safely able to do, you might say, in the open airspace.

Part of this is due to the fact that some of these jet aircraft in climb or even in descent configuration, the angle or deck angle of the aircraft is up so that the pilot, as Captain Ruby already testified, cannot really see down below him over the nose even though the aircraft may be descending.

So we think that this concept of the restricted climb corridor for high-performance aircraft is one that should be studied and established by the FAA without delay.

As far as our kind of traffic, general aviation slow traffic going through these corridors, we would use the same procedure we now use with the military climb corridors, where a simple call to controller on the radio will give you permission to transit the corridor if it is clear. Otherwise, we would avoid it.

This may, Mr. Chairman, cause some comment from some general aviation pilots, but we think this is all to the good. It has been recommended to our staff here by a number of our members throughout the country.

Our next recommendation is to assign a high priority to improved conspicuity of aircraft. In other words, let's speed up this process of making airplanes easier to see.

When you know traffic is near sometimes, even when the radar controller tells you you have traffic in a certain direction, it is difficult to see, and sometimes it is so high or so low you can't see it. But we think we need increased effort on reflective paints, distinctive painting schemes, high-intensity lighting, and any other means of enhancement that can be devised to make aircraft more visible to the naked eye.

Some of these ideas have been explored partially in the past, but the emphasis seems to have fallen by the wayside. We would like to see that revitalized.

Our next recommendation is to increase the availability of radar advisories from FAA facilities for the benefit of all traffic.

Right now most general aviation pilots know that they can get radar advisories in a terminal area where radar coverage is available. Most of them do not know that they also can get radar advisories while they are en route under certain conditions. We hope that the FAA will make this service available to more aircraft and a greater part of the time.

Our eighth recommendation was to assign high priority to the development of a proximity warning indicator that is operationally and economically suitable for use by general aviation aircraft.

There was quite a bit of discussion here this morning on the matter of a collision avoidance system with Captain Ruby, and it brought out that this is more or less a sophisticated, high-priced system, and it takes equipment in both airplanes, what we call a cooperative system—I think he termed it a compatible system—before it will work.

We think there is a legitimate requirement for that sophisticated system, particularly in the airline aircraft, because we are coming up now with stretched jets, 747's, SST's, and two of these airplanes with 400 or 500 people each aboard certainly need some kind of a backup device, you might say, to protect them from themselves.

From our point of view, we also need a simple device that will warn us at least of the proximity of another airplane to us, if someone is in our vicinity, a kind of heads up, alert device, so that the pilot will be extra sharp in looking for other traffic.

There is pretty ample evidence over the years that some of the collisions that have occurred have been in clear weather, or at least where the two pilots could have seen each other, and one or the other of the pilots possibly, in most cases, most certainly could have seen the other airplane.

In the case of the Grand Canyon collision the closure rate was on the order of about 40 miles per hour. We think that if there is some kind of device that alerts the pilot that there is some other aircraft in his vicinity—that is, a potential collision, this would go a long way to preventing collisions.

We have recommended to the Administrators of FAA and NASA that they initiate a joint or cooperative project on the development of this warning device. We feel that by pooling the expertise, the manpower, and taking advantage of the research and development authorizations of the two agencies, that they should be able to come up with something in a relatively short period of time that is usable, and that we can carry in the airspace without, you might say, a prohibitive penalty as far as cost, weight, and so on, are concerned.

I would like to make a general comment with respect to the foregoing recommendations: There has been a considerable amount of pressure from some quarters for so-called positive control of all aircraft around major terminals and in the lower airspace along busy airways. This would require the pilot to have an instrument rating, the aircraft to have a transponder and IFR-type equipment.

Positive control is not a guarantee against collision. All the elements of positive control were present in the collision over Staten Island, N.Y., on December 16, 1960, between two airliners in which 134 people were killed.

The FAA currently has proposals outstanding for lowering positive control to 18,000 feet and instituting controlled VFR in such airspace. AOPA is on record as opposing the former and encouraging the latter, although we do not completely agree with the rules proposed by the FAA, particularly with respect to the requirement for a radar transponder in the aircraft.

