recommendations were not in that letter to General McKee. We have added them for the purpose of this testimony. We realize that the FAA has not had time to study our recommendations in depth, even though some of them were known to their staff for some time before this. We do expect to be working with the FAA and with others in the aviation community, as time goes on, since we, like all other pilots, have a vital interest in safety in the air.

While the Government has the responsibility for safety programs in the public interest, the pilots who fly have a much more personal and compelling interest in this subject because the life that they save may be their own.

On behalf of our association of 138,000 members, Mr. Chairman, I wish to express our appreciation for your courtesy in hearing our views.

Thank you.

(Mr. Kayne's full statement follows:)

STATEMENT OF VICTOR J. KAYNE, VICE PRESIDENT, POLICY AND TECHNICAL PLANNING, AIRCRAFT OWNERS AND PILOTS ASSOCIATION

Mr. Chairman, my name is Victor J. Kayne. I am Vice President, Policy and Technical Planning, of the Aircraft Owners and Pilots Association, commonly referred to as AOPA. AOPA is a service association comprised of over 138,000 members who own or fly aircraft for personal, business or pleasure purposes. A summary of the nature of our organization is contained in Annex A to this statement. My personal qualifications are outlined in Annex B.

We appreciate the opportunity to present our views on aviation safety.

WHAT IS GENERAL AVIATION?

Our type of flying encompasses all civil flying other than that done by the airlines and is known as "general aviation." It is the fastest-growing segment of the aviation community. The active fleet of general aviation aircraft numbered more than 104,000 planes at the beginning of this year and our airplane manufacturers are turning out new planes at a rate that exceeded 15,000 last year. The average list price of these new aircraft was over $37,000. These aircraft are flown by approximately 500,000 pilots for personal transportation and a large variety of business reasons. By comparison, the total airline fleet numbers slightly over 2,000 aircraft. General aviation is playing an increasingly important role in our national economy through the flexibility and utility that it offers in a vast number of industrial, agricultural and other business applications. It is a modern day tool that serves farmers, foresters, salesmen, engineers, executives, scientists, doctors and a host of other occupations in addition to its lesser use for personal transportation for pleasure and recreation. According to FAA statistics, general aviation flew some 21 million hours in 1966. This was divided as follows: Pleasure flying 24%; Business flying 34%; Commercial 16%, and Instruction 26%.

With regard to the future, the FAA has predicted that the general aviation fleet will number 180,000 aircraft by 1977. However, they also forecast only 17.5 million hours for 1966, whereas general aviation actually flew 21 million hours. This is consistent with a past history of the FAA to underestimate general aviation activity, and we think that the forecast of 180,000 aircraft by 1977 also may be understated by 20,000 or more units.

To round out this picture of general aviation, there are some 9,600 airports in the United States that are used by general aviation. The airlines serve only 600, in round numbers. Air service to the remaining 9,000 airports is solely general aviation. One airline alone has estimated that 30,000 of its passengers last year connected at the major airports by air taxi or other general aviation aircraft. At the 304 airports where the FAA has control towers and a record is made of aircraft operations, general aviation accounted for more than 33 million landings and takeoffs in 1966, or 74 percent of the total operations at these airports.

ACCIDENTS AND THE SAFETY RECORD

According to the figures that we have received from the FAA and the CAB, general aviation suffered 5,425 accidents in 1966. An accident is counted as such when damage to the aircraft is over $300. Quite often, the so-called "accident" is nothing more than a minor mishap quite like minor auto accidents resulting in bent fenders and the like. Of the total number of accidents, 538 of these resulted in fatalities, killing a total of 1,069 people, which includes passenger and crew fatalities. We mention the latter because the general aviation fatality record often is compared to air carrier passenger fatalities, without counting air carrier crews or other persons.

The total general aviation accident *rate* for 1966 was 25.5 per 100,000 flying hours. This is the best record to date and compares with 1965 at 31.4, 1964 at 32.2, 1963 at 31.0 and 1951 at 45.2. Fatalities for 1966 in general aviation reached an all-time low of 5.085 per 100,000 flying hours and was lower than the 5.323 of the U.S. scheduled airlines. Annex C details the record back to 1950.

PILOT TRAINING AND PROFICIENCY

Private pilots are quite often the subject of criticism because they do not have the proficiency and knowledge of the professional pilots who man the airlines and the large corporate and business airplanes. However, professional pilots are not born or produced fully experienced by some magic process. They all start as student pilots and progress through the private pilot stage while learning the professional skills that will enable them to make a living as a paid pilot. Last year, the FAA issued approximately 128,000 new student certificates. While there are many dropouts along the way to achieving the necessary training and passing the FAA written and flight examinations, many of these students eventually will be released by their instructors and become private pilots. Recognizing that many private pilots, and even some commercial pilots, may have been flying for some time since they last brushed up on their technique, AOPA has developed a series of upgrade training courses and has sponsored flight training or refresher clinics around the nation for the past several years. These clinics are manned by some of the nation's finest flight instructors, including some airline captains who have maintained their instructing proficiency. To date, more than 18,000 pilots have been through the various flight and ground school courses of these clinics.

SAFETY RECOMMENDATIONS

The AOPA staff has a number of safety programs under study, some of which have been informally discussed with the various FAA staff echelons, while other recommendations had been formally proposed to the various responsible agencies over the years. Last week, on August 23, 1967, we sent a letter to General McKee, the FAA Administrator, urging action on a number of these items. I will briefly review them here for you.

AVOIDANCE OF COLLISION

The recent collisions at Urbana and Hendersonville have focused attention on the midair collision problem. Over the years, there have been a number of collisions between various combinations of airline, military and general aviation aircraft. These last two collisions have brought undue emphasis on the general aviation-airline type of collisions, although past history will show that this type of collision has not been particularly disastrous to the airlines with respect to passenger fatalities. The most disastrous collisions 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 combined. A recap of the midair collisions back to 1955 is contained in Annex D.

The present trend of design and manufacture of airplanes for the airlines is toward "jumbo" and "stretched" jets that will hold up to 500 passengers. With this kind of a human cargo, it is obvious that the airlines, above all, must take additional steps to protect themselves from each other. General aviation also has a grave concern with the matter of avoiding collision, primarily from the viewpoint of self-preservation. We worry about being hit from the rear or in some other blind spot by one of these giant jets in which the pilots are pre-

occupied with in-cockpit procedures and do not have a good view out of the cockpit, even when they do have time to look out for other traffic. Accordingly, we have made the following recommendations to the FAA Administrator:

(1) Rigidly enforce present general standards for cockpit visibility and establish more detailed and definitive minimum standards for cockpit visibility for all civil aircraft.

Background

AOPA's active interest in this subject dates back many years. In an editorial in the October 1941 Pilot, we stressed the limited visibility from the average military aircraft cockpit and urged our members to be alert for other traffic that might not have good visibility from the cockpit. In 1949, AOPA brought the limited cockpit visibility of some airline aircraft to light in testimony before the CAB accident investigating team concerned with the collision between a P–38 and Eastern Air Lines at Washington National Airport. The CAA Experimental Station at Indianapolis worked on this subject for several years, making studies and surveys of cockpit visibility. Little was done to incorporate realistic standards in the airworthiness requirements, although general standards now exist in Parts 23 and 25 of the Federal Aviation Regulations (Annex E). AOPA formally petitioned the CAB on March 19, 1956, for the establishment of realistic cockpit visibility standards in both Part 3 and Part 4 of the Civil Air Regulations (Annex F). Strong objection from the airframe manufacturers prevented any effective action and this problem is still with us in the face of ever-increasing traffic. 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 any 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.

(2) Institute rule making to specifically require a lookout for other traffic when flying in VFR weather conditions.

Background

Over the years there have been a number of collisions wherein the aircraft were operating in VFR weather and the closure rates were relatively low. In many of these cases, there exists a good possibility that the collision could have been avoided if the pilots of the aircraft were maintaining a lookout for other traffic. Until a few years ago, the Civil Air Regulations, Part 60, indicated that one example of careless and reckless operation was "Lack of vigilance by the pilot to observe and avoid other air traffic." This was in a 1949 edition of Part 60, yet was dropped despite an increasing population of aircraft in the airspace. Avoidance of other traffic is *implied* in Parts 91.65 and 91.67 of the present Regulations. A specific requirement should be reinstituted.

(3) Impose a speed limit of 250 knots in the airspace below 10,000 feet MSL. Initiate a study with regard to limiting vertical speeds in this airspace and also in connection with the present regulation regarding the 250-knot speed limit below 10,000 feet within 30 miles of destination. Departing and en route aircraft are not covered by the latter regulation.

Background

AOPA has supported the present speed limits in airport traffic areas and below 10,000 feet for arriving aircraft. Approximately 96 percent of all general aviation aircraft flying is done below 10,000 feet MSL. This includes aircraft that are in slow flight configuration for arrival and departure from airports. Many thousands of these airports do not have airport traffic areas. The higher speed aircraft, particularly those with turbine power, usually are designed for greater operational efficiency at the higher altitudes and it makes no sense to permit these aircraft to operate at high speeds in the lower airspace, which must be used by the slower traffic, including aircraft landing and taking off.

(4) Raise the VFR flight visibility requirements to five miles for aircraft operating above 10,000 feet MSL at speeds in excess of 250 knots.

Background

There has been a considerable amount of discussion and study over the years with regard to proposals to raise the present three-mile VFR visibility requirement to five miles. This was done in the continental control area above 14,500 feet on the basis of high-speed aircraft operating in the upper airspace. Three miles remains an adequate visibility requirement for the slower speeds of 250 knots and below in the context of our recommendation for a speed limit below 10,000 feet. In the airspace above 10,000 feet MSL, where higher speeds would be permitted, increased visibility would appear to be a valid requirement for those aircraft that are operating at the higher speeds.

(5) Establish climb and descent corridors for high performance aircrift and require such aircraft to use these corridors unless adhering to the speed limits recommended in 3 above. Not more than two corridors should be established at any airport. The applicable rules would be essentially the same as those for military climb corridors. There would be no speed restrictions in the corridors.

Background

The airlines and the operators of general aviation turbine-powered aircraft are not able to utilize the maximum climb and descent capabilities of their aircraft with complete safety today because of the inabiilty to see and avoid other aircraft or to take evasive action on a timely basis under conditions of high rate of climb or descent. This is especially true of many aircraft that have a high deck angle during such maneuvers. The climb corridor concept would expedite traffic safely and would permit better utilization of the characteristics of these high performance aircraft during climb and descent. Other aircraft would be permitted to transit or cross the corridor by means of a simple radio call to the traffic controller for transit permission. Two corridors only would be needed at each major airport, serving the most used directions of approach and departure. The needs of other runways not aligned with the corridor could be served by a combination of the airspace in the corridor and that of the 2,000 feet of airport traffic area extending at a five-mile radius around the airport, wherein communications with the tower already are required under most circumstances. Speed outside the corridor, but within the airport traffic area would be subject to the existing speed limits with authortiy for ATC to waive it if traffic conditions permit.

(6) Assign a high priority to improved conspicuity of aircraft.

Background

A considerable amount of effort has been expended in several different fields with respect to making an aircraft easily discernible to another pilot in the air. The efforts in this field have included reflective paints, distinctive painting schemes, high-intensity lighting and other means of enhancement of conspicuity. Several of these ideas have been partially explored, but the development efforts seem to have tapered off due to some of the difficulties encountered or to a degree of indifference with respect to activities in this field as compared to more glamorous devices for detection of other traffic.

(7) Increase the availability of radar advisories for all traffic.

Background

Most pilots know about and can get terminal area radar advisories. However, many pilots do not know that they also can get radar advisories while en route under the VFR rules. Further, the provision of this service is at the discretion of the controller and many times a pilot is refused service because the controller is "too busy with IFR flight plan traffic." This tends to discourage VFR pilots from even trying to use the en route radar system. The FAA must take positive steps to make this traffic advisory service available to all users of the airspace where radar coverage is available.

(8) Assign high priority to the development of a proximity warning indicator (PWI) that is operationally and economically suitable for use by general aviation aircraft.

Background

The AOPA staff has participated in the deliberations of the FAA-sponsored Collision Prevention Advisory Group for some eight years in reviewing all proposed developments in the collision prevention field. Our objec-

tive is to see that any system adopted for national use, and particularly one that may become a regulatory requirement for flying in certain airspace, is operationally and economically acceptable to general aviation. AOPA's stated objective is for the development of a simple proximity warning device that could become a building block for a sophisticated collision avoidance system (CAS). The PWI would merely give the pilot warning of the presence of another aircraft, whereas the CAS would also indicate to the pilot what evasive action should be taken. Obviously, the CAS must incorporate a highly accurate detection and ranging device, coupled with altitude information, and then process this through a computer to give the pilot evasive instructions. The airlines currently are pushing a cooperative CAS which would work only with other aircraft having the same equipment. Essentially, this is the system developed by McDonnell Aircraft with a current price tag of $60,000 per installation. The production price has been estimated from that figure downward to $30,000. We recognize that the airlines must have some system to protect them from themselves in order to avoid a monstrous catastrophe such as a collision between two 747's with four hundred passengers each. However, it is also obvious that there could be some misguided action to try to force general aviation into using any basic system adopted by the airlines. A $30,000-plus device certainly is not suitable for general aviation.

We have recommended to the Administrators of the FAA and NASA that the two agencies initiate a joint or cooperative project for the development of a proximity warning device that is economically and operationally suitable for use by all civil aircraft. This would be done through cooperative use of the expertise, manpower and R. & D. authorizations of the two agencies. NASA in particular has a rather large budget for aeronautical research. Congressman Fascell has introduced a bill, H.R. 11677, directing the FAA Administrator to research the development of such a device.

GENERAL COMMENT

There has been a considerable amount of pressure from some quarters for "positive control" of all aircraft around major terminals and in the lower airspace along busy airways. This would require an instrument rating, a transponder and IFR type equipment in the aircraft. Positive control is not a guarantee against collision, since 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 agree with the rules proposed by the FAA, particularly with respect to the requirement for a radar transponder on the aircraft.

We now understand that a number of in-house proposals are being evaluated by the FAA staff with regard to imposing positive control down to the lower altitudes on some of the more heavily traveled airways and possibly in some of the busier terminal areas. These proposals are a direct outgrowth of the public furor created by misleading reports on the Asheville collision. However, they still would not have prevented the Asheville collission where both aircraft were on IFR flight plans and were under the control of the Asheville ATC facility. Asheville has neither primary nor secondary radar, thus making the addition of a transponder requirement irrelevant. Likewise, these proposals would not have prevented the Dayton collission. In fact, they would not have prevented any of the most disastrous collissions over the last few years, such as TWA and United over New York City or Eastern and TWA over Long Island.

The current in-house proposals being considered by the FAA would, in effect, build a series of fences across the navigable airspace and impose extremely burdensome restrictions on general aviation aircraft for the use of this airspace, or to even be able to get through it from one side of the fence to the other. They also would add a great burden of additional traffic and workload on the controllers at a time when testimony before committees of the Congress indicates that the FAA does not have enough controllers and may have to curtail services if the FAA appropriation request suffers any significant cutbacks. How this great additional workload would be absorbed in the air traffic control centers, towers and flight service stations has not yet been developed by the proponents of these proposals.

In summary, AOPA believes that measures to enhance the avoidance of collision should be directed primarily at helping the pilot through improved visibility out of the cockpit, a requirement to watch for other traffic (just as we have at sea), warning devices to alert the pilot as to the proximity of other traffic, sensible speed limits in the airspace (just as we have on the highways), better traffic information and enhanced conspicuity of aircraft. Some of the approaches being considered by the FAA would not significantly help the situation, would place grave restrictions on general aviation and would gather to the Government a tremendous liability and responsibility in connection with a manyfold increase in traffic under the control of the Federal controllers. The impact on the Federal budget would be severe, just for operating cost alone, not even considering the liability factor. The latter 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. Almost $16 million was paid out to settle such claims in the preceding nine years.

The foregoing recommendations have been directed at the prevention of collisions. There are other areas wherein action is needed by the FAA to improve safety and these are detailed below.

AVIATION WEATHER SERVICE

(9) Improve the quality, quantity and scope of the aviation weather program.

Background

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. Senator Peter Dominick, himself an experienced pilot, spoke to the needs of his own state of Colorado in this respect on the floor of the Senate on August 18, 1967. The needs of his state are reflected in almost all other states and the Civil Aeronautics Board has listed weather as a contributing factor in a significant number of general aviation accidents. We need regular weather observations from more locations, with greater frequency (some locations have only a few observations a day as required to get one or two airline schedules in and out), and 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.

PILOT ACCESS TO WEATHER INFORMATION

(10) Provide better accessibility to weather information, both to pilots in flight and to pilots on the ground for flight planning purposes.

Background

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. The FAA has tried to reduce the number of these facilities, and has curtailed weather broadcasts in many areas, thus compounding this situation. The transcribed weather broadcasts on low frequency stations, which are used by many pilots, particularly in outlying areas, to obtain preflight weather information, have been reduced despite pilot objections. Now, the FAA is emasculating the scheduled broadcasts on the VOR facilities. Further, the FAA made a test of a direct pilot-to-forecaster radio link so that the pilot in flight could discuss his weather problems directly with the Weather Bureau forecaster, and despite the overwhelming consensus of pilots that this was a good safety program, the FAA has dropped the idea. Until recently, it looked as though the FAA had developed a scheme whereby the pilot could call the FSS and be plugged through to the forecaster by a "patchcord" arrangement, but even this idea has been allowed to die on the vine despite the fact that a frequency is available and the service is much needed.

IMPROVED PILOT BRIEFING FACILITIES

(11) Place into effect the new flight service station program jointly worked out by industry and the FAA.

Background

AOPA and other aviation organizations have worked with the FAA in a series of meetings for many months to develop a program for a better network of flight service stations designed to provide essential services, including weather briefing to pilots, on a much wider and more effective basis than the existing system. The new system 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 understand that this proposed new system has the approval of top FAA echelon, but there is yet no evidence of it being placed into effect. The greatly increased briefing capabilities of the proposed system would make essential weather and other flight information available to many more pilots than under the existing system and would greatly enhance safety.

THE NEED FOR GENERAL AVIATION AIRPORT FACILITIES

(12) Redirect the emphasis of the National Airport Plan 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.

Background

There has been much loose talk about banning general aviation from the major airports. This is not practical from either a legal or a practical viewpoint. These public airports must serve all comers and there are many general aviation flights that must use the major airports because of the nature of their business, which quite frequently consists of handling connecting passengers for the airlines, or the fact that no other suitable airport exists. Short parallel runways will greatly expedite traffic handling and will enhance safety by allowing the general aviation aircraft to stay out of the areas of dangerous vortices created by the larger aircraft. Good satellite airports, with adequate facilities, will attract general aviation traffic that does not have to go to the major airport. Most pilots would prefer such an arrangement, but good facilities generally do not exist today in many metropolitan areas, leaving the pilot no choice. In other areas, there is a great need for improved general aviation airports.

The legislative history of the Federal Airport Act is crystal clear about the intent of the Congress being to encourage private flying through a nationwide system of good airports, reaching a total of some 6,000 airports in seven years at an expenditure of over one billion dollars. The need for airports for private flying was recognized as a legitimate need and the major thrust of the justification for the Act was oriented to this objective. However, over the years, the original intent has been perverted to the point that now, just twenty years later, the total program is just reaching the billion-dollar level—and for about 2,300 airports instead of 6,000—with 83 percent of the total expenditures having gone to airline airports. The present priority system of the FAA for Federal aid expenditures for airports further emphasizes this derogation of the original intent of the Act by placing top priority on the needs of the commercial operators to the detriment of the needs of general aviation. AOPA recommended a revised schedule of priorities to the FAA Administrator in June of 1966 (Annex G) that more nearly meets the intent of the Federal Airport Act, as expressed in the legislative history.

AOPA has urged the FAA Administrator to take action on the above recommendations and we stand ready to assist the FAA in these programs in every way that we can. We realize that the FAA has not had time to study our August 23 letter in depth, even though some of the recommendations were known to their staff for quite some time. We expect to be working with them as time goes on since we do have a vital interest in safety in the air. While the Government has the responsibility for safety programs in the public interest, the pilots who fly

have a much more personal and compelling interest in this subject because the life that they save may be their own.

On behalf of our association, I wish to express our appreciation for your courtesy in hearing our views on aviation safety.

ANNEX A

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

The Aircraft Owners and Pilots Association is an organization which provides services to more than 138,000 members located in every state in the Union. It is a non-profit association incorporated under the laws of New Jersey.

Purpose

It was formed in 1938 to promote, protect and represent the interest of its members in aeronautics and the pursuit of flying; to promote economy, safety, popularity and use of aircraft by members. To accomplish these purposes, we seek several specific objectives: maximum freedom of the airspace for all users consistent with safety, improved aviation safety, an adequate airport system, an adequate system of air navigation aids, production of improved aircraft, reduction of frustrations in aircraft ownership and use, facilitation of international travel by private aircraft and wider public support of general aviation requirements.

Membership

Half of the active general aviation aircraft in the United States are owned and operated by our members. Our 138,000 members comprise about 30% of all the active civil pilots in the entire country. Sixty-three percent (63%) of our members hold private certificates, 24% hold commercial certificates, 2% hold airline transport ratings, 8% hold student certificates and the balance are pilots in military service. OAPA is not a professional or trade association in the common sense of these terms. The majority of our members are non-professional pilots and therefore do not join for the usual professional or commercial reasons characteristic of unions or business trade associations. AOPA is a service organization more analogous to the American Automobile Association or the National Rifle Association.

AOPA staff

To serve our members, who fly for business, personal and recreational purposes, we have assembled a full-time staff of 127 people. Our professional staff is composed of specialists who are acknowledged experts in their respective fields. We cover virtually every field of significant interest to the owner or pilot of non-commercial aircraft. Many of these fields are also of interest to commercial operators. Our headquarters is located in Bethesda, Maryland.

Method of policy formulation

You will recognize the inherent problem in policy formulation in an organization with so large a membership. It is not unlike your own problems in representing your constituents on specific issues. Like you, we pay very close attention to the substance and volume of mail from our members, as well as our personal contacts with members throughout the country. AOPA policy is formulated, in the light of extensive member comment, by the professional staff members, who combine their knowledge, background and understanding of aviation problems. Our rapid growth in 28 years from zero to 138,000 members, is practical testimony to the success of this method and the accuracy with which our staff reflects member desires—for our support depends upon voluntary membership.

ANNEX B

VICTOR J. KAYNE

Starting his career in aviation in 1930, Mr. Kayne worked in several phases of general aviation operations, including work as an A & E mechanic. He came into air traffic control as a member of the original staff of the control tower at the old Washington-Hoover Airport in 1935, when ATC was a municipal and private-industry operation. He was the first chief of the Washington National

Airport Control Tower and was assistant chief of the CAA headquarters, Division of Airways Operations when he resigned from Government in 1954 to enter private business. He was the first controller to apply for a controller's license under the Civil Aeronautics Act of 1938. He assisted CAA in developing the first airport traffic control manual, and wrote many of the procedures still in use today.

When the United States entered World War II, Mr. Kayne was assigned to assisting in the establishment of air traffic control facilities used by military and civil aircraft. In 1942, after serving briefly as ATC inspector at Fort Worth, Texas, he was called back to Washington and promoted to inspector-at-large for all CAA air traffic control facilities.

Mr. Kayne headed a mission to Brazil in 1944 to help the U.S. Fourth Fleet establish air traffic control and air navigation facilities. Brazil's present airways system is an outgrowth of his extensive work with the Brazilian Air Ministry.

While assistant chief of the CAA Air Traffic Control Division, he was selected to act as U.S. spokesman on air traffic control at International Civil Aviation Organization regional meetings at Seattle, Washington, New Delhi, India, and London, England, in 1948 and 1949. During the same period, he worked closely with the Canadian Department of Transport to standardize Canadian and U.S. air traffic control systems.

While deputy chief of the Air Traffic Control Division in 1950, he established procedures for the control and protection of air traffic in the vicinity of the then highly secret atomic energy tests about to be staged near Las Vegas, Nevada.

Mr. Kayne has been with AOPA since 1956 and currently is Vice President, Policy and Technical Planning. In this position, he is responsible for AOPA policy in the fields of air traffic control, communications, airspace, airports, legislative and international matters.

Mr. Kayne is a private pilot and formerly held second-class radio operator and Airframe and Engine mechanic licenses. He was among the group of controllers that founded the Air Traffic Control Association and holds membership number P–42 in that Association.

ANNEX C

FATALITIES PER 100,000 HOURS FLOWN

Year	Air carrier			General aviation		
	Total fatalities	Total hours	Rate	Total fatalities	Total hours	Rate
1950	205	2,561,900	8.001	871	9,650,000	9.025
1951	323	2,799,900	11.536	750	8,451,000	8.874
1952	246	3,030,800	8.116	691	8,186,000	8.441
1953	312	3,271,900	9.535	653	8,527,000	7.446
1954	40	3,294,100	1.214	684	8,963,000	7.631
1955	271	3,672,500	7.379	619	9,500,000	6.515
1956	174	4,031,000	4,316	669	10,200,000	6.558
1957	98	4,443,500	2.205	800	10,938,000	7.313
1958	160	4,860,000	3.292	717	12,579,000	5.699
1959	340	5,060,000	6.719	823	12,903,000	6.478
1960	499	4,660,000	10.708	787	13,121,000	5.998
1961	311	4,190,000	7.422	761	13,602,000	5.594
1962	330	4,110,000	8.029	857	14,500,000	5.910
1963	264	4,130,000	6,392	893	15,106,000	5.911
1964	238	4,359,445	5.459	1,056	15,738,000	6.709
1965	261	4,743,533	5.502	1,018	16,733,000	6.083
1966	272	5,109,992	5.323	1,069	21,023,000	5.085
Average			6.538			6.781

Source: FAA Statistical Handbook, 1966, except air carrier hours for 1950–57 from FAA, and include scheduled service only; nonscheduled not available; and hours for 1958–63 from CAB. If hours for nonscheduled operations were available the rate would be insignificantly lower. Rate calculated by AOPA.

ANNEX D

MIDAIR COLLISIONS

AIR CARRIER-GENERAL AVIATION MIDAIR COLLISIONS, 1955-67

Date	Location	Fatalities	
		Air carrier	General aviation
January 1955	Covington, Ky	13	2
July 1955	Kansas City, Mo	0	2
August 1955	Hobbs, N. Mex	0	0
June 1956	Bartlesville, Okla	0	0
April 1960	Hickory, N.C	0	4
October 1960	Orlando, Fla	0	1
Do	McClellan AFB, Calif	0	2
November 1960	Denver, Colo	0	0
June 1966	Columbia City, Ind	2	1
March 1967	Urbana, Ohio	25	1
July 1967	Hendersonville, N.C	79	3

AIR CARRIER-AIR CARRIER MIDAIR COLLISIONS, 1955-67

Date	Location	Fatalities
June 1956	Grand Canyon, Ariz	128
December 1960	New York, N.Y	[1] 128
December 1965	Westchester, N.Y	4

[1] And 6 on ground.

The above tabulation does not include the accident off Jones Beach, New York, wherein an Eastern Air Lines DC-7 dived into the ocean with 84 persons aboard as the result of an evasive maneuver to avoid a Pan American 707. This actually was not a collision, but the loss of life resulting from the attempt to avoid a collision is just as real as if Eastern had been struck down in a collision.

It is interesting to note that in more than one-half of the cases cited above, at least one of the aircraft, and usually both of them, were under air traffic control at the time of the accident.

ANNEX E

EXCERPTS FROM THE FEDERAL AVIATION REGULATIONS

23.773 Pilot Compartment View

(*a*) Each pilot compartment must be free from glare and reflections that could interfere with the pilot's vision, and designed so that—

(1) The pilot's view is sufficient extensive, clear, and undistorted, for safe operation; and

(2) Each pilot is protected from the elements so that moderate rain conditions do not unduly impair his view of the flight path in normal flight and while landing.

(*b*) If certification for night operation is requested, compliance with paragraph (a) of this section must be shown in night flight tests.

25.773 Pilot Compartment View

(*a*) *Nonprecipitation conditions.*—For nonprecipitation conditions, the following apply:

(1) Each pilot compartment must be arranged to give the pilots a sufficiently extensive, clear, and undistorted view, to enable them to safely perform any maneuvers within the operating limitations of the airplane, including taxiing, takeoff, approach, and landing.

(2) Each pilot compartment must be free of glare and reflection that could interfere with the normal duties of the minimum flight crew (established under 25.1523). This must be shown in day and night flight tests under nonprecipitation conditions.

(*b*) *Precipitation conditions.*—For precipitation conditions, the following apply:

(1) The airplane must have a means to maintain a clear portion of the windshield, during precipitation conditions, sufficient for both pilots to have a sufficiently extensive view along the flight path in normal flight attitudes of the airplane. This means must be designed to function, without continuous attention on the part of the crew, in—

(i) Heavy rain at speeds up to 1.6 VS1, with flaps retracted.;

(ii) The icing conditions specified in 25.1419 if certification with ice protection provisions is requested.

(2) The first pilot must have a window that—

(i) When the cabin is not pressurized, is openable under the conditions prescribed in subparagraph (1) of this paragraph and provides the view specified in that paragraph; and

(ii) Gives sufficient protection from the elements against impairment of the pilot's vision.

ANNEX F

BEFORE THE CIVIL AERONAUTICS BOARD, WASHINGTON, D.C.

(Docket No. —)

Aircraft Owners and Pilots Association, Petitioners v. *Civil Aeronautics Board, Respondent*

PETITION TO AMEND CIVIL AIR REGULATIONS

The Aircraft Owners and Pilots Association hereby requests that the Civil Aeronautics Board amend Sections 3.382 and 4b.351 of the Civil Air Regulations to provide specific measurable visibility standards from the pilot's seat with respect to the following:

(*a*) Angle forward above the horizon unbroken.
(*b*) Angle forward below the horizon unbroken.
(*c*) Angle above the horizon 90° to left.
(*d*) Angle below the horizon 90° to left.
(*e*) Angle to the left.
(*f*) Angle to the right.

It is further requested that definite and measurable standards be fixed requiring visibility from the cockpit directly above, below and to the rear of the aircraft either by direct view, by optical means, or other devices.

This petition is based upon the following facts:

The present regulations Sections 3.382 and 4b.351 above specified are general in terms and do not provide for adequate minimum standards of cockpit visibility. Air carrier aircraft which have been built under the standards of Part 4 and subsequently Part 4b of the Civil Air Regulations are inadequate with respect to cockpit visibility. Of six models of air carrier aircraft examined, not one met the minimum standards recommended by Report No. 32 of Committee S–7 of the Society of Automotive Engineers, Inc., which is composed of twelve representatives of airline and large plane manufacturers.

The record of aircraft collisions demonstrates that an important factor common to the collisions, which factor caused or contributed substantially to the cause of the accidents, was the limited visibility from the cockpit of either one or both of the planes involved.

Respectfully submitted.

AIRCRAFT OWNERS & PILOTS ASSOCIATION
By J. B. HARTRANFT, JR.
President—Petitioner.

STATE OF MARYLAND,
County of Montgomery, ss:

J. B. Hartranft, Jr., being first duly sworn deposes and says that he is President of Aircraft Owners and Pilots Association, Petitioner in the foregoing petition; that he has read the foregoing petition and that to the best of his informa-

tion and belief every statement contained in the petition is true and no statement in the petition is misleading.

J. B. HARTRANFT, Jr.

Sworn to and subscribed before me this 15th day of March, 1956.

CLARENCE C. KEISER,
Notary Public.

My commission expires May 6, 1957.

ANNEX G

AOPA POSITION: FAAP PRIORITIES

1. *Statutory Basis.*—The Federal Airport Act provides in Sec. 3 that the National Airport Plan is "to provide a system of public airports adequate to anticipate and meet the needs of civil aeronautics . . . and shall not be limited to any classes or categories of public airports" and that the Administrator shall "take into account the needs of both air commerce and private flying . . ."

The Act provides in Sec. 4 that the Administrator may grant funds for ". . . the establishment of a Nationwide system of public airports adequate to meet the present and future needs of civil aeronautics . . ."

2. *Agency Policy.*—Priorities for Allocation of Federal Funds are established by AC 150/5100–2 dated 5/9/66 and Policy Statement dated 5/24/66.

3. *AOPA agrees that.*—(a) Requests exceed funds available; (b) Priorities are necessary; (c) Best use of available funds should be made.

4. *AOPA disagrees with.*—(a) The priorities established; (b) the underlying concept that funds should be concentrated at airports with a "significant volume of commercial air traffic" regardless of the fact that other airports needed to complete the system have not been established.

5. *AOPA Recommended Priority.*—Requests for aid should be satisfied in the following order:

(*a*) Initial purchase of land and initial development to provide a new public airport to complete the National Airport Plan.

(*b*) Provision of improvements to meet minimum standards for elementary (i.e., parking, lighting, etc.) airport facilities.

(*c*) Provision or improvement of airports to relieve congestion at major airports in metropolitan areas.

(*d*) Provision of Category I capability at airports without any instrument capability.

(e) Improvements to provide additional runway and ramp capacity at existing airports.

(*f*) Provision of Category II capability.

(*g*) Improvements to existing facilities by enlarging, strengthening or marking runways, taxiways and ramps.

(*h*) Provision of Category III capability.

REASONS FOR AOPA POSITION ON FAAP PRIORITIES

(1) The primary purpose of the Federal Airport Act is to establish a nationwide system of airports to meet existing and future needs of civil aeronautics. All other considerations are secondary.

(2) The best use of Federal aid is to encourage provision of fundamental and essential facilities. Improvements above this minimum level should take lesser priority in the order of their sophistication.

(3) Loss of privately-owned, public-use airports due to tax and economic pressure is creating an airport shortage. The surest remedy is public ownership.

(4) The ability of a community to survive depends on its ability to participate in the air commerce system. Carriage for hire is only a part of air commerce. Not-for-hire operations are also vital to the economy.

(5) Completing the airport system will serve more additional people and their communities than adding improvements to a few airports.

(6) Meeting existing needs will pave the way for satisfying more sophisticated future needs by making more of the public aware of the benefits of airport development.

(7) AOPA's priority list is more likely to generate broader public and congressional support for airport development since it enables new service for new peo-

ple and new communities instead of merely improving service for those already served.

(8) The high priority projects:

(*a*) Are generally low in cost and therefore a great number can be undertaken.

(*b*) Will procure the most time and cost critical item—land—which will increase in cost more rapidly than labor or material.

(*c*) Will expand and complete the system, thereby making the aircraft and each existing airport even more useful and valuable.

(*d*) Will not eliminate low priority projects because the number and cost of high priority projects is unlikely to require all the funds, whereas satisfying sophisticated requirements first is likely to preempt most funds; nor is there sufficient money to complete all such projects anyway.

Mr. FRIEDEL. I want to thank you very much, Mr. Kayne. I will reserve my time.

Mr. Dingell, have you questions?

Mr. DINGELL. No questions, Mr. Chairman.

Mr. FRIEDEL. Mr. Devine?

Mr. DEVINE. I am glad you appeared here today. One, you are in a position to give us valuable information, and, two, I have had a good bit of mail from the general aviation segment, which always seems to be in a defensive position. Apparently they feel they have been badly handled by the press or someone because every time there is a midair collision there is an inference that it is the fault of general aviation. I think that is one of the reasons we asked the representative of AOPA to appear, in order that you may give your views on the subject and point out that all these accidents, of course, are not due to private aviation. You have a very rich background. I have read your biography that is attached to your statement. You are aware of all the problems of the air traffic controllers. I think that is one of the sensitive areas that has to do with air safety, particularly midair collisions.

In going over your testimony, I would like to ask one question in the area of visibility. You point out in your statement that there is a strong objection to increased visibility, or at least changing the air frame structure by the air frame manufacturers. Would you tell the committee for the record why is there that objection? What is the reason?

Mr. KAYNE. Mr. Devine, I think you are referring to my statement which was carried more or less in full starting on page 6 of the written testimony. We did include a statement there. This is more or less historical at this point. There was a statement that there was strong objection from the airframe manufacturers with respect to imposing, you might say, rigid and detailed minimum standards for cockpit visibility. Captain Ruby very competently touched on that this morning when he, in effect, stressed some of the difficulties that an airframe manufacturer has in increasing the visibility for the pilot from within the cockpit.

Mr. DEVINE. He suggested decreasing, actually, in the more sophisticated aircraft. In the SST when we saw the mockup on the west coast, they have to drop the nose prior to landing so they can see when they come in.

Mr. KAYNE. I believe there are some foreign models of the SST projected that will have a shield that will drop in front of the windshield when they are at high altitude in flight, to protect the windshield from undue heat and pressure, and so on.

In any event, obviously, as airplanes got faster and the pressure or stress on the hull of the airplane, including the windshield became greater, the tendency, of course, was to make the windshield smaller and stronger. If you have a large expanse of glass, this means that the glass has to be much stronger to withstand the pressure over a larger area.

So there apparently has been some tendency to reduce visibility. I might stress again that our recommendation here is not directed particularly at airline aircraft. It is airline aircraft, yes, but also we would like to see better visibility out of some of our general aviation aircraft.

Mr. DEVINE. Are we getting to the point of no return on speed, perhaps?

Mr. KAYNE. I would not try to minimize the difficulties, Mr. Devine, of the manufacturers or designers in producing high speed aircraft with better visibility from them. The military at one time or another have approached this by placing the pilots in, you might say, a bubble configuration, so that he was elevated above the fuselage a little bit and could see out better. There have been a number of schemes on this. This is one that we would like to see greater concentration on, on the part of not only the manufacturers and researchers, but we think possibly NASA should be able to contribute some very good research work in this field.

Mr. DEVINE. To get to another area, would it be your opinion, Mr. Kayne, that proximity warning indicators in general aviation aircraft, which would be perhaps within the financial means of some of the private pilots, and collision avoidance systems on the commercial aircraft, the two devices, although having the same purpose but being different in operation, do you think they would help solve some of these midair problems?

Mr. KAYNE. I think they would help greatly, sir. I know there has been some discussion informally between pilots. In fact, we have talked this over with some of the airline pilot group. There was some talk of that at their last safety forum here in Washington. The thinking is that the airlines, and this is my personal opinion, too, must have a collision avoidance system in their aircraft, for one.

Two, we have conceived this proximity warning indicator, which I will refer to as PWI, as a simple device, possibly on a noncooperative basis, so that this gives you warning of someone else in your vicinity. We hope that could be a building block to go into the collision avoidance system. If it would not be, then you could carry the two systems, say, in an airline airplane. We could carry one but they could carry both the sophisticated and the simple system and then they would have protection against themselves and protection against any intruder of any kind that did not have a system or if the collision avoidance system was not operating.

Mr. FRIEDEL. I know back in 1957–58, an invention was placed on the dashboard of an aircraft and there would be an indication that if a plane was coming from the right, the light would light, on the right side, or from the left on the left side, and at mileages that were indicated. The only thing you could not do with that was to tell at what altitude the plane was. I believe this is a simple device and not very expensive, so far as I know. That would be a tremendous help to the general aircraft, the small planes. Why that was not pursued, as

I would like to see it pursued, I cannot understand. I think it is not expensive. This should be pursued immediately. At least give them that much for the smaller planes. The others may have radar that would give altitude, but the small plane would know if a plane is to the left or the right, 5 or 10 miles away, and he would start looking for it.

Mr. KAYNE. I agree with you, Mr. Chairman, we think this would be a great help. I did notice that Congressman Fascell has introduced a bill, H.R. 11677, directing the FAA Administrator to research the development of such a device. We are wholeheartedly in favor of this. We hope that this action will really be pushed.

Mr. FRIEDEL. I think they have been really slow in coming to the conclusions on this. I know in 1957 and 1958 at Atlantic City we witnessed it and they were experimenting with it then. I would like to see something move forward on this immediately. I think this was given to the Government for $1, by an inventor from Baltimore, Mr. Charles Adler. I think he deserves a great deal of credit.

That is all I have to say right now.

Mr. DEVINE. I have a question on your annex D to your statement, Mr. Kayne. You pointed out the number of collisions between commercial aviation and general aviation and the number of collisions between commercial and commercial; but you do not have statistics on midair collisions between general aviation and general aviation. Can you provide such statistics at a later time?

Mr. KAYNE. Yes. I might say that is a fairly substantial number, without equivocation. I think it is easy to understand this because quite a few of those collisions incidentally result not in a loss of life but they happen between students who are training at a small airport and they are going around and around, shooting landings and takeoffs. Invariably one of them is concentrating so much on his airplane that they brush wing tips.

Mr. DEVINE. Would you provide that information?

Mr. KAYNE. Yes; we will.

(The following material was received by the committee:)

SUPPLEMENTAL STATISTICS ON COLLISIONS BETWEEN GENERAL AVIATION AIRCRAFT, SUBMITTED BY AIRCRAFT OWNERS AND PILOTS ASSOCIATION

Congressman Devine requested statistics on collisions between general aviation aircraft similar to those provided in Annex D to AOPA's written testimony before the Subcommittee.

Our source of information on these accidents has been the Civil Aeronautics Board and now is the National Transportation Safety Board (NTSB).

We have queried the NTSB for the desired statistics, but they are either unable or unwilling to make this information available. We suggest that it can be obtained by an inquiry from the chairman of the Subcommittee.

We do have partial information indicating the number of collisions between general aviation aircraft, but we are lacking the number of fatalities. The number of collisions for each year is indicated below and we believe that the number of fatalities resulting from these collisions in each year will be somewhat less than the actual number of collisions. We have arrived at this conclusion by a process of elimination applied to available statistics. For example, in 1963 there were 11 collisions between general aviation and two collisions between general aviation and military aircraft. These collisions produced a total of six fatalities. In 1964, the ratio was 12 general aviation and two general aviation military collisions with a total of 11 fatalities.

Collisions between general aviation aircraft are as follows:

Number of collisions between general aviation aircraft

Year:	
1955	16
1956	14
1957	10
1958	12
1959	10
1960	19
1961	20
1962	14
1963	11
1964	12
1965	24

Source of the above figures is the Civil Aeronautics Board Bureau of Safety.

Mr. DEVINE. In your statement, you suggest short parallel runways at your main airports being helpful to general aviation. Would you make any suggestion on how far separated those should be from your main runways? Are you talking about 5,000 feet?

Mr. KAYNE. That is a hard question to answer specifically, Mr. Devine, but I think I can answer it enough to satisfy you. In the first place, New York City, or the Port Authority of New York, for example, recently converted three taxiways on John F. Kennedy Airport to short runways for general aviation. Unfortunately, at least one of those, and possibly several of them, are so close to the main runway and placed in such a position so that if a fully loaded DC–8 going overseas, for example, takes off and rotates, his wingtip vortices and turbulence hits just about where you are over on the short runway. It is so close that it gives you pause for thought before you use it.

One of the others they have is so spaced that the taxi distance on John F. Kennedy makes it almost impractical to use it. We have just looked into this to see why these runways are not getting sufficient use and one of these is apparently that several of them are too close to the main runway.

Mr. DEVINE. Would a separation such as the Potomac River out here with Washington National and Bolling be adequate?

Mr. KAYNE. That would be more than adequate.

Mr. DEVINE. Have you made recommendations in that area?

Mr. KAYNE. Yes, sir. As you probably know, we have been pushing to have a runway on the old Bolling-Anacostia complex used for general aviation. In fact, we could almost make parallel runways there.

O'Hare in Chicago has two parallel runways that are about 5,000 feet apart and these are used for simultaneous IFR approaches by large aircraft with just a slight staggering of the altitude. For the general aviation part we could be closer than that. We can do a little research. I would hazard a guess that somewhere in the neighborhood of 700 to 800 feet between the runways would give us sufficient distance to avoid wingtip vortices except under the most unusual conditions where the wind might be drifting slowly over toward the general aviation runway.

Mr. DEVINE. Thank you very much.

Mr. DINGELL (presiding). Mr. Kuykendall.

Mr. KUYKENDALL. Mr. Kayne, would a crop dusting airplane without a radio and no flight plan be allowed to land at Memphis, Tenn., Municipal Airport?

Mr. KAYNE. I can answer that, but I would have to qualify my answer.

Mr. KUYKENDALL. I am waiting for an answer.

Mr. KAYNE. I am not familiar specifically with the traffic at Memphis, but I suspect that there may be some crop dusters landing there.

Mr. KUYKENDALL. Yes. There was a 727 that I was a passenger in forced to go around the field by a crop duster with no radio several weeks ago.

Mr. KAYNE. There are many of our airports that are used by airlines, and I will avoid the term major airports because I don't think it really happens in the major airports, there are many airports used by airlines that also accommodate crop dusters working the local fields in that vicinity. There is a provision in the regulations to permit the control tower chief, at his discretion, to allow such aircraft without radio in and out. He usually does this under, you might say, closely controlled conditions where he knows when they are going, when they are coming. They get a green traffic light from the control tower to indicate that they can land or take off. These conditions are closely monitored. We know that some of the crop dusters, particularly if they are dusting, have an explosive combination in that dust, particularly if the bin is partly empty.

Mr. KUYKENDALL. Forget about the fact that he is a crop duster. Make like he is a cattle rancher. I am speaking of the fact that this airplane has no radio, has no flight plan, has no weather report, and just came in and landed. He got a green light, yes. I am sure he would have landed whether or not he got the green light. This is a major airport, two 10,000-foot jet runways with probably 300 transactions a day.

Mr. KAYNE. When we say no flight plan——

Mr. KUYKENDALL. He could not have a flight plan because he took off from his back pasture.

Mr. KAYNE. If he took off from his back pasture and landed there without advance coordination and approval from the control tower, my answer to your question would be no, he should not be allowed there.

Mr. KUYKENDALL. I know that this is the extreme bottom of the people you represent.

They own an airplane with an engine and a propeller, one or two seats, a gallon of gas and that is it. The other extreme is the corporate jet, whose pilot may have as many hours, Mr. Chairman, as Mr. Ruby. That is the other extreme. I think we on this committee are going to have to differentiate between the crop dusters with no radios and the corporate jets.

It is my understanding that recently the authorities in France, after having built a subsidiary field with GCA and ILS have prohibited the use of Orly and Le Bourget by any aircraft that does not have at least two pilots and compatible electronics. Have you heard about this development?

Mr. KAYNE. No, sir. I heard you speak of it this morning.

Let me put it this way: I know that Orly and Le Bourget have restricted traffic.

Mr. KUYKENDALL. They did have the other equipment ready, the other strip ready and equipment ready, when they made the decision. That is our understanding.

Mr. KAYNE. My understanding of that, and maybe my information is not as current as yours, is that the other airport that they made available for general aviation was located quite some distance from the city. I have forgotten what it exactly is, but it is something on the order of 30 miles. It was not really a well equipped airport, as far as general aviation is concerned.

As I say, I think your information may be more current than mine.

(The following information was received by the committee:)

GENERAL AVIATION USE OF AIRPORTS IN THE PARIS, FRANCE, AREA, SUBMITTED BY THE AIRCRAFT OWNERS & PILOTS ASSOCIATION

The following information concerning general aviation use of airports in the Paris, France, area is supplied in connection with a point raised by Representative Kuykendall at the August 28 hearing on aviation safety.