We also understand, Mr. Chairman, that the FAA has a number of in-house proposals that they are studying at the present time for, you might say, measures to bring forth, as a result of the public furor created by the Asheville and Urbana collisions.

We have had access to some of these proposals. Informally, I might add. We have not yet seen any that would have prevented the Asheville collision, where both aircraft were on IFR flight plans and were under the control of the Asheville ATC facility. I might add that the Asheville tower has neither primary nor secondary radar. A transponder would have done no good there, though primary radar may have helped the controller spot the situation that was developing just prior to the collision.

The current in-house proposals which are being considered by the FAA, among other things, contemplate lowering of positive control down to some fairly low altitudes along the main airways in parts of the country.

These, in effect, would build a series of fences across the country, if you can visualize them as such, and they would impose extremely burdensome restrictions on general avitaion aircraft, and I suspect also on some military aircraft, for the use of this airspace, or even to be able to get from one side of the fence to the other.

What is even worse is that proposals of this type would add a great burden of additional traffic and workload on the controllers at a time when testimony before committees of this Congress, by the FAA, has

indicated that they do not have enough controllers and they may have to curtail services if the FAA appropriations request suffers any significant cutbacks.

How this great additional workload would be absorbed in centers, towers, and flight service stations we have not yet heard from the proponents of these informal proposals in the FAA.

We prefer, Mr. Chairman, that the collision-avoidance proposals be aimed at measures which will help the pilot help himself. We can't put everything on the ground to lead each pilot around by the hand. We must provide the pilots with better means so that they can see out of the cockpit better, so that they have radar advisories on a more timely basis, so that other aircraft are easier to see, so that there are reasonable speeds at the lower airspace, just as we have speed limits on the highways.

We think this is a better approach and it certainly is one that will be less costly to the Federal Government and the taxpayer, not only for operating cost, but also from the viewpoint of liability. This latter point is not to be lightly dismissed. As of April 30, 1967, there were 433 suits outstanding against the Government for claims totaling $203 million as a result of aviation accidents. That was prior to the last unfortunate incident.

Almost $16 million was paid out to settle such claims in the preceding 9 years, prior to the rash of suits that came about as a result of the New York collisions, and so on.

We also have several other recommendations, Mr. Chairman, which begin on page 15, that are not directed to the prevention of collisions, but they are related to aviation safety.

The first of those is to improve the quality, quantity, and scope of the aviation weather program. A little-known fact is that the Federal Aviation Administration is responsible for providing aviation weather requirements to the Environmental Science Services Administration, which includes the U.S. Weather Bureau.

General aviation spokesmen have been trying, without success, to convince the FAA and the Weather Bureau that the present aviation weather services are inadequate to safely fulfill the needs of general aviation. We need regular weather observations from more locations, with greater frequency.

I say that because some locations have only a few observations a day as required to get one or two airline schedules in or out of that particular airport.

We need greatly improved forecasting. The latter is particularly critical since much of the forecasting now is done by computer on a probability basis, and the hapless pilot all too often finds that the actual conditions encountered in flight have no relation to what was forecast before he took off.

With that, our next recommendation goes hand in glove. That is to provide better accessibility to weather information, both to pilots in flight and to pilots on the ground for flight planning purposes.

As it now stands, the pilot has direct contact available with the Weather Bureau station and its trained meteorologists at all-too-few locations. Pilots obtain most of their aviation weather information from FAA flight service stations, and even these are insufficient in number to adequately service all areas where needed.

I think it is history in this committee, Mr. Chairman, that the FAA tried several years ago to reduce the number of these facilities, flight service stations, rather unsuccessfully, I might say. They have curtailed weather broadcasts in many areas, which is compounding the situation as far as the pilot is concerned.

The transcribed weather broadcasts, which are on low frequency and are used by many pilots, particularly in outlying areas, at home, the ranch or the farm, to obtain preflight weather information, have been reduced despite pilot objections.

There further at the moment is a program underway to additionally reduce the scheduled broadcasts on our omni or VOR facilities. We are watching this very closely and we hope this will not further derogate the weather services to the pilot.