Orly Field is the main airline terminal for Paris and it is generally acknowledged that general aviation operations are discouraged at Orly. However, there are no restrictions indicated in the International Flight Information Manual published by the U.S. Department of Transportation. The Aeronautical Information Services document (Doc 7383–AIS/503/18) published by ICAO also lists no specific restrictions concerning private aircraft and merely indicates that prior permission is required. Apparently, a small number of general aviation movements are permitted since some have been reported by our members in Europe.

Le Bourget airport may be compared with La Guardia Field in New York, since it accommodates both general aviation and domestic airline operations. No restrictions on Le Bourget are indicated in either the U.S. or ICAO documents. However, Le Bourget does charge an "Assistance tax" of 65 Fr. (about $13.00) for services rendered. This does tend to discourage general aviation traffic.

Traffic figures furnished for Paris unfortunately lump all traffic for both Orly and Le Bourget for a grand total of 191,023 plane movements in 1966. This means that these two airports together handle a volume of traffic that is comparable to that handled by our airport at Nashville, Tennessee, which ranks #80 in the standing of traffic volume at U.S. airports.

There are two general aviation airports in the vicinity of Paris. One of these is at Guyancourt, which is a sod strip and which suffers from prolonged shutdowns during winter months because of the unsafe condition of the sod.

The major general aviation airport is Toussus-le-Noble airport. This field is approximately eleven nautical miles airline distance from the center of Paris. It is the base for approximately 230 aircraft and has, in round figures, 200,000 plane movements a year. Current aviation charts and manuals do not indicate either radar or ILS at this airport. These publications indicate that the airport does have a control tower and VHF direction finding service. It did not have a night beacon until September 22, 1966, at which time it was officially opened for night and IFR operations.

The Paris Airport Authority indicates that 17% of the combined plane movements for Orly and Le Bourget are general aviation. It is also interesting to note that Toussus-le-Noble handles more operations than Orly and Le Bourget combined. By U.S. standards of traffic-handling, neither Orly or Le Bourget are operating anywhere near maximum capacity. In fact, they can be considered as being very lightly used in comparison with the traffic at a large number of major airports in the U.S.

The above commentary was prepared from a number of official U.S. and ICAO documents, together with letters from AOPA members in Paris, articles from French magazines and statistical information provided by both the French and U.S. governments.

Mr. KUYKENDALL. I don't have information as to the proximity of the auxiliary airport.

It seems to me that we are going to be faced in the long range with a great many of the suggestions that you made in your report having merit, but it seems that most of them are putting a patch on a patch, that we are going to have a matter, let's say at National Airport, or at

JFK, that, if you do not control the entrance of general aviation, and you limit the airport to the number of transactions per hour, then the airliner will be edged out completely. In other words, it does not reciprocate control.

I notice in using your figures about the number of interested people involved in using the taxpayers' supported facility you use only the owners as compared to the owner, so to speak.

But using your own figures here, the number of passenger miles, and this is the people involved, the citizens involved, of the airline, according to your own figures, would be almost six times as great for the airlines as it would be for private aviation. I don't think it is good to come here and have either of you against each other.

I join in what Mr. Devine said. I don't like to be comparing collisions. That is just like some Vietnam peace people coming to us and saying, "Your atrocities are worse than theirs." I don't like either one of them. I don't like the idea of comparing the collisions as a means of comparing the validity of the two causes. I think both have good validity. This is a point I wanted to make here:

That either party, because of the size of their business has certainly a valid use, one not more than the other just because there are more private owners than there are commercial owners. There are many times more public passengers than there are private passengers.

Do you think that there should be any airports today where noncommercial type aircraft—let's go back to the same definition we used before, two pilots with compatible electronics—do you think there should be any airports in America today that should not be allowed to be used by airplanes without this type of equipment and pilots?

Mr. KAYNE. I don't know exactly what you are talking about in the way of compatible electronics.

Mr. KUYKENDALL. ILS, GCA, and two pilots.

Mr. KAYNE. The regulations require two-way radio communication with any airport with control towers operated by the Federal Government. That included Memphis.

Mr. KUYKENDALL. What would be the penalty if he came in and landed without it?

Mr. KAYNE. I don't know what schedule of penalties are under the Federal Aviation Act. They would be subject to either fine or revocation or suspension of certificate, or both.

Mr. KUYKENDALL. You say two-way radio is required on any FAA-supervised landing facility?

Mr. KAYNE. Any airport that has a Federal control tower. It could be FAA or a military field with control tower, this equipment is required at either. ILS, of course, is an instrument landing system and this is something that you would not need in good weather. If you are going to make an instrument approach or flying IFR and make an instrument approach I would say we would have it, whether general aviation or air carrier.

Mr. KUYKENDALL. Do you think a student pilot with full radio equipment should be allowed to land at National Airport?

Mr. KAYNE. I would not rule out the student pilot with full radio equipment landing at National Airport for several reasons. In the first place, before he lands there he has to get a clearance. He is under control. The tower is watching him and working him all the way.

This, incidentally, must be part of the training of the student as he comes along. These students eventually become private pilots, commercial pilots, and then airline pilots. That is the way we get airline pilots. If you are asking this in the context of a brandnew student who is just soloing and so on, normally we would not encourage it at places like Washington National.

Mr. KUYKENDALL. Can he land there now?

Mr. KAYNE. Washington National to my recollection has some restriction against student operations. This is not true of all airports. Some airports do have it and some do not. We also have found that there are some students who are trained right on major airports because the schools are located there and they go out and they have instructors with them. This is done under carefully controlled conditions.

Mr. KUYKENDALL. But they cannot control that young solo pilot on his first time out.

Mr. KAYNE. I would not recommend the young solo pilot in the conditions you are talking about, his first time out.

Mr. KUYKENDALL. Would you prohibit him from doing that at National Airport?

Mr. KAYNE. From my own personal opinion, I would say yes. But also I have to tell you that National Airport right now is not operating up to its capacity. It is conducting 4,000 operations a year less than it did in 1960. At the same time, we had Bolling and Anacostia operating with more traffic in the air, so that the total operations at National and in the vicinity are down. National is not congested as far as airplanes on runways are concerned; it is terribly congested so far as airline passengers are concerned in the terminal building. The airline ramps are congested but the general aviation side of it and the runways themselves are not congested. The air traffic part of it is not congested.

Mr. KUYKENDALL. You are the first person who has even implied this may be true. Most of the other witnesses have gone in the other direction but I won't get into argument about that.

Mr. KAYNE. This is rather well documented. I think I am very well qualified to speak on this because I was the first chief controller of the tower at Washington Airport. I have followed that airport for many years.

(The following information was received by the committee:)

STATEMENT ON USE OF MAJOR AIRPORTS, SUBMITTED BY VICTOR J. KAYNE, VICE PRESIDENT, AIRCRAFT OWNERS & PILOTS ASSOCIATION

Mr. Kuykendall discussed the use of major airports by various types of traffic and mentioned an incident at Memphis wherein a crop duster apparently landed with no clearance from the control tower.

The current FAA regulations require a radio clearance from the control tower prior to landing or taking off from any airport with a Federal control tower. There also is a provision for the controller to allow non-radio traffic to land or take off subject to prior approval from the tower. If this was not obtained in the Memphis incident, then the pilot was in violation of the regulations. When we are dealing with a pilot who will violate existing regulations, it obviously would do no good to write additional regulations, since the pilot would also violate those rules.

Our public airports accommodate all types of traffic, under reasonable rules imposed by the FAA, without discrimination as to whether the traffic is airline, military, commercial, private, or any other category. An effort to distinguish between some of these with the objective of restricting certain operations would

be virtually impossible on a fair and impartial basis. For example, if we attempt to rule out so-called pleasure flying or transportation for personal reasons in a private aircraft, then it also appears that we should rule out the airline trip that is carrying a cargo of vacationers or people otherwise traveling for pleasure. After all, the airline is a commercial venture for profit and has no greater entitlement to the use of public facilities than a businessman in his company airplane.

Crop dusters usually do not operate from the major hub airports, although they do operate from many airports that also accommodate the scheduled airlines. This usually is done through a mutual arrangement with the control tower and all operations are carefully controlled so as to avoid hazard to other traffic.

Reference is made to aircraft operated by cattle ranchers with the inference that such aircraft are usually poorly equipped, or as Mr. Kuykendall phrased it, with no radio, no flight plan, no weather report and representing the extreme bottom of the people in our Association. Our experience is that some ranchers do own such aircraft for use on the home acres, but the aircraft that they use for travel away from the home ranch is exceptionally well equipped by anyone's standards. They certainly do not represent the bottom of AOPA's membership.

AOPA's testimony before the subcommittee with respect to airports, and I refer specifically to recommendation No. 12 on page 18 of my prepared testimony, makes several recommendations with respect to provision for general aviation on major airports and the establishment of other airports designed to draw general aviation traffic away from the major airports insofar as practicable. We recognize the desirability of this, but we also recognize that some general aviation operations must continue to be accommodated at the major airports used by the airlines. It would be impossible to establish different categories of such traffic, because the need varies with the requirements of the aircraft operator in light of a variety of local circumstances. Further, it has not been established that general aviation use of major airports is a hazard to safety. There has been some discussion of inconvenience to the airlines, but no one has yet suggested that we ban private and business automobiles from our public superhighways in order to give preferential treatment to the buses and other commercial motor carriers.

Mr. KUYKENDALL. Let me close with this: You pointed out that there have been two disastrous collisions in recent months. Now, unless we do something as a Congress and as a people and we suddenly start out here with a rash of collisions at National and Dulles and John F. Kennedy, the hue and cry from the general public is going to be such that we are going to wish we had acted.

I would like to see from your organization some categorization of your type of flying and some suggestions as to what can be done to regulate it for safety purposes. This is for the future. As a member of this committee I would like to have this from you.

Thank you, Mr. Chairman.

Mr. FRIEDEL. Mr. Pickle, do you have any questions?

Mr. PICKLE. I do not have any questions at this point.

Mr. FRIEDEL. Mr. Dingell.

Mr. DINGELL. You discuss in your comments, sir, the question of positive control. You indicate an opposition on the part of your organization to reducing the level of positive control of aircraft to 18,000 feet. I would like to know the rationale, why you oppose that reduction of positive control height.

Mr. KAYNE. Our reasons for opposing it are severalfold. Incidentally, this is a matter of proposed rulemaking before the FAA and this is not the first time they have proposed it and it is not the first time we have objected to it. They tried this several years ago and the response that they got back from their public rulemaking under the Administrative Procedure Act was so strong as to cause the agency to abandon the requirement at that time.

Now we have a number of general aviation aircraft and the number

is increasing all the time, that can operate at the higher altitudes, with pressurized cabins and turbocharged engines.

Mr. DINGELL. Twin engines?

Mr. KAYNE. Not only twins, but we have them coming along in singles, too. We have the better known general aviation jets, Lear Jets, Jetstars, and so on.

Mr. DINGELL. Was it one of those single-engine turbine jets that was operating at 23,000 feet a while back when a National Guard plane flew into its rear end?

Mr. KAYNE. I thought that was a single-engine Bonanza. I may be wrong.

Mr. DINGELL. Single-engine pressurized supercharged aircraft, single-engine, general aviation, up 23,000 feet, and a National Guard aircraft flew right into the rear end of it. This is a very, very good argument for positive control of aircraft at 20,000 feet.

Mr. KAYNE. Sir, the fact that one airplane flew through another one, or ran over him, whichever way you want to put it, does not really make an argument for additional regulations there.

Mr. DINGELL. In all probability that accident would not have occurred if both those aircraft had been under positive control.

Mr. KAYNE. We have had accidents where everything there was under positive control, full traffic control, and yet the two ran into each other. In Asheville, two airplanes with ATC talking to them up to the last minute, they still ran together.

Mr. DINGELL. That was a control error, I believe, in Asheville, where one aircraft flew into the bottom of the other one.

Mr. KAYNE. The way we understood it he did not fly into the bottom of it. One popped up in front of the other one. It was a matter of one at cruising level and the other one in a climb. It was a popup. He hit the bottom or the side of the fuselage. It was a matter of coming up in front of him.

Mr. DINGELL. It is fair to say the more positive control you have the less area you will have where you have risk of collision because of random movements of aircraft.

Mr. KAYNE. Idealistically your statement I think is sound. From a practical application viewpoint in the airspace today, and this is what I tried to bring out here and Captain Ruby also brought out in response to earlier questioning, our air traffic control system only has a certain capacity to handle airplanes.

Mr. DINGELL. When we get the new systems in, everything computerized and everything under radar, there it would most certainly be time to consider reducing the heights, would it not?

Mr. KAYNE. Sir, right now it is taking more people in the FAA to handle the traffic after they had computers than they did before they got computers.

Mr. DINGELL. They handle it better?

Mr. KAYNE. That is a matter of personal opinion. I have talked to controllers. Right now they tell me that computers lose something like 15 percent of the flight plans, for example.

Mr. DINGELL. I want you to tell me why your organization opposed a really meaningful program of positive control at lower altitudes down to 18,000 feet. You have made some criticism of the FAA, but if those criticisms of the Administration are eliminated then it becomes very clear that positive control can be had. So, let us assume

that we eliminate the criticisms which you have of the Administration and buckle down to adequate administration. You indicate there is a lack of money. I suspect that that perhaps is Congress' fault, the Bureau of the Budget's fault. You have already conceded ideally it is better to have positive control at lower heights.

Mr. KAYNE. I don't think I have conceded that.

Mr. DINGELL. You said idealistically.

Mr. KAYNE. Idealistically in a sense. We have found out that we have collisions under air traffic control.

Mr. DINGELL. And you have collisions where they are operating without positive control?

Mr. KAYNE. That is right.

Mr. DINGELL. In theory at least, and ideally, there is much larger opportunity for a collision where aircraft are not under positive control. Isn't that a fact? Can you deny that?

Mr. KAYNE. In the limited context you ask it, I would say yes, I agree with you.

Mr. DINGELL. Not in a limited context. Cold logic says if you have aircraft under positive control there will be less chance of collision particularly when aircraft now are operating at 300 to 1,400 miles an hour instead of the 180 or 250 miles an hour that they used to operate in, because of visibility problems, reaction time, and the other problems we face in this area. Is that correct?

Mr. KAYNE. I am afraid this question is very much like: "Have you stopped beating your wife?"

Mr. DINGELL. No, it is not.

Mr. KAYNE. I can agree with you and I can disagree with you.

Mr. DINGELL. It is cold logic.

Mr. KAYNE. I can agree with you but I would have to qualify my answer and the chairman is waving the gavel.

Mr. DINGELL. I suppose if I were an oldtime seat-of-the-pants pilot I would be like that too.

Mr. FRIEDEL. I will allow you to answer if you wish, but the time of the gentleman has expired.

Mr. KAYNE. Let me make a brief offer. We will provide a detailed answer to that in writing if that will help.

Mr. DINGELL. I have no objection.

(The following information stating the AOPA position was received by the committee:)

AIRCRAFT OWNERS & PILOTS ASSOCIATION,
Washington, D.C., July 7, 1967.

FEDERAL AVIATION ADMINISTRATION,
OFFICE OF THE GENERAL COUNSEL,
Washington, D.C.
(Attention: Rules Docket.)

GENTLEMEN: Reference is made to Docket No. 67-WA-16 issued May 11, 1967 entitled "Positive Control Area."

AOPA is an organization of approximately 138,000 members who operate aircraft for business purposes, personal transportation and for pleasure. The aircraft flown are becoming increasingly more sophisticated in design, instrumentation and capability. More and more of them, including pressurized turbo-charged single-engine four-place aircraft, have the ability to take advantage of optimum cruising altitudes up to and above 24,000 feet MSL. In general, cruising speeds of such aircraft, excluding jets, do not exceed the 250-knot range. At such speeds the see-and-be-seen principles for collision avoidance are practicable.

AOPA has been working closely with the FAA for ten years on problems arising from high speeds in the airspace. With the introduction of jet aircraft into the air carrier fleet, the Agency placed certain equipment requirements on their high altitude operation, provided traffic advisory service to them and designated positive control airspace on both a route and area basis. The optimum cruising altitudes for jet aircraft are above FL 240 and the closure speeds indicate that the pilot is not able to avoid collision satisfactorily without assistance from ground radar. AOPA supports this view.

Since 1958, AOPA has consistently recommended to the FAA and to the Congress that ways and means be developed for control of VFR traffic in areas which might require positive control for high speed aircraft. AOPA's position on this matter has not changed. This NPRM indicates that this requirement for general aviation has been satisfied because a separate action proposes an amendment to Part 91 of the FARs which would permit CVF in positive control airspace. This action, however, gives only lip service to AOPA's requirements. The sole concession to the rigid requirements for IFR operation in positive control airspace is that the pilot need not have a current instrument rating. The aircraft itself must have all the sophisticated operating equipment required for jet aircraft flight except a DME. AOPA will have detailed comments on the inadequacies of the proposal in its response thereto.

The subject proposal states that the "FAA now has the capability to provide positive control service in the proposed area *with its present resources* and without undue hardship to the users." It also states that "Because of the additional safety provided by positive control, it is proposed to lower the floor of the positive control area to 18,000 feet MSL within the airspace described herein." AOPA has strong doubts concerning the validity of both statements. Our reasons are as follows:

(1) In 1961, air traffic control operated 36 centers with 6,349 controllers, 49 radars, 50 beacons and handled 9,697,417 IFR operations. This was performed, so far as positive control was concerned, along 7,297 miles of intermediate altitude positive control jet routes and 77,950 miles of jet routes. Area Positive Control between 24,000 and 60,000 feet MSL was implemented in 1962 over practically all of the 48 States. In 1966, air route traffic control operated 28 centers with 6,573 controllers, 88 radars, 89 beacons and handled 13,534,883 IFR operations. There were 96,935 miles of jet routes.

This means that the number of control personnel has increased 3.84%; the number of radar systems he has to watch is up 79.59%; the beacons by 78.00%; the overall IFR activity is up 39.57%; the numbers of radar and beacons per controller up about 73.0% BUT the IFR activity per controller is up a whopping 35.84%. On the other hand the activity per radar per controller is down by 24.92% which means that as the radar coverage went up and the traffic increased, the control personnel were spread thinner and thinner and the cost of each operation in terms of facilities mounted astronomically.

The NPRM states, inter alia, "* * * predicts a 61 percent increase in scheduled air carrier aircraft and 504 percent increase in general aviation aircraft." The FAA publication "En route IFR Air Traffic Survey" for FY 1965 reports peak-day activity between 18,000 feet MSL and 35,000 feet MSL of 2,639 air carrier and 177 general aviation aircraft. Projecting these figures to 1970 by the FAA's own prediction would indicate an annual workload, in addition to normal increases in other altitudes, of 15,608,120 more air carrier and 9,271,730 more general aviation IFR operations in the positive control system, or a total increase of 24,879,850. This is almost twice the number of IFR aircraft handled during CY 1966 in the entire ATC system. These are peak-day figures and it is well-known that right now the present ATC system becomes overloaded with this amount of activity, breakdowns frequently occur and serious delays build up. There is no evidence extant of any FAA planning to handle air traffic loads of approximately three times the volume of present loads within less than three years. There is no evidence now that the FAA ATC system could cope with the traffic loads which would accrue with the proposed lowering of positive control areas to 18,000 feet MSL. If the FAA takes on this task through arbitrary rulemaking, it must be prepared to assume the responsibilities and liabilities which are inherent to such an undertaking.

In view of this analysis, it appears the workload on the control personnel is reaching the breaking point. This is a national figure. To add to this

burden in the most heavily traveled area in the world by requiring all aircraft at 18,000 feet MSL and above to be controlled could have catastrophic results.

(2) There is no evidence on the record anywhere that positive control provides additional safety. On the other hand, there are abundant records that some of the most serious collisions in the history of aviation have occurred when all of the significant elements of positive control have been present. Both TWA and UAL were on instruments under air traffic control on December 16, 1960 over Staten Island when they collided with a resultant loss of 134 souls. Both TWA and EAL were under air traffic control north of New York recently when they collided. Both the Dove and Cherokee were under the control of the LaGuardia Tower recently when they collided.

So-called "Positive" control would have added nothing that would have prevented these accidents. Further, the FAA is unable to provide any instances whatever where positive control has actually shown where a near mid-air collision could and would have been averted. In fact, the FAA has not been able to show where actual near mid-air collisions in the airspace under discussion have occurred.

In conclusion AOPA feels that there is no conclusive evidence that a valid requirement exists for lowering positive control airspace to 18,000 feet MSL. Neither is there any evidence that the FAA ATC system is prepared or capable of handling the influx of mandatory IFR or CVF operations without imposing undue hardship, delays and expense to the users of the airspace. AOPA strongly urges that the proposal be withdrawn.

Sincerely,

ROYS C. JONES,
Director, Air Traffic Control Department.

Mr. KAYNE. I just want to add one thing. It is very short. The number of passengers we are talking about and Mr. Kuykendall referred to that, too, all available information we have now indicates that general aviation carries as many people in the air as the scheduled airlines do every year. This is a myth that the airlines are carrying the largest number of public and general aviation is carrying one or two people. We are carrying more than one or two people, we are carrying them more times, more frequently in more airplanes.

Mr. DEVINE. Mr. Chairman, before you release the witness are you expecting to call a witness representing the air traffic controllers? If not, Mr. Kayne and his colleagues here are the best qualified in that area.

Mr. FRIEDEL. They are on the list.

Thank you, Mr. Kayne.

Mr. KAYNE. Thank you, sir.

Mr. FRIEDEL. Our next witness will be Mr. Stuart G. Tipton, president of the Air Transport Association.

You have quite a lengthy statement. Do you wish to summarize it?

STATEMENT OF STUART G. TIPTON, PRESIDENT, AIR TRANSPORT ASSOCIATION; ACCOMPANIED BY CLIFTON F. VON KANN, VICE PRESIDENT, OPERATIONS AND ENGINEERING; WALTER A. JENSEN, ASSISTANT VICE PRESIDENT, OPERATIONS AND ENGINEERING; AND STANLEY L. SELTZER, DIRECTOR, AIR NAVIGATION AND TRAFFIC CONTROL

Mr. TIPTON. Normally I would very quickly agree to summarize this statement, Mr. Chairman, but I have been thinking about it all during its preparation. What the statement consists of is quite a detailed action program for improvement, and I can't really do it without taking more time than would be taken if I read it.

Mr. FRIEDEL. You may proceed.

Mr. TIPTON. I appreciate that very much because I know how hard-pressed the committee and its members are.

Before starting my testimony, I would like to introduce my associates here. On my right is Gen. Clifton Von Kann, vice president of operations and engineering of the Air Transport Association, long familiar with military flying operations.

On my left is Walter Jensen, assistant vice president of the association covering that same area. Mr. Jensen is an experienced airline pilot and has spent a good part of his professional life in the study of the air traffic control and air navigation system.

On my far right is Stanley Seltzer, the head of our air navigation, air traffic control group. Mr. Seltzer is an experienced air traffic controller. I think he was the third head of the Washington tower.

With that, I would just state for the record my name is Stuart G. Tipton. I am president of the Air Transport Association, which includes in its membership virtually all of the scheduled airlines of the United States.

Last April, we appeared before the full committee to discuss several general areas of safety which we believed to be most deserving of the committee's attention. Today our discussion will largely focus on ways to reduce the risk of midair collisions and especially to bring before the subcommittee recommendations concerning those elements of the national airspace system which are the Federal Government's responsibility.

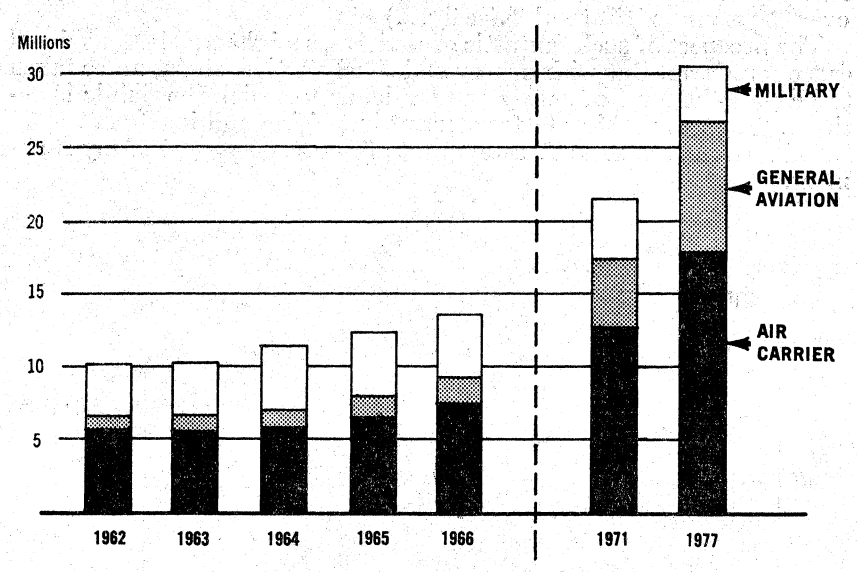
PROBLEMS OF GROWTH

The unprecedented increase in demand for passenger and cargo capacity is spurring a massive airline investment in new aircraft. Outstanding orders as of June 30, 1967, plus aircraft already delivered since the beginning of 1966, total 1,180 new aircraft valued at $7.7 billion. Sizable orders have been placed since June 30. The airline fleet, now some 2,000 aircraft, is forecast to grow to approximately 3,500 aircraft by 1977. The general aviation fleet, however, consists of some 104,000 aircraft today and is expected to increase almost twofold by 1977—to 180,000 aircraft. FAA expects at least 8,000 of these to be business jets. So business jets will outnumber airline jets by more than two to one.

To relate this more closely to the demand for air traffic control services and facilities rendered by the Federal Government, let us examine the number of controlled aircraft handled at FAA air route traffic control centers. Last year, traffic under center control reached about 14 million: by 1971, FAA forecasts a figure of 22 million, climbing to 31 million by 1977. (See fig. 1.) A sizable portion of this increase is forecast to be general aviation activity.

A better overall perspective of the relative traffic demand upon FAA traffic control facilities is shown by the number of aircraft operations at airports controlled by FAA control towers because all aircraft landing or taking off from these airports utilize some portion of the services provided by the control tower. There has been a doubling of traffic from 1961 through 1966, with FAA controllers handling nearly 45 million landings and takeoffs last year. This traffic volume will again triple by 1977 when FAA expects controllers will be called upon to handle almost 140 million landings and takeoffs. By that time, gen-

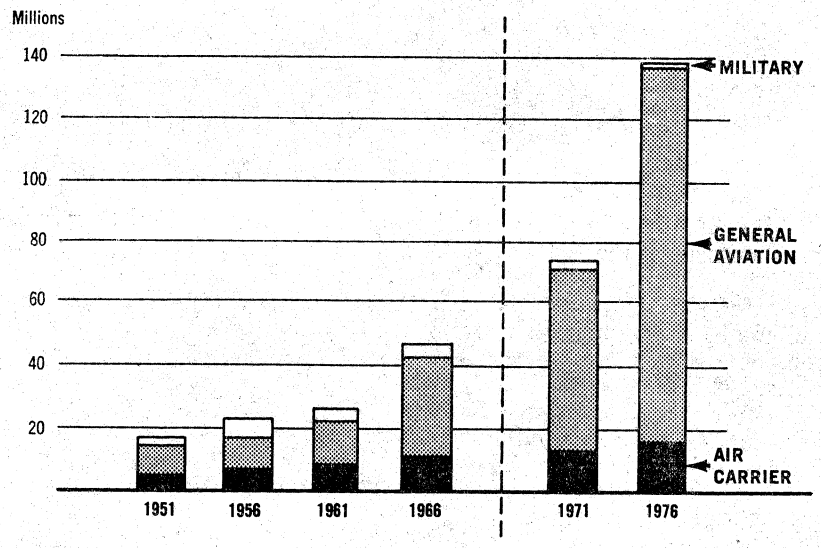
TOTAL IFR AIRCRAFT HANDLED AT FAA AIR ROUTE TRAFFIC CONTROL CENTERS



SOURCE: FAA Aviation Forecasts, FY 1967-1977

Figure 1.

AIRCRAFT OPERATIONS AT FAA CONTROL TOWERS



SOURCE: Federal Aviation Agency

Figure 2.

eral aviation operations at FAA controlled airports will comprise over 85 percent of the total. (See fig. 2.)

The prospect of such fantastic growth rates might well be considered cause for alarm. But with proper and timely action, steps can be taken to provide the level of safety and efficiency to which the public is entitled. We have nothing to fear except indecision and inaction.

I direct the committee's attention to figure 3 on page 4 of my statement.

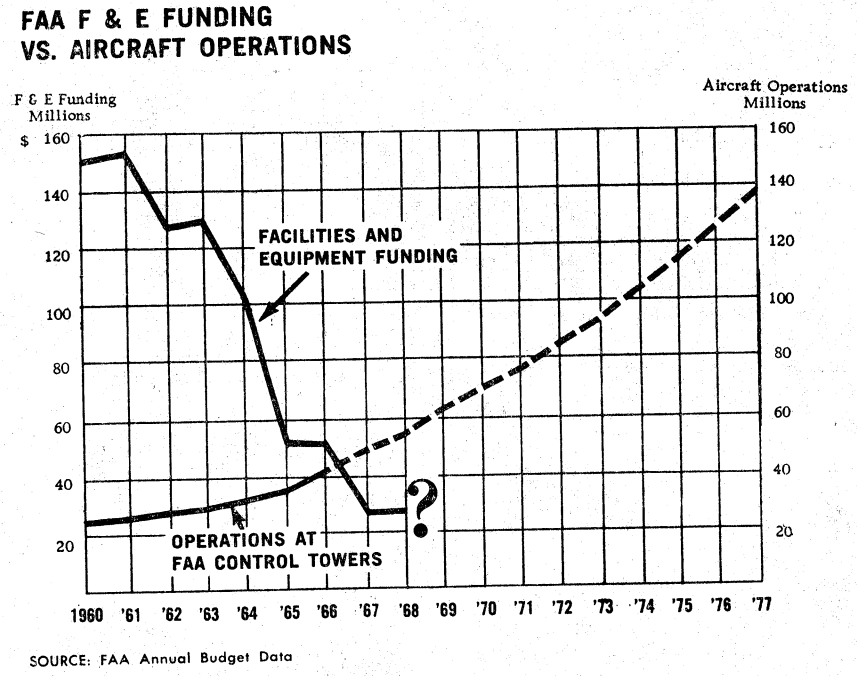


Figure 3.

FUNDS LAG WHILE TRAFFIC GROWS

While FFA funding for operation and maintenance of existing facilities has risen somewhat with increase air traffic, funding for new facilities and equipment has declined. This decline runs counter to the growth of air traffic that will use these facilities. From this we must conclude that only a greatly stepped-up effort by the Government can keep the airways and the air traffic control services from falling still farther behind.

We do not expose these differences as any criticism—actual or implied—of FAA or any other branch of Government. Rather, the airlines feel it is their obligation to contribute to a reexamination of the national thinking with respect to the safety and efficiency of the national airspace system.

We have no interest in finding fault; we are merely interested in making air transportation safer, more efficient, and more reliable for all.

WHAT IS REQUIRED

The air transport industry is of the firm conviction that the best overall method for collision prevention is a highly efficient and reliable air traffic control (ATC) system.

Safety, reliability, and efficiency are so interdependent that it is frequently difficult to identify any valid distinctions between them. An efficient system with a smooth flow of traffic, capable of comfortably handling traffic demands, is inherently a safe system. The greater its efficiency, the greater its capacity; and the greater its reliability, the greater is its safety. For this reason, we believe that the public interest will best be served by a vastly increased capability in the ATC system.

But to have such a system is not enough. That system must be used, and its users must be properly equipped and competent to participate.

In expanding the air traffic control system capability, it is important to recognize that there are two basic forms of flying—VFR and IFR. Although the airlines see the need for considerably more positive control by ATC, they also recognize that there are some areas wherein VFR flying can be accommodated safely without the full rigor of IFR control. Nevertheless, a higher level of safety for both VFR and IFR traffic can be achieved by requiring more aircraft effectively to participate in the air traffic control system. Accordingly, our recommendations, which follow, include those services and facilities which are concerned with VFR traffic as well as IFR traffic.

These recommendations include provisions for—

(*a*) Vastly improved ATC capability.
(*b*) Greater participation in the ATC system.
(*c*) Improved aircraft and pilot capabilities.

VASTLY IMPROVED ATC CAPABILITY

Control towers: One of the facilities serving both VFR and IFR traffic is the airport control tower. Of the 526 airports served by the scheduled airlines only 234 have control towers. (See fig. 4.)

Present FAA planning standards require that an airport generate 24,000 itinerant aircraft operations per year before it can qualify for a control tower. These standards give no consideration to total traffic volume nor do they attach any special significance to the fact that the airport might have scheduled airline service.

The number of aircraft operations is increasing steeply. More and more aircraft—both airline and general aviation—are high-performance jets and turboprops, which makes it more difficult for pilots to rely solely on the "see and avoid" principle for traffic separation.

It is clear that with increasing numbers of general aviation and airline jets, even the smaller airports are beginning to face the same congestion problems as did the larger airports a few years back. Lack of a control tower at airports served by the airlines can no longer be set aside as a negligible lack. The airlines hold that scheduled passenger service, in itself, is enough to qualify an airport for a control tower.

The airlines therefore recommend that FAA provide a control tower at every airport having scheduled airline passenger service.

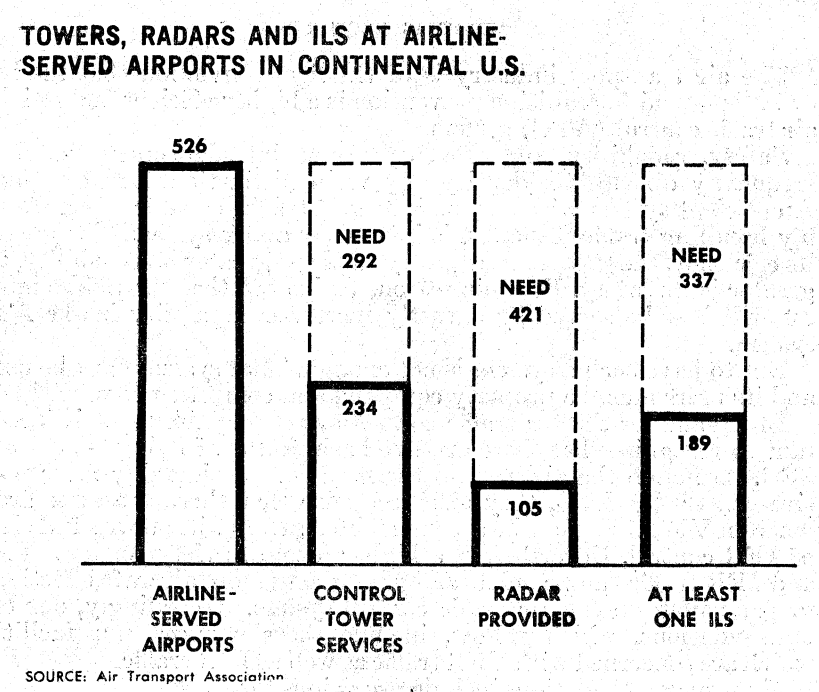


Figure 4.

TERMINAL RADAR SERVICE

Although it was originally looked upon as an aid to IFR traffic, radar has become an invaluable tool in handling VFR traffic as well, especially in terminal areas. But only 105 of the airports served by airlines have radar service. (See fig. 4.)

Without radar the higher speeds and growing volume of aircraft flying into and around airports make it increasingly difficult for tower controllers to visually observe and separate all aircraft. It is impossible for controllers to provide pilots with traffic information concerning other aircraft which the controllers cannot see, or of which they have no knowledge. Radar displays in the tower, permitting controllers to observe all traffic operating within their area of jurisdiction, will improve the safety of airport traffic control service. In most cases, it will be necessary to install the radar at individual airports to provide this radar service in the tower; in some cases the proximity of airports may be such that one radar could be made to serve the displays in two or more control towers.

The airlines recommend that FAA provide terminal radar service at every airport having regularly scheduled airline passenger service.

INCREASING THE UTILITY OF ATC RADAR

We have noted that because it provides precise, up-to-the-minute views of traffic movements in a given area, radar has become a fundamental tool in our ATC system. Nevertheless, radar has many limita-

tions which must be reduced so that controllers can use the radar more effectively.

Altitude on radar. Among the most significant deficiencies of current ATC surveillance radar is its lack of altitude information. Without altitude information on the radar scope, it is exceedingly difficult for controllers to properly assess the collision potential between aircraft whose blips appear on radar.

If the radar display showed altitude information automatically tied to aircraft targets, more meaningful traffic information and advisories would be possible. Furthermore, controllers and pilots would not be distracted by targets representing aircraft already safely separated by altitude; thus they would have more time to cope with traffic deserving their attention.

The airlines recommend: Expedited installation of alphanumeric and automatic altitude read-out on all terminal and en route facilities. (See fig. 5.)

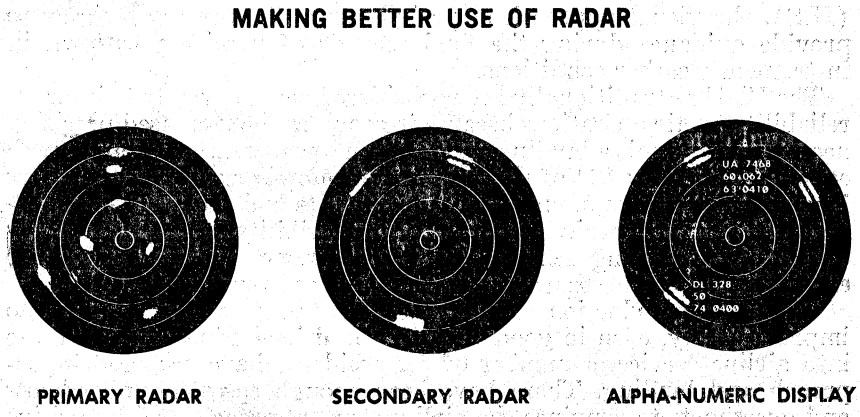


Figure 5.

Daylight radar scopes. The high ambient light level in control tower cabs during daylight hours can render a radar scope unusable unless some of light shield or cover is placed around the scope. Such shields themselves interfere with the controller's ability to readily view the scope. Consequently, bright tube radar displays suitable for daylight viewing have been developed and are planned for those control towers which currently have radar. Because the bright tube display makes it possible for the tower controller to utilize his radar during daylight hours, it should become a standard installation in radar equipped control tower cabs. This would be of considerable aid to the controller in the handling of both VFR and IFR traffic.

The airlines recommend that: FAA provide bright tube radar displays for all tower cabs at radar-equipped locations.

Radar weather displays. Thunderstorms and other weather phenomena containing heavy precipitation introduce severe clutter on some radar scopes to the extent that the radar can become useless for ATC. To offset such problems, circular polarization has been utilized to

effectively reduce the display of the radar clutter often associated with severe weather. Where secondary radar is used alone, no weather information is seen on scopes.

As a consequence, radar controllers, lacking sufficient information on storm cells within their area of jurisdiction, may inadvertently direct aircraft through an area of severe weather. With appropriate displays, controllers can: (1) avoid inadvertently directing aircraft through severe storm cells; (2) aid pilots in avoiding severe weather; and (3) anticipate pilots' requests to alter flight paths because of severe weather, making appropriate advance plans for alternate routings.

The airlines recommend that: FAA provide improved display of weather information on all air traffic control radar scopes.

Instrument landing system. The airport and its approach systems must be considered an integral part of the ATC system.

Facilities used to improve the success of an approach and landing contribute to reliability and efficiency, as well as to safety. These facilities include the precision electronic instrument landing system (ILS), the visual approach slope indicator, and approach lights to provide guidance during the final seconds of precision letdown in instrument weather conditions.

The ILS has traditionally been considered necessary only to improve reliability of air operations because it provides the increased precision necessary to permit a landing approach in lower weather minima with equal safety. Only 189 of the 526 airports now served by the airlines have ILS; those communities whose airports lack ILS are often deprived of airline service during reduced visibility conditions. Every community receiving scheduled airline passenger service should be entitled to an ILS to assure greater reliability of service.

With the introduction of jets, the ILS takes on a second role to improve safety, even in good weather conditions. Since the jets came into airline service, a number of jet accidents have occurred in approach and landing. There have been enough cases of undershoots and overshoots to convince the airlines that approaches with positive glide slope guidance will be better stabilized and therefore safer approaches.

In our view, every runway used by airline jets should have glide slope guidance, either electronic or visual. The ILS, with its electronic glide slope, can fulfill this requirement in addition to the requirement for a precision landing aid for lower weather conditions. Where ILS is not available, visual approach slope indicators (VASI) can meet the requirement of good weather conditions.

To reduce the need for circling approaches, it is necessary to provide landing aids which serve at least two basic approach directions, especially for jet operations. Thus, some airports will have a need for two or more ILS installations. The busier the airport, the greater will be the need for additional ILS facilities to service the traffic volume. Parallel ILS installations permit a significant increase in traffic volume during instrument weather conditions.

While there is a great need for ILS—with or without approach lights—to provide precision approach guidance for jets in both good and bad weather, ILS does not yield its full value without approach lights. Approach lights at a price lower than the current $150,000 to $200,000 should be achievable.

By an objective examination of actual needs and by an energetic cost reduction program, the cost of this equipment should be lowered substantially. We urge that FAA promptly complete examination of our prior recommendations (we believe a reduced length and lower intensity lights will suffice) so that at least 150 approach light systems can be included in the fiscal year 1969 budget request.

The airlines recommend that—

(*a*) ILS and approach lights serving two basic directions of approach be installed at every airport receiving scheduled airline service.

(*b*) Glide slope guidance—either electronic or visual—be installed on every runway used by airline jets.

ATC AUTOMATION

Proper application of automation to the air traffic control system should relieve controllers of many routine functions, including numerous clerical chores. Additionally, automation permits more effective coordination between controllers and control facilities. By relieving controllers of time-consuming tasks and by providing means for automatically processing and transmitting required flight data among control positions and control facilities, automation enhances the controller's ability to devote more time to the separation of aircraft. This promotes air safety.

The airlines therefore recommend that—

(*a*) FAA's current automation program for all air route traffic control centers be completed at the earliest possible date.

(*b*) Terminal area automation plans of FAA be vastly expanded and expedited.

(*c*) Pending availability of full-scale automation equipment planned for the New York, Chicago, Washington, Los Angeles, and San Francisco terminal areas, FAA install as a first step at least alphanumeric and automatic altitude readout capability on radar displays in these terminal facilities.

(*d*) All terminal area radar facilities which do not receive full-scale automation systems at least have automatic altitude readout on radar scopes.

SYSTEM RELIABILITY

It has become increasingly apparent that redundant equipment for such things as standby electric power, communications, navigation aids, and radars are essential to insure the safety, efficiency and integrity of the national airspace system, particularly where traffic densities are high.

Area electrical power failures over the past several years have shown the need for standby electrical power generators that are independent of commercial power sources. A recent radar failure at Kennedy Airport resulted in air traffic delays of more than 2 hours, and some 25 flights were diverted to other airports. A survey of the New York Air Route Traffic Control Center recently showed that 102 communications outages, totaling about 335 hours, occurred in a little over a month. Lack of frequencies to use as spares and lack of spare telephone lines were contributing factors.

Last year, FAA air route traffic control centers handled over 14 million flights; Chicago, Kennedy, Miami, and Los Angeles Airports each handled over 400,000 annual flight movements. The safety and efficiency of air commerce dictate the need for a reliable air traffic control system that will provide continuous operational capability. A breakdown in the air traffic control system at any one of the major high-density terminals or air route traffic control centers disrupts scheduled airline service throughout the country.

The airlines, therefore, urge the FAA take steps to assure continuity of service, despite equipment failure or malfunction, at high traffic density terminals and all en route centers. FAA is now procuring equipment for 50 selected airports to provide standby electrical power supplies which will be independent of commercial power. A similar capability to survive radar and communications equipment failures should also be provided at key control facilities.

The airlines recommend that: FAA initiate a program to assure that continuity of service despite failures of power, navigation, radar, and communications equipment be completed by 1972.

NEED FOR ADDITIONAL PERSONNEL

One important aspect of the national airspace system which cannot be overlooked is the need for additional personnel to install, maintain, and operate the various facilities necessary to handle the present and future volume of air traffic properly. Virtually every major FAA air traffic control facility is short of personnel. Shortages exist among controllers, maintenance technicians, and installation engineers. The shortages apparently stem from budgetary limitations of recent years. As a consequence, the efficiency of the system has suffered. Burdened controllers are unable to provide additional ATC services which could enhance safety and cope with the growing traffic volume.

Also affecting FAA's hiring practices is the hope that future automation might reduce the requirement for added controller personnel. While we share this hope, we consider it ill-advised to delay present hiring in the expectation that future automation, which is still some 3 to 5 years away, will eventually reduce the requirement for additional controllers. The demands of traffic growth alone may absorb any potential reduction in future personnel requirements that might accrue from automation.

Not only should FAA be granted a restoration of fiscal year 1968 funds requested for personnel, but additional funds should be provided to permit the hiring of still further personnel necessary to provide the added safety services we recommend.

The airlines recommend that—

(*a*) FAA be authorized to acquire operations personnel commensurate with the safety services required for the growing traffic volume.

(*b*) Budgetary limitations not be imposed upon personnel providing safety services.

Present Pace Won't Do. We have suggested in the past few minutes very extensive and expensive improvements in the ATC system. Nothing that we have suggested is beyond the state of the art. However, if our present pace in carrying out these plans is

maintained, we will fall drastically behind the growth of traffic and real safety problems will arise. What is needed now is a real sense of urgency in carrying out new ideas and new techniques, and expedited procurement and installation. Obviously, changes will be needed in the FAA's Airway Planning Standards, which are used as the criterior for establishing ATC facilities and services. Our present measured pace will just not do this job.

GREATER PARTICIPATION IN ATC

Greater improvement in the effectiveness of the ATC system can be achieved by making certain that it is widely used and understood. The more aircraft that participate in the ATC system, the greater the safety provided by the system. In many instances some pilots just don't want to be bothered with ATC. In other cases it is probably a lack of recognition of what services might be available. It is not necessary to have full-scale IFR traffic-control service in all instances; services in varying degrees will satisfy individual situations.

With vastly improved capability in the ATC system, such as recommended above, the system should be capable of serving greatly increased numbers of aircraft. Not only will it be capable of satisfying the needs of IFR traffic, but it could provide additional service to VFR traffic.

CONTROLLED AIRSPACE

ATC services, especially for IFR traffic, are available only in airspace which is officially designated as controlled airspace. The amount of designated controlled airspace has increased greatly in recent years. However, there still remain a number of routes and terminal areas where airlines operate which are wholly or partially uncontrolled. To obtain the benefits of ATC separation service for all airline IFR operations, action must be taken to encompass all routes and all terminals served by the airlines with controlled airspace.

The airlines recommend that it become standard practice for FAA to designate controlled airspace and control zones to encompass all routes and terminal areas used for IFR operations in scheduled airline service.

TERMINAL AREA OPERATIONS

Each airport having a control tower has an "airport traffic area" of 5 miles radius around the airport, extending from the surface up to but not including 2,000 feet.