Several years ago the FAA made a test of a direct pilot-to-forecaster radio link so that the pilot who was in flight and encountered some unusual weather conditions could call to the ground and talk directly to the forecaster in the Weather Bureau and then get some advice as to what this condition was that he happened to see ahead of him or that was coming up on him. That was a test. The test was terminated, and despite the fact that the overwhelming consensus of pilots was that this was a worthwhile service in the interest of safety, we have not gotten it back.

Until recently it looked as though the FAA had developed a scheme whereby the pilot could call the flight service station and the flight service station would plug him through to the forecaster on what we call a patch cord arrangement through a telephone line. Even this idea has been allowed to die on the vine, despite the fact that we have a frequency that could be used for this by both the airline pilots and ourselves. So we do need action on this.

Our next recommendation was to improve pilot briefing facilities so that pilots have access to this information at more locations. There has been a program worked out jointly between industry and the FAA for a better network of flight service stations designed to provide essential services, including weather briefing, to pilots on a much wider and much more effective basis. They would consist of a basic network of full-time stations, supplemented by a number of smaller part-time stations located on the busier general aviation airports.

We have seen nothing in the way of action to implement this proposal, even though apparently it has agreement within the FAA and has the wholehearted support of the general aviation industry.

Our last recommendation, Mr. Chairman, has to do with the need for general aviation airport facilities. I stress the word facilities because I am talking more than just the airports.

We recommend that the emphasis of the national airport plan be redirected to provide adequate facilities for general aviation, including short parallel runways on major airports, good satellite airports in major metropolitan areas, and an improved system of general aviation airports and facilities in areas where the need exists.

To briefly summarize the need for this, a general aviation aircraft quite frequently has need to use a major airport. This need can arise from a number of things. He may have connecting passengers for the airlines—and one airline has estimated that 30,000 of their passengers last year were brought to the airport or taken away from the airport

by air taxis or other general aviation aircraft. He may have business on that airport or near that airport. This may be the only airport in the vicinity that has adequate facilities for servicing, taxis, food, weather, communications, rental cars, and other things of that nature. So we find that quite frequently the general aviation traffic must use the major airport. They have no other choice.

In many cases, this is not so. If there is an adequate airport somewhere else in the vicinity, if it is convenient, I, for one, for example, would prefer to land on that airport where I am not mixed up with the wing tip vortices and turbulence left by the big jet, where the service is tailored to my needs, and so on.

So we have come up with these recommendations and I think, from the discussion I have had, for example, with some of the representatives in the Airline Pilots Association they also support this, that on some of these major airports if we could put a short parallel runway to one side, a general aviation airplane can use it. It only needs about 3,000 feet of runway and it need not be as wide and not as thick as the 12,000 foot concrete runways needed for the jets. This will expedite traffic. It increases the capacity of the airport. It keeps us out of the turbulence and vortices created by the larger aircraft.

Above all, for the taxpayer, it provides full utility and greater advantage for the facilities than the Government has put on that airport in the way of radar, communications, weather services and so on. So there is a great need for this.

Along with it, we would like to see some good satellite airports, such as were put in, I think, around Minneapolis, that will drain off traffic that does not have to use the major airport. We recognize that some have to use it, but you can drain off a consdierable amount of it if we have good facilities for those people who do not have to go to the major airport. We are at this time, Mr. Chairman, also about to testify before Senator Monroney's committee on airports. We will see that your committee is provided with copies of our testimony there.

(Statement referred to was subsequently submitted and has been placed in committee files.)

Mr. KAYNE. We have noted that the legislative history of the Federal Airport Act talked at great length about encouraging private flying through a nationwide system of good airports. Over the years, in fact, about 20 years since the Federal Airport Act was first passed, we are just about reaching the dollar volume of expenditure for airports originally envisioned in those earlier sessions of Congress. However, the money has gone for only 2,300 airports instead of some 6,000 as originally talked about back in the legislative history.

Despite all the emphasis on general aviation airports, or private flying, as they termed it then, 83 percent of the total expenditures under the Federal Airport Act have gone to airline airports. This is why we say there needs to be a redirection of emphasis under that program.

One additional point I would like to clarify. On the recommendations I have outlined, because I was summarizing and not reading my text specifically, the first eight recommendations were in the letter that we sent to General McKee on August 23. The additional four