Under current regulations, an aircraft operating under VFR can overfly the world's busiest airport at 2,000 feet above the surface without the need for contacting the control tower at that airport. In fact, the VFR aircraft can fly through that airport traffic area at less than 2,000 feet, without contacting the control tower, if it is landing at another airport within the 5-mile airport traffic area. Since ATC currently has no information concerning the position, altitude or intention of such traffic in the airport traffic area, it is virtually impossible to provide meaningful traffic information to aircraft under its jurisdiction.

If the size of the airport traffic area were increased and all aircraft were required to obtain prior permission to enter such an area, con-

trollers would have specific knowledge of all traffic within that airspace and could use this knowledge for the issuance of traffic information to aircraft under their jurisdiction. This information could also be utilized as a basis for subsequently providing separation of traffic within the expanded airport traffic area. This service could be made available to both VFR and IFR traffic and would not necessarily require that aircraft be operated solely under instrument flight rules in all cases.

The airlines recommend that: (*a*) The "airport traffic area" be enlarged to include that airspace from 2,000 to 5,000 feet out to at least a 15-mile radius of the airport; (*b*) traffic information be provided to all aircraft which have been authorized to operate within the airport traffic area; (*c*) this service be expanded to provide separation between aircraft where traffic warrants.

SPECIAL VFR

Certain minimum visibility and distances from clouds are specified by the regulations for VFR operation within controlled airspace. No reduction in these minima is permitted along controlled airways. When weather is such that these minima cannot be observed along the airways, flights must be conducted under instrument flight rules (IFR). By contrast, however, within airport control zones, even those with a high volume of traffic, a reduction in the basic VFR weather minima is permitted for "special VFR" operations. Although a 1-mile minimum visibility is stipulated for such operations, there is no minimum ceiling specified. Pilots are merely required to remain "clear of clouds." Despite the fact that "special VFR" traffic must obtain a traffic clearance in order to safely intermix with full-scale IFR operations in the control zone under these marginal conditions, the "special VFR" pilot need not be instrument qualified and the aircraft need not be equipped for instrument flying. As a consequence, air traffic controllers are limited in the separation standards they can use.

The airlines recommend that "special VFR" procedures be eliminated for fixed-wing aircraft at all airports used by the airlines within the 48 contiguous United States.

ELIMINATING THE "POPUP" PROBLEM

Traffic information derived from radar observations has helped reduce the collision hazard. With alphanumeric radar displays showing automatic altitude readout on the radarscope, the traffic information service will be greatly improved for both VFR and IFR traffic. However, controllers, particularly in air route traffic control centers, are faced with the problem of unanticipated radio calls from VFR flights which desire radar traffic advisories. Descriptively named "pop-ups," such traffic requires an extensive exchange of communications to ascertain the type of aircraft, the pilot's desire, position, altitude, intended route, and destination, and to effect radar identification.

If the controller had advance information, possibly in the form of a simple flight plan, appropriate flight progress strips could be prepared in advance and the controller would then be alerted to forth-

coming traffic. Both pilot and controller would thus be relieved of communications workload.

The airlines recommend that: FAA explore the possibility of requiring that VFR flight plans, specifying the pilot's intended altitude and route of flight, be transmitted to ATC terminal and en route radar facilities for radar flight following and traffic information service. Also, that pilots submitting such flight plans be required to maintain routine radio contact with ATC and to advise ATC prior to changing the route or altitude specified in the flight plan.

Voluntary IFR operation. For years the scheduled airlines have made it a general practice to utilize the IFR system regardless of weather conditions in order to gain the advantages of ATC separation. This is not true of all other airspace users. Complete separation of all aircraft flying the airways does not occur with this practice because there can be a mixture of VFR (uncontrolled) with the IFR (controlled) traffic. However, the practice does have the advantage that ATC separation is provided between those who voluntarily participate. Safety from collision will therefore be enhanced, in direct proportion to the number of aircraft that participate in this voluntary practice.

The airlines recommend that: To the maximum practical extent, qualified pilots utilize the IFR system, regardless of weather, in order to gain the advantages of ATC separation.

Positive control. The airlines believe the use of "see-and-avoid" procedures alone for collision prevention is unrealistic where jet aircraft operate. We have offered a number of recommendations which will serve to augment the use of "see-and-avoid" procedures in certain airspace. However, the airlines believe that there is other airspace wherein the density of traffic or the operating characteristics of the aircraft make it necessary to replace "see-and-avoid" with "positive control" regardless of weather conditions. Under this form of control, separation between all aircraft is the direct responsibility of the ATC system.

Expansion of positive control. Positive control service is now provided by FAA between 24,000 and 60,000 feet over practically all of the contiguous 48 States. This service is designed to eliminate the mixture of controlled and uncontrolled flights in specified airspace so that all traffic therein will receive positive separation by ATC, without reliance on the "see-and-avoid" principle, even in clear weather conditions.

The airlines are convinced that safety requires the expansion of positive control service in congested airspace and specifically recommend that:

a. Positive control service be extended down to and including 18,000 feet over the entire 48 contiguous States by January 1968.

b. Positive control service be extended further by lowering it to 10,000 feet within the "Golden Triangle" area (New York, Washington, and Chicago) by January 1969.

c. Positive control service be lowered down to and including 10,000 feet along the west coast between San Francisco and Los Angeles (to encompass all routes used by traffic operating between these two cities) by January 1970.

d. Positive control service be extended from 10,000 feet down to the ground in certain critical high density terminals. Terminals that

should receive initial consideration are New York, Chicago, Los Angeles, the San Francisco Bay area, and Washington, D.C. Action to obtain positive control service in these terminal areas should be started immediately with implementation dates no later than July 1970.

Let me pause there to comment briefly on positive control. I noted that the previous witness used basically only one argument against it; that is, under positive control there have been collisions and there have indeed been collisions when the aircraft was under positive control. That does not really argue against positive control. It is quite clear, as Mr. Dingell was saying, that collisions can be avoided by giving aircraft the benefit of positive separation under the ATC system, and I don't believe really that is debatable. It is entirely possible even under all that precaution that there will be collisions but we at least will have done everything we can to avoid them.

GREATER AIRCRAFT AND PILOT CAPABILITIES

How well, and under what circumstances, users participate in the air traffic control system has a fundamental bearing on the system's ability to serve them safely and efficiently. Not only is it important to have more users participate in the system, but it is equally important that participating users be capable of doing so without placing an extraordinary burden on the system. If air traffic control must compensate for lack of capability in the aircraft, or lack of pilot proficiency, then the kind and quality of ATC service will be adversely affected.

Inability to communicate with air traffic control on each of the specific VHF frequencies used by different ATC functions is already eroding the capability of ATC to provide some types of service. For the future, this communications capability will be essential.

There will also be a growing need for airborne radar transponders that can automatically report identity and altitude of the individual aircraft to ATC. Recognizing that the ATC system can function better when aircraft are properly equipped to cooperate with it, the airlines have equipped their fleets with basic radar transponders. Additionally, airlines are now equipping their aircraft with newer transponders which send the necessary identity and altitude signals to permit the automatic display of this information on controller's scopes. An ATA survey earlier this year showed that about 200 airline aircraft are already equipped with these newer devices and that 70 percent of the fleet will be fully equipped by 1970. Another 20 percent will at least be equipped to send the individual identity signals. The airlines' aircraft will be equipped to transmit automatically their individual identity and altitude signals long before ATC facilities will be prepared to receive and display them.

The airlines recommend that:

a. Airspace users be encouraged to equip their aircraft with those avionics devices that will enhance their ability to participate in the ATC system, even though such equipment might not be required by regulation in certain airspace.

b. FAA specify by regulation that avionics equipment and pilot capability required for safer and more efficient operation of the ATC system, even outside of high density areas.

Requirements for flight into high density airports. Traffic at major airports has reached a volume and complexity that warrants careful attention. The time has come for FAA to specify pilot qualifications and aircraft equipment required for flight into and out of certain high density airports, such as Kennedy, La Guardia, O'Hara, Washington National, Miami, Los Angeles, and San Francisco. The complexity of operations at these airports is such that only experienced pilots should be permitted to use them. In fact, it may be that two experienced pilots should be required in each airplane in order to safely and efficiently carry out the duties required in these areas. As far as pilot experience is concerned, we concede that this will be difficult to spell out. However, since major airports use procedures that closely approximate IFR procedures in good weather conditions, we suggest that, as a minimum, an instrument rating be required.

The FAA provides many electronic facilities at major airports. These contribute to safer and more efficient operations—provided the aircraft are equipped to use them. We believe that in addition to the requirement for a safe standard of pilot experience, all aircraft operating into or out of major airports of the type noted above should be equipped with operating:

1. VOR and DME, or two VOR receivers.
2. ILS and marker beacon receivers.
3. Radar transponder beacons with 64 identity codes now, and later with 4096 identity codes and automatic altitude reporting.
4. VHF communications transmitter and receiver having switch and pushbutton-type channel selectors on the specific frequencies required for efficient operation in these areas.

The airlines recommend that: The above standards be prescribed by FAA for flight into and out of high density airports.

LOOKING TO THE FUTURE

What we have recommended is by no means the whole story. It is the minimum that must be done to meet the traffic demands of today—let alone catch up with yesterday—with state-of-the-art equipment and the regulatory environment to make the most of this equipment.

For the future, however, greater effort and innovation will be needed. Therefore, there is a continuing and urgent need to expedite research and development that will increase the capacity of the ATC system and speed the development of future ATC systems. Some of the major areas that deserve attention are:

1. Conflict prediction.
2. Flow control planning.
3. Terminal approach sequencing.
4. Digital communications.
5. Improved man-machine workload relationships.
6. Application of time-frequency technology in air traffic control.
7. VOR/DME area navigation.
8. V/STOL and SST ATC requirements.
9. Measurement techniques to determine ATC system efficiency.
10. An airport simulator which would test the efficiency and capacity of airport plans before funds are committed for construction.

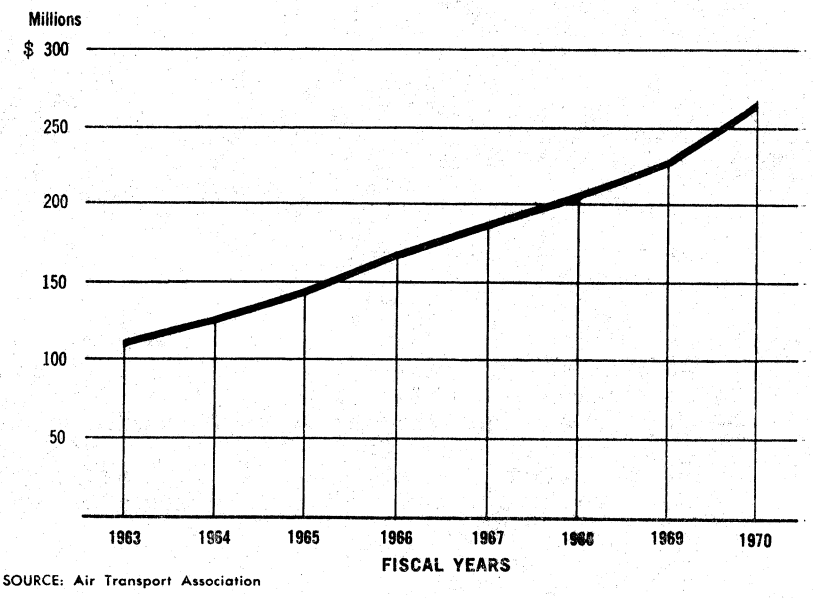
THE COSTS

The cost of the program we are suggesting is high, but the longer the expenditure is postponed, the higher the cost will be. The Federal Government undertook the responsibility for the establishment, operation and maintenance, of the Federal airways system over 40 years ago. In doing so, it undertook to meet the requirements of civil and military aviation, whatever they may be. At the moment, these requirements are not being met. Unless the program we suggest is carried out, that failure will carry with it increasingly adverse results as traffic grows.

Some years ago, the Government properly took the position that the civilian users of the system, air carrier and general aviation, should pay their fair share of the costs. The airlines agreed. About 4 years ago, the Congress imposed upon airline passengers a 5-percent ticket tax designed to cover the airlines' share of airways costs.

As can be seen by the chart (fig. 6), this tax will produce about

CONTRIBUTIONS TO DOMESTIC AIRWAYS SYSTEM FROM 5 PER CENT TICKET TAX



SOURCE: Air Transport Association

Figure 6.

$200 million next year—almost one-half the cost of the system—and this payment will continue to grow as traffic grows. This being the case, we feel we can ask for the improvements specified. It is the only way we can actually get the kind of system we are paying for.

Also, there is nothing sacred about the specific costs budgeted by FAA for facilities in the past. Major cost reductions are possible, with the application of the latest techniques, as FAA has so well demonstrated with the ILS cost reduction program (a better ILS for

$100,000 in place of an earlier figure of $275,000). A decision to equip every airline airport with a certain type of facility should carry with it an obligation to examine very carefully whether airports with a smaller traffic count can use simpler, less costly equipment to provide an adequate level of service.

The airlines recommend that:

FAA undertake an intensive cost reduction effort by—

a. More efficient and realistic design of lighting systems, electronic equipment, and the facilities which house them.

b. Purchasing in quantities large enough to permit manufacturers to use cost-saving production techniques.

c. Purchasing facilities on a complete package basis rather than as separate components.

d. Considering the purchase of selected facilities complete with onsite installation.

We are grateful to this committee for permitting us to explain so fully our recommendations for increased safety. We ask your help in achieving with great promptness four general objectives.

1. Completion of the currently planned ATC system.
2. Completion of the expanded program we have recommended.
3. More effective use of the system by all aircraft.
4. Expanded research and development for an even more advanced future system.

I have data, Mr. Chairman, which I think will be of use to the committee.

In view of the fact that the program which we have suggested involves additional appropriations, we appeared briefly last week before the Senate Committee on Appropriations and made specific suggestions as to additional funds to be appropriated. We identified not only the equipment that was to be acquired but the locations at which that equipment would be installed. I think it might be useful for the committee if I were to present this for this committee's record.

Mr. FRIEDEL. It may be included in the record.

Mr. TIPTON. Thank you, Mr. Chairman.

(Material referred to follows:)

APPENDIX A—AIRPORTS WITHOUT TOWER SERVICE

NOTE.—This list represents the busiest airports with airline service, but no control tower. Airports are listed in order of priority, according to total aircraft operations and do not take into account other important factors, such as weather conditions, terrain, other nearby airports and traffic activity in the general area. All of these factors should be taken into account and coordinated with the airlines and FAA. Since we have not yet had time to coordinate these specific locations with either the airlines or FAA, the actual places and their priority must be considered tentative.

Location	Total aircraft operations (thousands)	Location	Total aircraft operations (thousands)
1. Dothan, Ala	115.4	11. Minot, N. Dak	65.6
2. Bowling Green, Ky	106.3	12. Gainesville, Fla	62.8
3. Vero Beach, Fla	93.1	13. Morgantown, W. Va	61.9
4. Lafayette, Ind	88.3	14. Tuscaloosa, Ala	61.8
5. El Centro, Calif	85.8	15. Decatur, Ala	59.4
6. Columbia, Mo	81.8	16. Merced, Calif	58.1
7. Benton Harbor, Mich	74.7	17. Tacoma (Industrial), Wash	56.6
8. Grand Forks, N. Dak	74.4	18. LaCrosse, Wis	51.1
9. Enid, Okla	71.0	19. Pine Bluff, Ark	50.3
10. New Haven, Conn	67.1	20. Visalia, Calif	50.1

APPENDIX A—AIRPORTS WITHOUT TOWER SERVICE—Continued

Location	Total aircraft operations (thousands)	Location	Total aircraft operations (thousands)
21. Fayetteville, Ark	50.0	41. Jonesboro, Ark	38.9
22. Alamogordo, N. Mex	49.9	42. Keene, N.H	38.6
23. Bangor, Maine	48.8	43. Ponca City, Okla	38.6
24. New London, Conn	48.7	44. Prescott, Ariz	38.5
25. Hickory, N.C	47.4	45. Bloomington, Ill	37.8
26. Salem, Oreg	44.3	46. Greenwood, Miss	37.5
27. Redding, Calif	43.6	47. Myrtle Beach, S.C	36.5
28. Marysville, Calif	43.0	48. Florence, S.C	35.8
29. Kingston, N.C	42.3	49. Pasco, Wash	35.5
30. Fort Leonard Wood, Mo	42.1	50. Cape Girardeau, Mo	35.4
31. Harlingen, Tex	42.0	51. Scottsbluff, Nebr	35.2
32. Stillwater, Okla	42.0	52. Laurel, Miss	34.6
33. Burlington, Iowa	41.5	53. Bartlesville, Okla	34.0
34. Santa Maria, Calif	41.4	54. Ottumwa, Iowa	33.6
35. Poughkeepsie, N.Y	41.4	55. Flagstaff, Ariz	32.5
36. Temple, Tex	40.3	56. Danville, Ill	32.4
37. Laredo, Tex	40.2	57. Duncan, Okla	32.1
38. Albany, Ga	40.1	58. Astoria, Oreg	32.1
39. Greenville, Miss	39.6	59. Muskogee, Okla	31.4
40. Victoria, Tex	39.5	60. Mount Vernon, Ill	31.2

APPENDIX B—AIRPORTS RECOMMENDED FOR RADAR SERVICE IN FISCAL YEAR 1968

Note: This list represents the busiest airports with airline service, but without radar. Airports are listed in order of priority, according to total aircraft operations and do not take into account other important factors, such as weather conditions, terrain, other nearby airports and traffic activity in the general area. All of these factors should be taken into account and coordinated with the airlines and FAA. Since we have not yet had time to coordinate these specific locations with either the airlines or FAA, the actual places and their priority must be considered tentative.

Location	Total aircraft operations (thousands)	Location	Total aircraft operations (thousands)
1. Bridgeport, Conn	203.4	30. Grand Rapids, Mich	121.7
2. Champaign, Ill	194.6	31. Pueblo, Colo	120.6
3. Valdosta, Ga	194.3	32. Lafayette, La	118.1
4. Santa Barbara, Calif	190.4	33. Augusta, Ga	114.9
5. Huntsville, Ala	181.3	34. Modesto, Calif	113.9
6. Daytona Beach, Fla	181.0	35. Sioux Falls, S. Dak	113.6
7. Madison, Wis	180.0	36. Tallahassee, Fla	108.2
8. Lexington, Ky	178.2	37. Bowling Green, Ky	106.3
9. Rockford, Ill	175.1	38. Columbus, Ga	105.7
10. Orlando, Fla	173.5	39. Fargo, N. Dak	105.4
11. Lincoln, Nebr	173.5	40. Allentown, Pa	103.1
12. Pontiac, Mich	172.7	41. Reading, Pa	101.3
13. Yuma, Ariz	170.4	42. Boise, Idaho	100.4
14. Springfield, Ill	169.1	43. Wilmington, N.C	98.8
15. Flint, Mich	159.1	44. Cedar Rapids, Iowa	98.3
16. Bakersfield, Calif	157.4	45. San Angelo, Tex	98.1
17. Peoria, Ill	153.7	46. Kalamazoo, Mich	94.8
18. Lansing, Mich	149.2	47. Vero Beach, Fla	93.1
19. Stockton, Calif	142.6	48. Evansville, Ind	92.1
20. Billings, Mont	142.0	49. Elmira, N.Y	91.8
21. Wilmington, Del	139.1	50. Sioux City, Iowa	91.4
22. St. Joseph, Mo	134.7	51. Fort Smith, Ark	91.1
23. South Bend, Ind	131.0	52. Yakima, Wash	90.9
24. Moline, Ill	130.1	53. Lafayette, Ind	88.3
25. Midland, Tex	128.3	54. Muskegon, Mich	88.2
26. Columbia, S.C	127.9	55. Springfield, Mo	87.2
27. Beaumont, Tex	127.0	56. Erie, Pa	86.9
28. Cheyenne, Wyo	124.8	57. El Centro, Calif	85.8
29. Baton Rouge, La	124.2	58. Columbia, Mo	81.8

Location	Total aircraft operations (thousands)	Location	Total aircraft operations (thousands)
59. Rochester, Minn	79.7	68. Grand Forks, N. Dak	74.4
60. Hutchinson, Kans	78.0	69. Saginaw, Mich	74.0
61. Lancaster, Pa	78.0	70. Missoula, Mont	72.5
62. Waterloo, Iowa	76.7	71. Santa Rosa, Calif	72.1
63. Panama City, Fla	76.6	72. Eugene, Oreg	72.0
64. Fort Myers, Fla	76.0	73. Enid, Okla	71.0
65. Terre Haute, Ind	75.4	74. Worcester, Mass	70.8
66. Battle Creek, Mich	74.8	75. Palm Springs, Calif	70.4
67. Benton Harbor, Mich	74.7		

Appendix C—Additional Airports Expected To Have Airline Jet Service by 1972

Aberdeen, South Dakota
Alexandria, Louisiana
Alpena, Michigan
Augusta, Maine
Beckley, West Virginia
Bloomington, Illinois
Bloomington-Monroe County, Indiana
Bozeman-Gallatin, Montana
Bradford, Pennsylvania
Bridgeport, Connecticut
Burlington, Iowa
Butte, Montana
Cape Girardeau, Missouri
Carlsbad, New Mexico
Chico, California
Chisholm/Hibbings, Montana
Clinton, Iowa
Columbia, Missouri
Columbus, Mississippi
Crescent City, California
Danville, Vermillion, Ilinois
Decatur, Illinois
Dothan, Alabama
Dublin, Virginia
Dubuque, Iowa
Durango, Colorado
Eau Claire, Wisconsin
Elizabeth City, North Carolina
Elko, Nevada
Ephrata, Washington
Escanaba, Michigan
Farmington, New Mexico
Florence, Alabama
Florence, South Carolina
Fort Dodge, Iowa
Fort Lauderdale, Florida
Fort Leonard Wood, Missouri
Fort Myers, Florida
Gainesville, Florida
Galesburg, Illinois.
Glens Falls, New York
Grand Forks, North Dakota
Grand Island, Nebraska
Greenville, Mississippi
Groton, Connecticut
Gulfport, Mississippi
Hancock/Houghton, Michigan
Harlingen, Texas
Hayden, Colorado
Helena, Montana
Hickory, North Carolina
Hot Springs, Arkansas
Idaho Falls, Idaho
Imperial, California
International Falls, Minnesota
Iron Mountain, Michigan
Ithaca, New York
Jackson, Tennessee
Jackson, Wyoming
Jamestown, North Dakota
Keene, New Hampshire
Kingston, North Carolina
Kokomo, Indiana
LaCrosse, Wisconsin
Lafayette, Indiana
Lake Tahoe, California
Laredo, Texas
Las Vegas, Nevada
Lawton-Fort Sill, Oklahoma
Lebanon, New Hampshire
Lewiston, Idaho
Liberal, Kansas
Manhattan, Kansas
Marion, Illinois
Marquette, Michigan
Marthas Vineyard, Massachusetts
Mason City, Iowa
Matton, Illinois
McAllen, Texas
Melbourne, Florida
Merced, California
Minot, North Dakota
Missoula, Montana
Modesto, California
Mount Vernon, Illinois
Moultree, Georgia
Muskogee, Oklahoma
Myrtle Beach, South Carolina
New Bern, North Carolina
New Haven, Connecticut
North Bend, Oregon
North Platte, Nebraska
Ocala, Florida
Ottumwa, Iowa
Owensboro, Kentucky
Oxnard, Ventura, California
Paducah, Kentucky
Palm Springs, California
Panama City, Florida
Pasco, Washington
Paso Robles, California
Pellston Emmett, Michigan
Phoenix, Arizona

APPENDIX C—ADDITIONAL AIRPORTS EXPECTED TO HAVE AIRLINE JET SERVICE BY 1972—Continued

Pierre, South Dakota
Presque Isle, Maine
Rapid City, South Dakota
Redding, California
Riverside, California
Riverton, Wyoming
Roanoke, Virginia
Rocky Mount, North Carolina
Saginaw, Michigan
Santa Ana, California
Santa Fe, New Mexico
Santa Maria, California
Santa Rosa, California
Saranac Lake, New York
Sarasota, Florida
Scotts Bluff, Nebraska
Sheridan County, Wyoming
Stanton, Virginia
Sterling/Rock Falls, Illinois
Tacoma, (Industrial), Washington
Temple, Texas
Texarkana, Arkansas
Traverse City, Michigan
Tuscaloosa, Alabama
Tucson, Arizona
Twin Falls, Idaho
Walla-Walla, Washington
Watertown, New York
Watertown, South Dakota
Waycross, Georgia
Valdosta, Georgia
Vero Beach, Florida
Visalia, California
Yuma, Arizona

Mr. TIPTON. One point that was subject to some discussion that I think might be useful to discuss very briefly some more is collision avoidance.

I know the entire committee is deeply intersted in it, as we are. In view of the fact that the airlines have taken the lead and carried the major burden for the development of the currently projected system, I think it might be useful to have this discussed for a few minutes, what our progress is, what the equipment is like.

Mr. Seltzer, previously introduced, will say a few words on that.

Mr. SELTZER. I should point out that for over 12 years now the airlines have been seeking a collision avoidance system. In fact, approximately a year and a half before the Grand Canyon collision the ATA invited manufacturers, through a broadcast letter, to come forth with any ideas for a noncooperative system, one which would be completely self-sufficient and capable of operating without the need for the other aircraft to be equipped. Unfortunately, I think we got virtually no response until after Grand Canyon. Thereafter, many ideas were offered, but none of them came to fruition.

In approximately 1958, one of the prominent electronic manufacturers came forth with what he had as a proximity warning indicator which could grow into an eventual collision avoidance system. Had that come to pass, orders which would have amounted to $10 million worth of equipment would have been purchased then. However, we subsequently found that the equipment was not capable of performing as anticipated and the offer was withdrawn by the manufacturer. The airlines had still been urging a self-sufficient system, but our advisers in industry, from the electronic and manufacturing industry, advised us that our sights were set far too high. If we were anxious to obtain a collision avoidance system, we might have to accept, at least for the time being, that which the current state of the art could produce; namely, a cooperative system. It was then that we said rather than get nothing we would rather have something in the form of a cooperative system. That is the reason we are on the path we are at the moment.

It is unfortunate, however, that a system such as we have in mind is necessarily high in cost. The cost is not any more to our liking than it is to general aviation. Certainly we would not expect everyone to be

equipped with costly equipment of this sort. We have now a technical working group which has for the past 6 to 8 months been working specifically on a system description, such that manufacturers might utilize that description to produce prototype hardware which could be evaluated in flight. That group has incorporated in its system description the possibility of an abbreviated version which might come at lower cost, which would permit general aviation to participate.

Again we do not feel that this is necessarily the total answer for general aviation. In any event, our system description was completed at the end of June, some year and a half before people predicted we would be able to do it; and I think it is proper that we give thanks to the various manufacturers and to FAA who helped in that work because we never would have been able to do it alone. It is now anticipated that equipment suitable for flight evaluation will come from that system description and be available in the early part of 1969.

We agree that it is desirable to have a noncooperative, self-sufficient system, both for ourselves and for general aviation. We agree that it would be desirable to have a proximity warning device that would be noncooperative.

I might mention, sir, that we are familiar with the work of Mr. Adler, whom I believe you mentioned earlier today, and we have been in touch with him on numerous occasions. Some of the concepts and techniques have been embodied in our system description just completed. This entails the transmission and reception of radio signals among aircraft, which our system does involve. Unfortunately, the collision avoidance system is an exceedingly complex one. In essence, the black box is being asked to predict the future position of an aircraft that it knows nothing about.

Someone this morning, I believe, said that we can get a man to the moon but we can't seem to get a collision avoidance system. Strange as it may seem, we can predict where the moon will be a month in advance. But we cannot predict where an aircraft is going to be used a few moments from now. That is one of the fundamental difficulties.

However, we have come up with ideas, concepts, and techniques with which we hope that the flight evaluation program will prove feasible.

With respect to radar, which was mentioned as a possibility, airborne radar has constantly been looked upon as a potential for collision avoidance. The unfortunate part is that radar built specifically to see weather is more or less incompatible with a radar designed to look for airplanes. The air traffic controller has this problem today on his scope. When he first got radar, that radar was often obliterated by weather clutter. When they improved the radar to take out the weather clutter so he could see the airplanes, he now has the reverse situation. By the same token, the aircraft weather radar was designed to see weather and it doesn't do the best job to see aircraft. It has the narrow beam problem that Captain Ruby mentioned this morning.

Furthermore, there is the problem of ground clutter. The aircraft's height above the ground will be the distance at which ground clutter will appear ahead of the aircraft position on the radar scope. The crew is further distracted from looking out of the window by attempts to concentrate on a small radar scope in the cockpit. It is exceedingly difficult to ascertain which of these targets are targets of consequence.

It is a problem very similar to the one the controller has when he tries to ferret out which of the many targets he sees is the one he should pay attention to where he has no altitude information.

I believe that gives you a current summation of where we stand.

Mr. FRIEDEL. Thank you.

Mr. TIPTON. Thank you, Mr. Chairman.

We will be of course glad to try to answer any questions that are put.

Mr. FRIEDEL. It was a lengthy statement but a very, very informative statement, and I like your charts.

You have made a lot of recommendations. Have you given any thought as to what the cost will be for these recommendations?

Mr. TIPTON. In our recommendation for the current fiscal year which includes a large number of ILS as I have described, a large amount of radar, our total recommendation comes to an increase in the appropriation for the FAA for equipment of a little bit over a hundred million dollars. Now to move forward on that same program will cost at least that much every year for a number of years.

Mr. FRIEDEL. One of the witnesses this morning I think said around $2 billion. I wanted to know whether your recommendations were included in that or not.

Mr. TIPTON. I am told that was a comment made with respect to airport improvement. The FAA idea as to the need for airport improvement stated over in the other side in a hearing was $3 billion in the next 5 years. That was airport improvement.

I think that the airways improvement will not rise to nearly the bill that the airport improvement contemplated in future years will rise.

Can we give a better answer to the chairman on cost, Mr. Von Kann?

General VON KANN. I think the $101.5 million we have used with the Senate Appropriations Committee, sir, is for basic hardware procurement. We would have to say offhand that there would be siting and installation costs, and operation and maintenance costs; so there would be some inflation in the FAA budget in addition to the hardware procurement that we have discussed. I think probably it might be well to consider this a program of about $150 million a year for a period of about 4 years. But this, too, is well within the amount of money that the passengers are contributing right now through the ticket tax.

Mr. FRIEDEL. You mentioned something about glide slopes. How many of the airports have glide slopes?

Mr. TIPTON. Can you answer that offhand?

General VON KANN. Yes; we have glide slopes or ILS's at 189 of the 526 airports used by the airlines. Now, some of these airports have two ILS's and there are actually about 216 in service. So this leaves a requirement——

Mr. TIPTON. Shown on page 7 of my statement. (See fig. 4, p. 226.) A total of 337 ILS installations are required to cover the scheduled airline airports.

Mr. FRIEDEL. 337 are required?

Mr .TIPTON. Yes.

Mr. FRIEDEL. That do not have it today?

Mr. TIPTON. We have at the present time 189. This is also on page 7 of the statement. And 337 are required.

Mr. FRIEDEL. Just one brief question now. On page 25 when you spoke of positive control service extending from 10,000 feet down to the ground at certain critical high-density terminals, in there you mention New York, Chicago, Los Angeles, San Francisco Bay area, and Washington, D.C. Why was Miami left out, since Miami is a high-density area?

Mr. SELTZER. Yes, sir; it certainly is a high-density area. Those shown are the first five on our list. We indicated in the paper that these were the first to receive consideration. Certainly Miami should be considered. I believe, sir, in the recommendation with respect to high-density airports which follow, you will see the mention of Miami.

Mr. FRIEDEL. On high density, on positive control you do not mention Miami.

Mr. SELTZER. No, sir; we do not. It does not mean it is excluded. It means when we first start we are asking to look at the first five.

Mr. FRIEDEL. When you speak of Washington, D.C., are you speaking of Washington National or the Washington, D.C. area, including Friendship?

Mr. TIPTON. As you know, we regard Washington, D.C., as being served by three airports; Friendship, Dulles, and Washington National. We would expect the area covered there to cover the Washington area.

Mr. FRIEDEL. Mr. Dingell?

Mr. DINGELL. I would like to defer my questions.

Mr. FRIEDEL. Mr. Devine.

Mr. DEVINE. On page 16, Mr. Tipton, you make reference to standby equipment or emergency equipment independent of commercial for power. You said the FAA is procuring equipment for 50 selected airports. Could someone provide us with those airports at some later time so that we will know what they are?

Mr. TIPTON. Yes.

Mr. DEVINE. You have reference also to Washington National. I think in the last 6 months we have two evidences of power failure out there on radar.

Mr. SELTZER. Yes. These are the 50 airports which FAA has termed continuous power airports. They were selected on the basis that the total geographic area of the country would have some safe-haven airport in the event of a regional power failure such as we encountered in the Northeast area approximately 2 years ago.

Mr. FRIEDEL. Do you have a list of the 50 sites recommended or selected?

Mr. TIPTON. We will put those in the record at this point. We don't have them with us.

(The information referred to follows:)

COMPILATION OF CONTINUOUS POWER AIRPORTS, SUBMITTED BY THE AIR TRANSPORT ASSOCIATION OF AMERICA

Albuquerque (ABQ)
Andrews AFB (ADW)
Atlanta (ATL)
Baltimore (BAL)
Bismarck (BIS)
Boise (BOI)
Boston (BOS)
Chicago (ORD)
Chicago (MDW)
Charlotte (CLT)
Cincinnati (CVG)
Cleveland (CLE)
Dallas (DAL)
Denver (DEN)
Des Moines (DSM)
Detroit (DTW)
El Paso (ELP)
Great Falls (GTF)

CONTINUOUS POWER AIRPORTS—Continued

Houston (HOU)
Indianapolis (IND)
Jacksonville (JAX)
Kansas City (MCI)
Los Angeles (LAX)
Memphis (MEM)
Miami (MIA)
Milwaukee (MKE)
Minneapolis (MSP)
Nashville (BNA)
Newark (EWR)
New Orleans (MSY)
New York (JFK)
New York (LGA)
Oklahoma City (OKC)
Omaha (OMA)
Ontario, Calif. (ONT)
Philadelphia (PHL)
Phoenix (PHX)
Pittsburgh (PIT)
Reno (RNO)
Salt Lake City (SLC)
San Antonio (SAT)
San Diego (SAN)
San Francisco (SFO)
St. Louis (STL)
Seattle (SEA)
Tampa (TPA)
Tulsa (TUL)
Washington (DCA)
Washington (DIA)
Wichita (ICT)

Mr. DEVINE. I would presume Washington National is among those to be equipped.

Mr. SELTZER. I am quite certain Washington is among them.

Mr. DEVINE. Is it now so equipped?

Mr. SELTZER. Washington National has an engine generator system in the terminal building itself. I don't know how well that serves the outlying facilities off the airport. On the airport Washington National does have generator service, yes.

Mr. DEVINE. Mr. Tipton, do you have any information relative to whether you feel that the air traffic controllers are overworked and under great stress in such places as O'Hare, Washington National, Los Angeles, Atlanta, Miami, Kennedy?

Mr. TIPTON. It is always a matter of concern to us, Mr. Devine. As you have noted, we recommended that additional personnel be brought in. I think being a controller that Mr. Seltzer can comment further on that.

Mr. DEVINE. Would you, please?

Mr. SELTZER. I think that the job the controller is expected to perform sometimes is not really and truly understood. Mr. Kayne in his testimony previously mentioned some 400 cases of litigation and some $200 million in claims being made against the Government. I feel part of this is due to the fact that people are expecting more from the air traffic controller than he is geared up to provide. In the recommendations we have made here we have tried to take account of that fact.

If I may just explain a little bit here, with respect to the traffic information service this is a service that does not necessarily require that an aircraft be conducted IFR and I am certain AOPA would like to have it. I don't blame them one bit but it is a difficult job for a controller to provide traffic information service when he has to look at a scope which does not have any identity or altitude information, nor does he have any knowledge of the intent of hundreds of targets that he may see on that scope. I think it is nigh on to impossible at this time to give meaningful traffic at all times. However, the controller gives the best he can with what he has to work. For that reason we have recommended the altitude reporting readout. I consider the altitude readout one of the most essential missing links in the radar system.

Since radar is the foundation of our current-day traffic control system, and in the foreseeable future it still remains the foundation of what the controller will use. I think we must enhance the utility of that radar so that it can serve the controller's needs and so that he can perform the service the public is coming to expect of him.

I know that controllers will say that automation increases their workload because they have many buttons to push. It is for that reason in our testimony we say don't force the controller to make up for the lack of capability in the aircraft. Try to make the aircraft work with the controller so that the controller can in turn help the pilot. For this reason we recommended a 4096 transponder so that when a controller's automation gear, which works with that device, comes into play, it can automatically acquire the target without having him press a lot of buttons. It is for that reason we have recommended the automatic altitude readout so that the black box will do the work rather than forcing the controller to press buttons.

Mr. DEVINE. I did not get a direct answer to my question. The only answer I have is that it was recommended that there be more traffic controllers. I personally have a great deal of respect for these men as human beings here and they are under great stress, emotionally and psychologically, particularly under crowded conditions and under IFR conditions. Particularly when they are trying to communicate with incoming aircraft, either commercial or private.

Do you find that the air is cluttered with so much communication that it is confusing to both the pilot and the traffic controllers?

Mr. SELTZER. From my personal observation in riding jump seat in air carrier aircraft I would say the situation in the terminal area is more of a problem than it is in the en route area.

During recent years FAA has adopted procedures which permit the omission of position reports by the pilot when they are under radar surveillance. This has helped tremendously. But lacking altitude information the controller is forced to verify altitude on each new contact with a pilot. In the terminal area the problem is more serious.

Mr. DEVINE. Most of us on this subcommittee have, either independently or as part of a group, visited a number of towers, including JFK. It is pretty rough in there, as you well know, when you have six or eight men all talking at once. I think this is one area where something must be developed.

Mr. TIPTON. Just to interrupt at that point, you said you didn't get a direct answer to your question, and I don't think you did. I will now answer it directly. I think that the controller's stress and strain is a problem. It is for that reason that we are struggling here to get an air traffic control system which will accommodate the controller's requirements so that he will not have to do so much pick and shovel work of his own. I think it is urgent that we make progress along these lines. Every recommendation we have made here I think would make the life of the controller easier.

Mr. DEVINE. I recognize the sophisticated equipment continues to be developed, yet the air traffic controller is a human being. He recognizes every minute that a wrong decision on his part may be calamitous and this puts great stress on him.

Mr. JENSEN. May I just add, Mr. Devine, in a direct comment on your question, one of the things that is going on today is the use

of a lot of overtime on the part of controllers. I think for the very reason you mentioned, the critical nature of their work, that it is very important that they have the normal allocated time off duty.

I think were we to get controllers in such quantity as to eliminate the overtime use of present controllers we would be better off.

Mr. DEVINE. Is there a great turnover in air traffic controllers?

Mr. SELTZER. I don't know that I can answer that, Mr. Devine.

Mr. DEVINE. Can you get the information on that?

Mr. SELTZER. I will be glad to.

(Information referred to follows:)

AIR TRANSPORT ASSOCIATION STATEMENT ON TURNOVER OF FAA AIR TRAFFIC CONTROLLERS

According to FAA reports, about 350 journeyman controllers left FAA during 1966. There were about 10,500 controllers so the turnover was about 3%.

Mr. FRIEDEL. Mr. Dingell.

Mr. DINGELL. I have just a couple of questions, Mr. Chairman.

Your comments with regard to the 5-percent tax imposed on airline ticket sales intrigues me. I am wondering what the cost of adequate area traffic control safety would be, gentlemen. Would it be in excess of the $200 million you projected this figure at on the basis of present earnings?

Mr. TIPTON. The present cost of operating the airways system is in the neighborhood of $450 million a year.

Mr. DINGELL. This would be approximately half?

Mr. TIPTON. Therefore, the ticket tax yields about half of it. However, it must be recognized that the use of the airways system by the airlines is probably less than one-third with general aviation using a portion of it and the military using a portion of it. So that at the present time the airline contribution is greater than the cost that is assigned to them, or should be assigned to them.

Mr. DINGELL. Assuming that is so, what is the cost, and I want to compare this to the cost of a really adequate program of the kind that you have inserted in your statement—you have made a whole broad series of recommendations for improvement in radar, traffic control improvements, additional controllers, instrument landing system and devices—so that we can compare the one figure against the other, we know what you have coming in within ballpark figures, anyway, but we do not have any idea what the other costs are. Can you give us some ideas on that?

Mr. TIPTON. The only cost study we have made on this relates to our program recommendation for installation of facilities during the fiscal year 1968. That was about $101 million additional in expense. Since that equipment is written off over 15 years that would be $15 million increase in annual cost.

General Von Kann estimated that our other recommendations would involve similar expenditures for a period of about 4 years, which would add in total about $600 million over that period. Our cost figures aren't any good.

Mr. DINGELL. They are about as good as any we have gotten to date.

Mr. TIPTON. We have a problem with it. The FAA has better cost data than we are likely to have. One of the things I would like to have happen would be for the committee to address the same question to

the FAA, saying, "Here the ATA has come forward with a program, how much is this going to cost us?" because I would like to know.

Mr. DINGELL. This is precisely the question I intended to direct to the chairman of the committee to find out what is the cost of adequate safety for the whole aviation agency. The Chair advises me that Mr. Stimpson is here from the FAA, so I assume that Mr. Stimpson will alert the FAA to expect some communication from the committee staff for appropriate figures for insertion in the record. I am sure, Mr. Chairman, we can look to their carrying this matter forward.

(The following information was subsequently submitted:)

FEDERAL AVIATION ADMINISTRATION STATEMENT ON ESTIMATED COST TO IMPLEMENT PROGRAM RECOMMENDED BY THE AIR TRANSPORTATION ASSOCIATION

We estimate that implementation of the program outlined in the formal statement made by the Air Transport Association would cost approximately $835 million for proocurement and installation of equipment over amounts appropriated through fiscal year 1967. In addition, annual costs of operation and maintenance would be expected to increase by approximately $75 million after the procurement and installation phases of the program were completed. Operating, training and maintenance costs could be about 30% greater during the changeover period to the new equipment.

Mr. DINGELL. Perhaps Mr. Tipton would like to take more time and direct himself more fully and comfortably and more conveniently to some of the aspects that you have given us on this point. I would like to now go into a couple of points that concern me.

The cost of the collision avoidance system I have heard is $50,000 and now it is $60,000 per aircraft. This would be on the order of a large aircraft a little but more than the cost of a propeller, would it not, for a conventional aircraft? A propeller for an aircraft is $25,000.

Mr. TIPTON. We don't buy as many of them as we used to, but I think it is in that neighborhood.

Mr. DINGELL. Also it would be roughly about the same as the cost of the theater and projection equipment that would go into a large 400- or 500-passenger jet that will shortly be coming down the ways; is that correct?

Mr. TIPTON. I have no idea as to the cost of that equipment, but I would not be surprised.

Mr. DINGELL. It really is not, on a 17 or 18 million dollar jet, a very large sum in terms of safety when dealing with the lives of 400 or 500 people.

Mr. TIPTON. We don't regard it as too large. We don't regard it as in any respect an objectionable expenditure. We have been trying for 12 years to get the opportunity to make that expenditure.

Mr. DINGELL. Now the other question I wanted to discuss with you is the standard of the FAA with regard to getting passengers out of aircraft. There are 2 minutes for the number of passengers we have in the aircraft to go through emergency exits. Do you regard this as an adequate standard of safety?

Mr. TIPTON. Yes. We have spent a great deal of time on that particular part of our work. I am hesitant to take the time at this point, but, if you would care to, General Von Kann could give you the discussion of industry effort on passenger evacuation. A memorandum prepared by the Aerospace Industries Association on passenger evacuation and crash worthiness will be put in at this point.

(Information referred to follows:)

PROPOSED AIA CRASHWORTHINESS DEVELOPMENT PROGRAM

OBJECTIVES

The Objectives of the proposed AIA crashworthiness development program are improvements in the state-of-the-art as it applies to aircraft crashworthiness and the determination and evaluation of new and improved methods, equipment, and design characteristics that will substantially increase the passenger's chance of survival in an aircraft accident by:

(*a*) Protecting passengers from smoke and toxic fumes and heat inside the aircraft and extending the period of survivable cabin atmosphere.

(*b*) Moving passengers to the exits as quickly as possible.

(*c*) Providing means by which passengers may reach the ground rapidly and safely.

SCOPE

The following areas will be covered:

1. Fire-resistant materials:
   - Industry Search for Materials Available for Early Incorporation.
   - Test Above Materials.
   - Establish Improved Criteria.
   - Establish Test Methods.
   - Initiate Advanced Material Development Program.
2. Fire-suppressant systems and smoke and fume protection:
   - Foam.
   - Fog.
   - Freon.
   - Powder.
   - Vents.
   - Curtains, Compartments and Masks.
   - Insulation, Walls and Floors.
   - Ventilation Air Flow Control.
3. Emergency lighting and exit awareness:
   - Interior Light Level.
   - Interior Light Intensity Distribution.
   - Exit Awareness.
   - Interior-Exterior Light Interrelation.
   - Warning Systems.
4. Evacuation:
   - Slide Improvement:
     - Flow Characteristics.
     - Fire Resistance.
   - Overwing Exit Passenger Flow Characteristics.
   - Exit Actuation.
   - Study Accident and Evacuation Demonstration Data.

ANTICIPATED PROGRAM TIMING

It is planned that this crashworthiness development program will commence immediately upon enactment of regulatory changes resulting from the NPRM, assuming that such regulations do not supersede the need for development in those areas described herein. Delaying the development program start until enactment of regulatory change could well affect and modify some areas of the proposed development work. However, if the FAA decides that certain of the regulatory areas will be delayed, then industry agrees to start the development program upon receipt of formal notification from the FAA to this effect. This agreement should be so worded as to assure that during the course of the development program undertaken, no regulatory changes will be promulgated by the FAA that would supersede the objectives of the development program.

As described herein, the program will continue for a period of 12 months. AIA/FAA coordination is planned during the program so that as major test or decision milestones are reached, program progress can be monitored. Twelve months from initiation of the program, the AIA will submit the following to the FAA:

Test reports, including results of the development work and conclusions drawn therefrom.

AIA proposed wording for regulatory changes in each technical area.

AIA proposes incorporation of the necessary hardware to comply with the suggested regulation changes on all new jet transport aircraft certificated to

CAR 4b or FAR 25, to be delivered 18 months after agreement has been reached on these regulation changes. This agreement may either be in the form of additional regulatory changes or receipt by the AIA of formal notice of agreement of the forthcoming regulation change from the FAA. It is recognized that certain of the development areas may not prove to be fruitful, in which case no recommendation for modified regulations would be forthcoming.

There is no intention on the part of industry to reduce the effort or scope of the development work which would normally take place in the industry to improve the crashworthiness or other important transport aircraft safety categories during or subsequent to the proposed 12-month development program.

Fire-Resistant-Materials Development Program

GOALS

Phase I.—To provide in 12 months, a regulation that would result in the use of the least flammable materials which are functionally satisfactory and which can be implemented in new airplanes within 18 months of the definition of the requirement. The regulation would define flammability test methods and requirements and a statement of the material properties, compartments or areas within the scope of the regulation considered pertinent to fire safety. This regulation is to be a definite upgrading.

Phase II.—To provide a statement of material research programs containing objectives and goals which, if accomplished, would result in a truly significant improvement in compartment fire safety through materials and new test methods capable of measuring the improvements.

PROGRAM

AIA members will establish a contemporary baseline of the best existing state-of-the-art materials being used by correlating the affected material specifications in use by the industry members and analyzing the correlation. This will assure knowledge of the best available materials in each of the application categories being used.

All materials significantly better than the contemporary baseline materials will be obtained through a search of the materials suppliers and supplier-industry development and will be tested to the methods for horizontal and vertical burn proposed in Revised Item 16 submitted by AIA on 23 February 1967. To assure timely production incorporation, only those new materials which will be available in production quantities within 15 months from start of this program will be considered. Only materials which meet improved criteria resulting from the overall program will be installed in production aircraft for delivery 30 months from start of this program.

The AIA will recommend revisions to FAA regulations, Paragraphs 25.853 and 25.855, covering the upgraded standards of these materials, at the conclusion of the 12-month development program.

The scope of the above includes materials in crew, passenger and cargo compartments used in sufficient quantities or in areas which directly affect fire safety.

As a separate phase of the program, existing burn criteria will be examined to determine if more meaningful tests can be devised for use as a future standard. If these revised criteria can be established, industry will include them as a modification to the regulations for incorporation in 30 months. Considerations will include determination whether both small and large ignition sources are necessary factors of the burning criteria or whether a numerical value can replace the existing burn rate test (e.g. numerical application of flash point, heat content, self-extinguishing property, etc.). Studies based on tests, and analysis of aircraft fires will be made to determine if new testing techniques and burn criteria would be desirable.

It is recognized that since these burn criteria and materials development efforts are limited in time, it is recommended that further FAA sponsored development programs be initiated in the specific areas of (1) improved materials, and (2) test methods and criteria. It is recommended that these programs be conducted by qualified materials producers and research organizations to industry de-

veloped, and FAA approved work statements. The industry work statement will be available in the 12-month period. If accomplished, this could result in a long term, truly significant improvement in compartment fire safety.

PROCEDURES (SEE FIG. 1)

Phase I.—Industry Search: A summary of available AIA data and survey of material suppliers.

(*a*) Individual AIA members will be assigned specific material categories to search. AIA members will supply each other with material specifications related to the particular category. Where specifications do not exist, an outline of the required physical and functional properties and flammability data (and test methods) shall be supplied. If materials in use are less flammable than the specification requirement, actual values will be stated. Members will also coordinate a list of material suppliers to be surveyed.

From these inputs a chart will be made to send to the material supplier. The chart will—

List functions and physical property requirements (e.g., abrasion impact, fungus and fluid resistance, acoustical properties, cementability, color fastness to light and laundering and drycleaning, strength, heat distortion and discoloration, permeability, flexibility, sewability, resistance to shrinkage from drycleaning and laundering, weight, luster, pilling and cracking, texture, color range, aging and fire resistance.)

Provide space for the suppliers to list their least flammable material.

Provide space to list material properties which are available for evaluation and will be available in production quantities within 15 months.

Provide space to list material properties for long term purposes which will be available at a specified future date beyond 15 months.

This chart will then allow a time-availability study to be made. See example chart. (Fig. 2.)

(*b*) Charts will be sent to suppliers with a request to reply within 30 days. Data will be accumulated and tabulated by the searcher and then distributed to the other AIA members.

(*c*) AIA members will be responsible for evaluating new materials with improved flammability, found by the survey, to determine their functional capabilities as related to required properties and implementation (timing and process or manufacturing) on new aircraft.

(d) After evaluation, AIA members will make recommendations for flammability requirement improvements and then the AIA will draft the proposed 12-month regulations changes. To assure timely production incorporation, only those new materials which will be available in production quantities within 15 months from start of this program will be considered in this recommendation.

Phase II.—Research statements: materials and burn criteria.

(*a*) From the survey conducted per Phase I, AIA members will determine what material categories require long range research and development to improve fire safety. AIA members will prepare the material research statements giving the appropriate burn criteria (not specific required values) and required physical properties.

(*b*) Concurrently with Phase I and Phase IIa, AIA members will review methods of determining material burning characteristics, including combustion products, and analyze the meaning of the test data. The AIA will relate the analysis of these data to data obtained from studies of actual airplane fire (mock-up and otherwise).

It is proposed to determine what test methods and test requirements for either material types or "area use categories" are meaningful for airplane fire safety. Both small and large energy ignition sources are to be considered.

(*c*) At the conclusion of Phase II, a and b, prepare coordinated AIA statements of material research programs and of development work required to define and measure meaningful material flammability properties for submittal to the FAA. Work is to be conducted by qualified material producers and research organizations under FAA sponsorship.

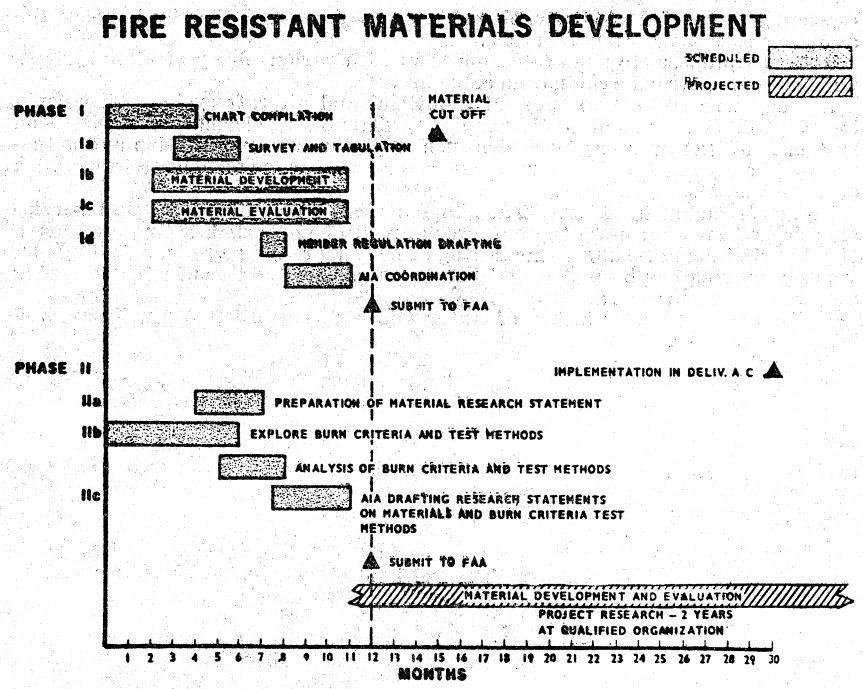


FIGURE 1

AIA MATERIAL SURVEY CHART

PROPERTY	TEST METHOD *3	REQUIREMENT	MATERIAL SUPPLIER TO COMPLETE	
			MATERIAL AVAILABLE *1 PRODUCT DESIG. _____	FUTURE MATERIAL *2 DATE AVAILABLE _____ PRODUCT DESIG. _____

*1 THIS COLUMN ONLY FOR MATERIALS AVAILABLE FOR EVALUATION & IN PRODUCTION QUANTITIES PRIOR TO 19

*2 THIS COLUMN FOR MATERIAL AT A FUTURE DATE BEYOND ,19 GIVE SPECIFIC DATE AVAILABLE

*3 MATERIAL SUPPLIER TO FILL IN IF DIFFERENT FROM AIA METHOD.

FIGURE 2

FIRE-SUPPRESSANT SYSTEMS AND SMOKE AND FUME PROTECTION

A provision which may contribute to survivability under a variety of conditions, and is also compatible with the trend toward larger capacity aircraft, is that of

extending the period of survivable cabin atmosphere, and thereby increase the allowable passenger evacuation time.

The AIA proposes to run evaluation tests with various fire protection systems with simulated airplane cabins and crash fire.

A study will be made of present industrial and aircraft systems that could be adapted. Development testing will (1) determine efficiency of suppression systems, and (2) overcome problems such as power supply, initiation and actuation methods, and interfaces with other aircraft systems. Comparability with other evacuation aids will be assisted during the program.

Tests conducted by ALPA, FAA, and airframe manufacturers and service experience have shown the types of crash fires to be expected, their propagation characteristics and results. Some testing of fire suppressing agents, shielding and venting systems has been accomplished to date. Investigations in the following area have been initiated:

Fire suppression by means of water fog, high expansion foam, Freon, and dry powder.

Use of masks, compartments and fire curtains.

Means of fire detection and initiation of suppressions systems.

Insulation improvement and duct fire stops to slow fire propagation.

These areas will be further pursued, and at the end of 12 months, industry will recommend a regulation change, which, while not requiring the specific system developed, will recognize and give full credit for the capabilities of such a system in the overall crashworthiness, materials flame resistance, and passenger evacuation time of the airplane design.

Specific tests will—

1. Evaluate the effect of lining materials with improved fire resistance on the survivability in a fire with a fuel ignition source. Survivability will be evaluated by measuring temperature and atmospheric content with respect to time.

2. Determine the value of water fog, high expansion foam, powder, Freon and masks to improve survivability in a fire with a fuel ignition source.

3. Evaluate changes in airframe insulation, wall and floor materials, and use of compartments, curtains, and vents, to reduce the possibility of external fire propagating to the airplane interior and throughout the airplane.

4. Evaluate means of preventing propagation of fire from air conditioning system to cargo compartment to cabin interior.

Emergency Lighting and Exit Awareness Development Program

The objectives of the emergency lighting development program shall be to develop a standard for emergency lighting intensities within a 12-month period. The resultant standard will be incorporated into production aircraft within 30 months after the start of the program. These lighting intensity standards shall be determined by development of mock-up tests, using human factor evaluation procedures, to determine:

(1) An acceptable cabin intensity level for evacuation.

(2) An acceptable light intensity distribution for exiting ability and exit awareness.

(3) The relationship between the interior lighting and over-wing lighting or escape slide lighting on exit ability, and the relationship between overwing or escape slide lighting and the ground on exit ability.

(4) The effect of tactile, audio, and brightness stimuli on exiting ability and exit awareness. Subjects will be tested in the mock-up that has bumps to feel on the hatrack near the exits, directions coming through the P. A. system, and exit signs in various locations. If a satisfactory method of using smoke or smoke simulation can be devised, it will be used in these tests.

Warning Systems Studies

Passengers have been known to sit immobile in a seat when they should have been moving because they failed to realize the danger and what to do about it. Human factor studies will be conducted by the AIA into the response of the passengers to various signals designed to alert the aircraft occupants in the event of an emergency. The objective of the work is to determine whether a system to warn the passenger that he should act to leave the airplane is required or desirable.

The program is to review test data of passenger response to various signals such as bells, sirens, voice commands, etc. These data will be used to define the value of these systems.

Emergency Lighting and Exit Awareness Mockup Test Items

1. Interior lighting levels:
   (*a*) Conduct test to verify 0.05 foot-candle average aisle illumination.
   (*b*) Conduct test to determine acceptable variation from average illumination levels.
   (*c*) Conduct test to establish exit area illumination levels with the 0.05 foot-candle average aisle illumination.
2. Exit awareness:
   (*a*) Evaluate exit signs and other tactile/visual aids for brilliance level, general geometry, etc.
   (*b*) Evaluate the above both with and without simulated smoke, if feasible.
3. Exterior lighting levels:
   (*a*) Establish light levels and satisfactory patterns for evacuation.
   (*b*) Determine adequacy of self-illuminated slides.
4. Warning studies:
   (*a*) Human factors studies of alerting devices to determine the worth of devices which will alert passengers that an emergency situation exists.
5. Inside-outside lighting levels:
   (*a*) Determine adequate levels of exterior lighting and contrast ratios with interior lighting, conduct tests with 0.05 foot-candle average aisle illumination.

Evacuation System Development

Studies of evacuation demonstration and actual accident reports indicate that some improvement in escape means can be developed in the near term for existing transport models. The industry proposes development effort in the following specific areas:

EXIT SLIDES

(*a*) Means to assist passenger transition from the exit door onto the slide.
(*b*) Means to assist passenger transition from the slide to the ground.
(*c*) Means to increase passenger confidence in the use of slides.
(*d*) Improve resistance of slide puncture due to small fire sources near the ground base.

OVERWING EXIT EGRESS

(*e*) Means to assist rapid egress from the overwing exits to the wing surface such as a step to reduce the distance, and a non-skid surface.

EXIT ACTUATION

(*f*) Means to assist rapid and positive opening of very large exit doors.

The original AIA proposal included development work toward possible improvement in the seat to Type III and IV exit opening arrangements due to recent FAA interpretation of the existing standards for the seat to exit relationship. No further work is proposed in this area.

AIA proposes to perform a system analysis of the results of airline and industry evacuation demonstrations already conducted to further improve the understanding of evacuation system restraints (time consuming factors). It is necessary that the FAA make these airline evacuation test results (without identification of specific airlines) available to the AIA to accomplish this analysis.

Results of the development work of items (*a*) through (*f*) above will be used to propose modifications to regulations or TSO's.

Program Management and AIA/FAA Coordination

The proposed AIA Management Organization Chart is shown as figure 3. An overall manager will be appointed from the AIA Ad Hoc Committee membership. Assistant managers will be appointed from each of the AIA member companies participating in a major sense in the development program. In addition, a technical manager will be appointed from that AIA member company doing the largest share of the development work in each of the technical development areas.

It is proposed that scheduled coordination meetings with the FAA be held at three-month intervals. The first three meetings, that is, those held during the 3rd, 6th, and 9th months of the program will be held at three of the participating companies. During the development program informal coordination meetings will be held timed to development test milestones. The final coordination meeting would be held at the FAA offices in Washington, D.C.

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AIA DEVELOPMENT PROGRAM MANAGEMENT ORGANIZATION

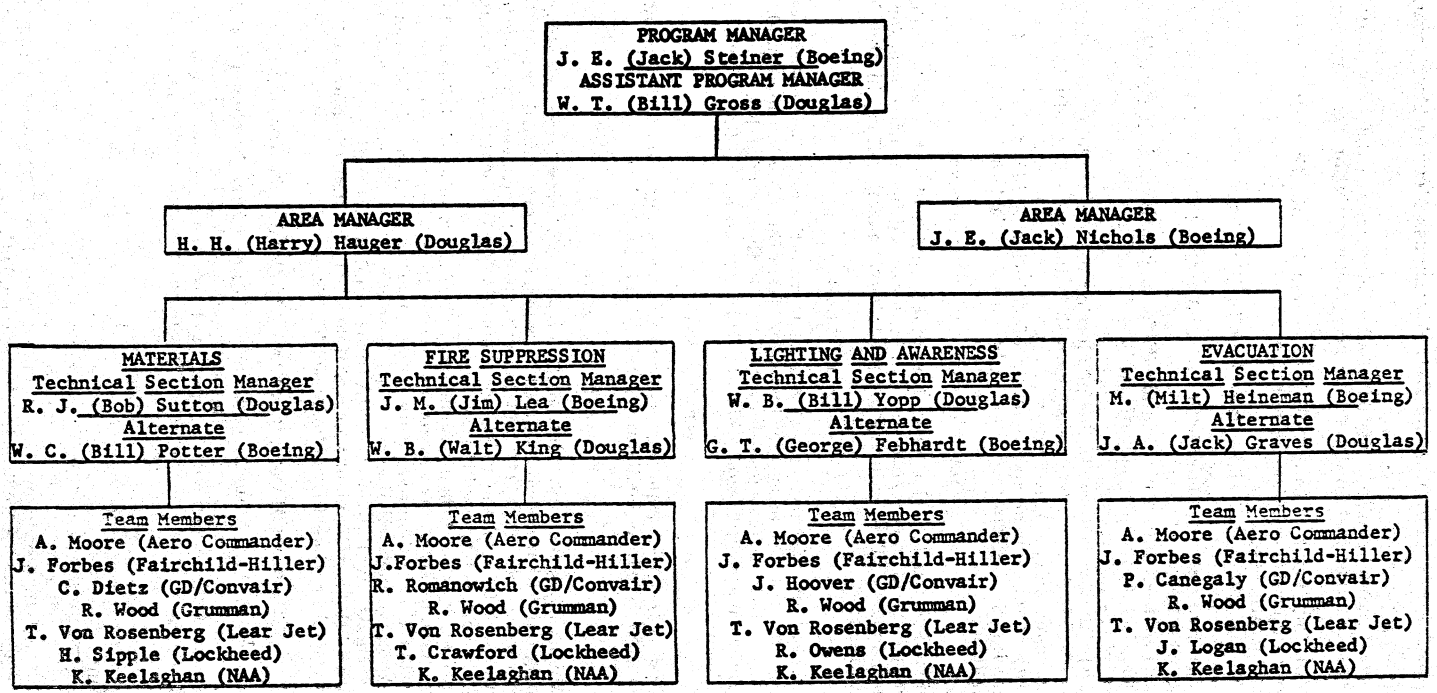


FIGURE 3

Mr. DINGELL. One very brief question: Isn't it a fact, though, if there is a great deal of flame, fumes, and smoke the passenger will be pretty well incapacitated in a minute?

Mr. TIPTON. The present tests of evacuation are very realistic ones in providing smoke and noise and everything else. Don't we have a movie on this subject?

General VON KANN. Yes, we have. I believe some of the films were shown to the committee, if I am not mistaken.

Mr. TIPTON. I don't think they have been shown yet.

General VON KANN. A great deal of research is going into that very subject, as it is going into every aspect of survivability and evacuation. We hoped around the turn of the year that one development might give a flame arresting capability. Unfortunately, the toxicity level turned out to be too high. I have no doubt again that with the effects that are underway we will find ways to cut down the propagation of flame and give the passengers more time.

Mr. DINGELL. When you are dealing with a 400- or 500-passenger jet is it not fair to say that you ought to err, if you err at all, far on the side of safety, and we are faced with the problem of 2 minutes being too long. If that jet is full of smoke and fire and oxygen-absorbing conditions it might perhaps asphyxiate or poison through smoke poison the passengers of that aircraft.

Isn't that something that should be looked at?

General VON KANN. It is being looked at. We anticipate a new rule by FAA in the near future. Although I can't speak for FAA, there is an indication that this may go down to a 90-second rule.

Mr. FRIEDEL. Thank you very much, gentlemen.

Mr. TIPTON. Thank you, Mr. Chairman and members of the committee, for the attention we have received.

Mr. PICKLE. Mr. Chairman.

Mr. FRIEDEL. Did I miss you? I apologize.

Mr. PICKLE. As usual, Mr. Tipton, you give this committee very thorough and complete testimony.

Mr. TIPTON. Thank you.

Mr. PICKLE. Certainly what you have said can hardly be argued with as I see it. I take it that you have limited your discussion, however, to the original statement when you said you were largely going to give testimony that would focus on ways to reduce the risk of mid-air collision. I like the information you have given us. I note at this point, however, that we did not go further into the area of corresponding cost to other aircraft beyond the ATA organization with the type of construction on planes and exits, certainly as it affects general aviation.

I know you are representing ATA; you are not trying to sell somebody else's hardware, but we have the problem in this committee of determining what is the best approach and still what is going to be fair to general aviation. I cannot help but feel that if we do these things that you recommend, and they are desirable, perhaps mandatory, it will result in the inability of many users of general aviation to take advantage of these commercial airports.

I don't see how they can come in if they have to meet all these requirements. Am I correct in that?

Mr. TIPTON. I think that you are quite correct in that our recommendations will undoubtedly require those general aviation aircraft that come into congested areas to be well equipped and the pilots to be experienced and well trained pilots. We did not think that there was any better way of maintaining proper safety standards as aviation grows, both general aviation and area operations grow, than that. I believe that the general aviation group must face that possibility.

Another recommendation that we are making at this same time relating to airports bears very strongly on this, however. In this I see that we are in complete concurrence with the AOPA. We think it is awfully important that adequate attention be given to the creation of airports specifically designed for general aviation. That is true for many reasons. One of the reasons is the one you have mentioned. We are recommending that in the Federal airport program that really primary emphasis be given to the creation and improvement of general aviation airports. We believe that that is a way by which the general aviation will be better accommodated and the airlines and their traffic be better accommodated.

Mr. PICKLE. If we had double the number of airfields and general aviation on separate fields it might eliminate many of the dangers we are talking about. This would take a stupendous amount of money. Even if we had it, though, we are not going to be able to separate general aviation from the commercial airfield. There are too many fields used as a sort of feeder point for the big airlines.

So, in accomplishing what you want and what you recommend, I still think that we have got to admit that these fields must be used by general aviation to a level that won't break their backs financially to do it.

Mr. TIPTON. We have no disagreement with that. We think that there must be a minimum of equipment and professional competence to participate in the congestion that is developing and will continue. This industry, as we noted here, is growing dramatically. I think that we all have to face, all of us aviation people, have to face the fact that it is going to be more difficult and more expensive than it has been in the past.

Mr. PICKLE. If we put in all these things, such as control towers, extra radar equipment, daylight radar scopes, and ILS, you are saying that it is beginning to approach somewhere in the neighborhood of a hundred million dollars. I would say it is more than that. Correspondingly, the private industry is going to have a tremendous amount of money to put into it. What I am concerned about is this: How many of these alphanumeric systems do they have in operation right now?

Mr. TIPTON. I think the only alphanumeric systems in operation right now are New York and Atlanta.

Mr. PICKLE. What does one of these systems cost?

Mr. SELTZER. I don't know exactly, sir. It is in the millions as they are currently configured.

Mr. PICKLE. How many do you envision we will have in the United States within the next few years—should have?

Mr. SELTZER. It is hard to say that unless we define terms, sir. There are various forms of alphanumeric systems, some of which are very sophisticated and very, very costly. Some of the lower cost versions of those which would print the numbers only on the scope can be obtained

for $150,000 to $250,000. Whereas some of those necessary for the more sophisticated terminal areas, and I speak of terminal areas only, might run anywhere from a half million to a million dollars. If we have one for each radar location, we currently would have need for it at the 105 airports receiving radar service today. How many there will be in the future I can't forecast, but we go into 526 airports, and use 21 air route centers.

Mr. PICKLE. You testified, if I recall, that approximately 200 of your craft now either have or are being equipped with machinery that would use the alphanumeric system, that is established altitude. If you are putting 200 installations on your planes why does the Government have only two systems?

Mr. SELTZER. I don't know that I can speak for the Government but I wish they had it in more places because I am certain it would be in more airplanes, sir. There are at least 200 in airplanes, by the end of this year it will exceed 300 aircraft. We have urged for years that the ground equipment be expedited. I don't know the specific reasons for the lag.

Mr. PICKLE. I suppose this is something for the FAA to answer but I can't understand why they only have two systems when 200 have and soon 300 of your aircraft will have machinery to receive it.

Those are all my questions now.

Mr. FRIEDEL. Thank you.

Mr. TIPTON. Thank you very much.

Mr. FRIEDEL. I have a question which is more of a statement. I am one with a personal belief that we should not spend a great deal of money for Washington National if eventually we are going to have it for general aviation and feeder service and shift all of our major flights to Dulles and Friendship. I think we have to consider this for the future in this area, particularly.

Mr. TIPTON. I should say, Mr. Chairman, I know you did not ask for my comment but I should say that if that were done, neither Friendship nor Dulles could handle the traffic. That requires a vast expansion of both fields. There are an awful lot of people and airplanes that go into Washington National, as you know. The CAB has a proceeding going on at the present time to try to sort all of this out. I would not undertake to make recommendations as to how it will be done.

Mr. FRIEDEL. Dulles is operating at around 10 percent of their capacity, maybe 15 percent, and Friendship at only about 40 percent of their capacity, if that much. So they can take many a flight out of Washington National and make it safe for all aviation.

Thank you.

Mr. TIPTON. Thank you, Mr. Chairman.

Mr. FRIEDEL. Our next witness will be Mr. Frank Smith, executive director of the National Aviation Trades Association.

I want to apologize to you, Mr. Smith. You were here this morning. You can see how we are pressed for time.

Mr. SMITH. Yes, sir; I understand I have about a minute and a half.

Mr. FRIEDEL. No, you have not a minute and a half. If you want to file your statement and briefly summarize it—we are going to read your whole statement—you may do so.

STATEMENT OF FRANK KINGSTON SMITH, EXECUTIVE DIRECTOR, NATIONAL AVIATION TRADES ASSOCIATION

Mr. SMITH. For the record, my name is Frank Kingston Smith, executive director of National Aviation Trades Association, which is a group of 400 businesses involved in the sales, service, and support business of general aviation. I am sorry to say that my statement has not been printed yet. It is at the printer's now. Our office has not received it yet due to some personal problems I had over the weekend.

Mr. FRIEDEL. When you have it ready will you submit it to us?

Mr. SMITH. Yes, sir; I shall submit it to you for the record.

(Mr. Smith's prepared statement follows:)

STATEMENT OF FRANK KINGSTON SMITH, EXECUTIVE DIRECTOR, NATIONAL AVIATION TRADES ASSOCIATION

It is a pleasure to appear before your distinguished subcommittee. I am Frank Kingston Smith, executive director of the National Aviation Trades Association, composed of general aviation businessmen, manufacturers, component suppliers, and operating support facilities. Our association represents sales, service, and supply organizations which support the operations of the entire general aviation fleet.

PREAMBLE

Over the last 18 months, the problems of air safety, air traffic control, and airport capacity of many communities served by the certificated air carriers have become of progressively greater concern to the air transportation industry, Congress, and the general public. The press has given prominent treatment to the growing number of air carrier delays, some at airports such as John F. Kennedy, Los Angeles, Miami, O'Hare, and Washington National, with the attendant increases in the operational expenses to the airlines, and passenger complaints of missed airline connections and missed business appointments. We would like to explore the subject with specific attention to three areas:

I. Scope of the airport problem.
II. Adequacies and inadequacies of today's system.
III. Needs of tomorrow.

I. SCOPE OF THE PROBLEM—THE NATIONAL AIR TRANSPORTATION SYSTEM

There are three facets of the national air transportation system:

1. Aircraft.
2. A system of airports from which they operate.
3. An air traffic control system that conducts aircraft from one airport to another, safely.

These three sub systems are inextricably intertwined to form the national air transportation system. The problems facing us are rooted in the fact that there has never been any real national system plan for air transportation. Each sub system has almost grown like Topsy independently, without directions or long range plans.

Before anyone can devise a workable solution it is necessary to understand the manner in which these three sub systems mesh. We will try to identify the problems, characterize them, identify areas in which problems are critical, and recommend a plan to solve these problems in such a way that all users will operate compatibly overall.

FUNDAMENTAL DEFINITIONS [1]

In both the public press and the Congress, attention given to the problems of air transportation is directed almost entirely to "commercial" airlines and "commercial" airports. The premise seems to be that "commercial" airlines are important to the national economy and that airline personnel, pilots, maintenance people, and administrations are ever perfect and without any human failings.

[1] Every profession and specialized trade has its own words of art, which have an entirely different meaning from that of lay usage. Aviation has developed its own meanings and technical terminology.

All other flying is conveniently (and confusingly) lumped together under the term "general aviation," treated all too often by press and in Congress as a nuisance activity carried on by untrained, incompetent, unequipped, unregulated, rich, and probably drunken pilots. The lack of comprehension of the impact of both airline and general aviation operations on our national economy is a basic problem which must be attacked first. Until aviation in its every form is defined clearly and its requirements are recognized and understood, it is impossible to make any of the decisions for which these hearings were called.

AVIATION TRANSPORTATION—THE BIG PICTURE

It is convenient but erroneous to separate and segregate arbitrarily the certificated air carriers and general aviation. The development of a national air transportation system must provide for both. Otherwise there is no system.

THE AIR CARRIERS

Although the press writes about the crowded skies and about traffic jams aloft, comparing them with the 5 p.m. rush on the Baltimore-Washington Parkway, this is simply not the situation. The Air Transport Association, representing the major carriers commonly called "commercial" airlines, has 40 members operating passenger carrying airplanes under Certificates of Public Convenience and Necessity, issued by the Civil Aeronautics Board.[2] These should be properly referred to as "certificated air carriers" or "certificated carriers." Excluding the aircraft operated by the six Alaskan lines, two Hawaiian, two Caribbean, and two helicopter airways which do not operate in the contiguous 48 states, fewer than 2,000 airplanes are operated in the U.S. by the certificated carriers.[3] Obviously not all of these air carrier airplanes are flying at any one moment, nor do they serve all the country equally. The air space over all the 48 states is certainly not crowded with air carrier airplanes as some people would have us believe.

AIR CARRIER AIRPORTS

There is a general misunderstanding concerning the coverage of air service in the U.S. and the facilities used by the airlines. Some people tend to treat public airport facilities served by certificated airlines as if they *are* for air carrier use only, and a recent trend of thinking is that general aviation should not be permitted to use any such airport facilities. The reason professed is safety. Is it valid?

For the record, the certificated airlines do not own any airports. Carrier airports are not private facilities. They are public facilities paid for by public funds, frequently matched by federal funds. Their use by all users should never be restricted arbitrarily and should not be discussed without a thorough understanding of the situation.

STATISTICAL REFERENCES

Consideration of this situation can be confused unless the various types of statistics used by the air carriers are placed in perspective. Furthermore there must be a clear distinction made between the problems of handling aircraft movements in the air traffic control system (including the airport approaches and landings) and the problem of handling mobs of people on the ground in the terminals.

Distinctions must be made between:

1. Aircraft movements, both on the airways and on airports;
2. Available passenger seats;
3. Load factors;
4. Number of passengers originated at airports;
5. Passenger miles en route; and
6. Revenue passenger miles.

These statistics have valid specific management uses for the airlines but can generate erroneous conclusions unless assessed in their proper frames of reference.

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[2] P.L. 85–726, 85th Congress, S. 3880, Title 3, Sec. 401.
[3] *1967 Air Transport Facts and Figures*, p. 34.

ANALYSIS OF STATISTICS

Let us first examine the airport terminal handling problem from a datum point of 1947. Twenty years ago the DC3 was the backbone of the air carrier fleet, an airplane that could carry 24 passengers.[4] Let us pose a hypothetical problem at a hypothetical airport to indicate how the present problem has slowly developed. Suppose a 1947 airport, with a capacity of 40 flights per hour for 16 hours a day, using DC3 equipment. This would mean that 640 airplanes would arrive and depart (and each arrival and departure counts as a movement), with a potential of 15,360 available passenger seats. Historically, air carriers have been running a load factor of about 50%, so we can project 7,680 people arriving and leaving the airport during each 16 hours—2,803,200 per year. Now let us suppose that this same airport is being served by exactly the same number of airplanes—but jets, with a seating capacity of 150. With the same number of aircraft movements, we now have 96,000 aircraft seats available and at a 50% load factor, the same airport handling the same volume of aircraft traffic now handles 48,000 people each business day, or 17,520,000 per year. The airways are no more crowded, the approach facilities are no more saturated, the airport runways and ramps have no greater volume of traffic, but the terminal facilities suddenly become crowded with humanity coming and going. This is the root of the present airport problem. It is therefore imperative that we always distinguish the factors of aircraft movements on an airport and the problem of passenger handling facilities.

Passenger Miles: The published statistics on passenger miles can create a distorted impression in the minds of laymen regarding both the airspace and the terminal facility problem. The term "passenger mile" is derived by multiplying the number of people actually on board an airplane and the number of miles the aircraft flies. For example, a 24 passenger DC3 flying 3,000 miles coast to coast generates 36,000 passenger miles, assuming a 50% load factor. A DC–8–61 with 251 seats, at 50% load factor, would generate 378,000 passenger miles, although there is still only a *single aircraft* movement handled by the air traffic system. We anticipate in the very near future aircraft with a potential of 450 passengers and 750 passengers, which project the passenger mile figure of each aircraft to astronomical proportions. To fill the seats of the progressively larger airplanes coming into airline use is one of the prodigious marketing problems facing the certificated carriers and is the reason for the extensive and expensive advertising campaigns carried on by them.

"Passenger revenue miles" refers to the number of passengers carried by airlines who actually pay a fare. We must recognize that many air travellers do not pay fares because of special nontariff arrangements. This revenue mile figure is a management statistic which really has no place in our considerations of crowded airport facilities since all passengers whether they pay fares or not have to be handled at the terminals.

"Load factor" refers to the number of people (or freight) expressed as a percentage of the total capacity of the aircraft.

THE AIRPORT SITUATION

Where is the airport problem? A common misconception equates all airports with Kennedy International, O'Hare, Los Angeles, or Washington National, and their high volume of traffic, then concludes that all general aviation should be barred from all airports served by air carriers. This is not a valid proposition.

The airport situation: FAA statistics disclose that there are 8,415 airports registered in the continental U.S., only 37.9% of which are publicly owned and 69.5% privately owned. However, of these 8,415 airports, FAA's testimony before the House Commerce Committee revealed that only 526 are served by the certificated airlines. That's all. And we must note that of these only 234 have control towers and can be legally called "control airports." Only 105 airports served by air carriers have airport radar surveillance facilities. To put it another way, there are 7,889 airports in the U.S. used by general aviation airplanes only and not served by certificated carriers. The vast majority of the general aviation fleet operates from these non-air carrier-served airports; therefore they do not contribute one whit to any of the congestion at the surprisingly few airports which have generated all the furor about which this committee is concerned.

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[4] DC–3 permitted variation up to 28 passengers, but 24 seats is the average number installed.

Where *is* the airport problem? CAB airline statistics indicate that one-third of the total U.S. airline passengers originate at just five airports in the U.S.; 10 generate 50%; 90 generate 90%; and the other 560 airports originate the remaining 10%. There is no factual basis to justify treating these 560 airports on the same basis as the 10 airports which are congested with transient human bodies and burdened with all the attendant problems of handling people, including terminal buildings, ticket and counter areas, parking facilities, rest rooms, restaurants, and public transportation.

GENERAL AVIATION ANALYZED

Business Aircraft.—Considerations of the very real problems facing a relatively few communities can be further distorted by some other statistics coupled with a misunderstanding of the composition of the general aviation fleet. According to FAA, there are more than 100,000 general aviation airplanes. With a ratio of 50 general aviation airplanes to 1 certificated carrier aircraft, there is a popular misconception that general aviation is akin to a cloud of aeronautical gnats which darken the skies. This is also wrong.

There are 40,000 airplanes in the general aviation fleet which are strictly business machines. Someone observed sagely that the people who make the decisions in our highly competitive business climate don't take the train or the bus—they fly! The business airplane is known as the "brain wagon" and for good reason.

Nearly 600 business aircraft in our fleet are pure jets, flown by ATR rated pilots. They *are* private airlines operating on their own schedules.

Almost 3,000 business airplanes are "air carrier types" used by large corporations and flown by ATR rated pilots.

Nearly 25,000 light twin engine airplanes in the general aviation fleet are used by appropriately rated pilots and flown for business purposes. The term light plane is also misunderstood. By legal definition a light plane is any heavier than air machine weighing less than 6¼ tons (12,500 lbs.), an arbitrary figure established more than 20 years ago when the DC–3 was the standard air carrier airplane at a gross weight of 35,000 lbs. The DC–3 carried 24 passengers at 165 mph for an extreme range of 1,000 miles. Many light planes outperform the venerable DC–3 with one exception—they carry only from 4 to 15 passengers. Modern light planes fly faster and higher than the DC–3, are better equipped, yet because they weigh less than 6¼ tons, are regarded by the unknowledgeable as flimsy toys. As long as this distorted image persists, the problem facing us today cannot be solved. Aircraft such as those described in the above categories range in cost from $60,000 to $2.5 million. These are not toys. They are business tools, yet, merely because they are not operated by the certificated airlines, they are popularly defined as "private planes" and the layman assumes that they are Piper Cubs, two place fabric covered training planes. Such aircraft are not worthwhile business investments unless they may be operated on a regular basis; therefore it is necessary not only that the pilot be instrument rated but that the airplanes be equipped with aircraft navigation and communications equipment, known as avionics, costing from $15,000 to $50,000 per airplane. These aircraft operate on precisely the same basis as the certificated carriers; instrument flight plans, frequently flown by pilots holding ATR ratings, the same as airline captains.

The question of the competence of private planes operating in the air traffic system is often raised. Here again there is a misunderstanding of terminology. A private airplane is also any airplane not operated by the certificated carriers. The Lockheed Jet Star, Grumman Gulfstream I and II, operated by General Motors and the Ford Motor Co., the Fairchild F27 operated by Champion Spark Plug Co., the DC–9 operated by Playboy, and the myriad DC–3's, Martin 404's, Convairs, and other corporate aircraft are private airplanes. It is time that someone capped the well of misinformation which keeps pumping into the minds of the public the idea that private planes are all Piper Cubs or the equivalent.

Air Taxi/Commuter Airlines.—In the last few years a new segment of aviation has developed to meet the transportation demands of many communities not served by the certificated carriers. This segment is known as air taxi, operating on either a demand basis (like a taxicab on the streets) or on a regular schedule between stated points. This latter development is variously known as scheduled air taxi, commuter airlines, short lines, feeder lines, and more recently as mini-lines. The demand for scheduled air transportation from small com-

munities is shown most vividly by the phenomenal growth of scheduled air taxi operations which in three years have increased from 12 air commuter airlines to nearly 120. These airlines operate without any route protection or federal subsidy.[5]

There is only one reason for a pilot to go into an airport—he has some legitimate business there. In the last few years a new industry has developed, rising to meet the need of people to travel quickly to an airport to make connections with a certificated carrier. This business began as a service of chartering airplanes from an outlying area to a hub, developed into an air taxi business on a demand basis, and under special FAA regulations is now developing into a regular scheduled service variously known as scheduled air taxi, commuter airlines, short lines, and feeder lines. This category of aircraft is flown by professional pilots who perform a needed function in air transportation using light aircraft carrying from 3–9 passengers. A new class of aircraft is being instituted now carrying up to 18 passengers to meet this demand.

Agricultural Aviation.—Included in the term general aviation is a specialty known as aerial application, snidely referred to as crop dusters, and looked down upon as a form of insanity by people who should know better. Few members of Congress and the general public realize that almost 20% of the arable acreage of the U.S. is treated by agricultural aviation, or know of the services performed in fire fighting, insect control, or vermin elimination. More than 5,000 aircraft are engaged in this business use.

Instructional Flying.—Obviously no one is born as an airline captain. Every pilot must begin with a course in basic instruction and most pilots continue to develop their proficiency as required for the type of flying performed. About 9,000 general aviation airplanes are used for instruction only.

Week End Pilots.—General aviation being an all inclusive term also includes many airplanes that are not used for rapid, all weather, business transportation. More than 30,000 such planes are used for recreation and other personal transportation in a local area. Some are small 2 and 3 place fabrics covered units. Most of them are used only by a group of people referred to as week end pilots. They do not operate from municipal hubs because they don't have to. Their bases are generally the smaller fields around the country and they are flown only in daylight during good visibility. Such airplanes do not need radio, never hook into the national air traffic control system, never use controlled airports, and contribute absolutely nothing to the airport problem.

Many airplanes are also used by individuals for personal transportation and the use of the airways system and major airports depends entirely on the proficiency of the pilot and the equipment of the aircraft. There are no statistics to show that such aircraft create congestion problems at airports or that they contribute to it in any way. Many thousands of pilots fly for recreation and enjoyment. About 30,000 airplanes are used for these legitimate purposes.[6] These week end pilots as they are sometimes called do not contribute to the problem facing this subcommittee for the simple reason that most of them never go near a controlled airport and never use the federally operated navigation and communications system maintained and operated by FAA.

Rules and Regulations. There is also an apparent assumption that while the certificated carriers are highly regulated, general aviation is not, and that almost all general aviation pilots are inept, untrained, and reckless. Without laboring the point we invite your attention to the voluminous Federal Air Regulations covering *all* aircraft and airmen under Title 14, Chap. 1, of the U.S. Code.[7]

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[5] *Scheduled Air Taxi Operations as of November, 1966,* FAA, Office of Management Services, Information and Statistics Division.

[6] Although the airlines claim that they are important because they are a business, the record shows that in 1966 they spent $144,345,086 (*American Aviation*, May, 1967, p. 28). It is public knowledge that a large volume of this advertising was to induce travel to vacation areas.

[7] *Federal Aviation Regulations,* especially :

Part 23. Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes.
Part 33. Airworthiness Standards: Aircraft Engines.
Part 43. Maintenance, Preventive Maintenance, Rebuilding, and Alteration.
Part 61. Certification: Pilots and Flight Instructors.
Part 67. Medical Standards and Certification.
Part 71. Designation of Federal Airways, Controlled Airspace, and Reporting Points.
Part 91. General Operating and Flight Rules.
Part 95. IFR Altitudes.
Part 97. Standard Instrument Approach Procedures.
Part 137. Agricultural Aircraft Operations.
Part 141. Pilot Schools.
Part 143. Ground Instructors.
Part 147. Mechanic Schools.

THE AIRWAYS SYSTEM

The federal airways system must be considered in two parts:

1. Navigation system relies on electronic and other aids which establish precisely the airways over which aircraft must travel to be included in the air traffic control system.
2. The ATC system itself.

The airways system is based upon electronic equipment used for navigation. The relative position of the ground based electronic fixes is accurately selected by the pilot using avionics equipment in his aircraft. This primary air navigation system depends upon an extensive network of radio fixes operating in the very high spectrum of electronic frequencies, from which bearings in all directions can be immediately detected by airborne sensing equipment. The technical name for this navigation equipment is VHF omni directional radio range, shortened in aviation usage to "VOR" or to "omni range." This type of equipment has recently been coupled with newly developed equipment which emits a signal that can be electronically interpreted aloft to show the aircraft's distance from the signal source. This is known as distance measuring equipment (DME).

Other navigation facilities include low frequency radio beacons, many of which are being phased out as the more precise VOR or VOR/DME installations are commissioned.

THE AIR TRAFFIC CONTROL SYSTEM

The air traffic control system is designed to provide guaranteed separation between aircraft on instrument flight plans while operating in actual instrument flight conditions. Thirty-five years ago all flying—military, air mail, air carrier, and private—was done only in daylight and fair weather, using the human eye both as the primary cross country navigation and traffic separation tool. As aviation matured, it became obvious that to provide any kind of scheduled flight operations for the air carriers or the military, a system was needed which would permit aircraft to operate safely under conditions of reduced or no visibility. The development of an air traffic control system had to wait until there was a reliable system of radio voice communication between the aircraft and the ground, coupled with a navigation system upon which a pattern of civil airways could be built.

No laymen can understand the problem of flying an aircraft without ground reference. It is the tragic fact that a pilot who has not been trained to control an aircraft solely with reference to fight instruments is literally committing suicide if he flies into a cloud mass and loses sight of the ground. Statistics show that under these circumstances an airplane becomes completely uncontrollable and lethal within 30 seconds. Therefore, before flying in clouds was possible, the industry first had to design a system of special flight operations, but it is only one part. The ability to follow the airways under no-visibility conditions, to compute positions and make estimates of arrivals at various points along the line, and to communicate with the ground, these are the other parts of the instrument en route flying picture. The last parts of the flight, arrival at a precise point in the terminal area and performing a landing under instrument conditions, are refinements.[8]

The key to air traffic control is the continuous cooperation between pilots aloft and air traffic control specialists on the ground.[9] Only if the pilot has the ability and proficiency to maintain a precise course on the airways and to predict accurately his estimated time of arrival at check points along the way can the ATC controllers on the ground reliably predict traffic movements and prevent possible traffic conflicts aloft. Constant radio-telephone dialogue between the controllers on the ground and pilots in the air is required to exchange advice and information which each must have. Communications and navigation equipment

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[8] It is imperative to distinguish the difference between instrument landings under actual instrument conditions and landings in good visual conditions while still under an instrument flight plan.

[9] The term "controller" is a misnomer. Actually the air traffic specialist on the ground exerts no control over the aircraft. The pilot is in control of the aircraft at all times. The proper relationship between pilot and controller is that of cooperative team work.

required both on the ground and in the aircraft is complicated and expensive, but must be used if the system is going to be expected to work.[10]

The Theory of Traffic Separation.—Separation of en route traffic can be explained in what is admittedly an over-simplified illustration. Imagine a series of small birds each in a separate empty box car on a moving train. This is how ATC operates. When an airplane is issued an instrument flight clearance, it means that ATC has reserved for it a box of moving airspace along a track over the ground. The box is 5 miles wide (the width of a civil airway), 1,000 ft. high, and its length varies from 9–50 miles (the minimum length of the airspace reserved is usually the distance covered by the aircraft in three minutes—the allowance error margin). To be immune from collision neither the bird nor the aircraft need be in the precise center of its moving box; it may be at the top, bottom, or either end; so long as it does not stray into the adjacent box, the system creates a protective cocoon of airspace.

Visual Flight Rules (VFR) Operations.—Federal Air Regulations under which all aircraft operate, both general aviation and air carrier, provide that visual flight, sometimes called contact flight, may be carried on as long as the lateral visibility is three miles or more and the cloud ceiling at least 1,000 ft.[11] Under these conditions the see and be seen concept operates as it did 30 years ago. Aircraft separation and collision avoidance by law are the responsibility of the pilot, who is legally bound to look out the window. In the language of the courts, the pilot under such circumstances is bound to see what he would have seen if he had looked. This is true whenever the actual atmosphere is clear enough to permit visual flying.

It is frequently said that the "see and be seen" concept is no longer valid. This is nonsense. The conclusion of invalidity comes from the widely held misconception that *all* air carrier airplanes are jets, flying constantly at 500 mph, which, it is alleged, generates "instantaneous closure rates." Let us discuss this point.

The Federal Air Regulations require that airplanes flying on easterly and westerly headings above 3,000 ft. must fly with 1,000 ft. of vertical separation. Thus an aircraft proceeding east is 1,000 ft. above or below an aircraft going the opposite direction. Only if they are going in the same direction can they be at the same altitude. The closure rate between two aircraft going the same direction at the same altitude is the difference in air speed between the overtaking airplane and the one being overtaken. This is certainly not "instantaneous." Jets at *their* altitudes fly with 2,000 ft. of vertical separation. At low altitudes the regulations impose speed restrictions on jet aircraft as for example in terminal areas. An airplane flying at 240 mph transits a mile in 15 seconds, or three miles in 45 seconds. Under VFR conditions this is not anywhere near being an instantaneous closure situation. Try holding your breath that long. As a better example: in 15 seconds an automobile traveling 60 mph travels a quarter of a mile, 1,320 ft., yet most of us operate in this environment without giving a thought to such a thing as instantaneous closure rates or considering that there might be a problem in swerving to avoid colliding with a car a quarter of a mile away. The only requirement is that the pilot be alert and look out the window.

Instrument Flight Rule (IFR) Operations.—Whenever the ceiling is less than 1,000 ft. or lateral visibility less than three miles, instrument flight rules (IFR) as prescribed by the Federal Air Regulations go into effect. Under these conditions only instrument rated pilots (those who are (1) licensed for this special type of flying; (2) using aircraft equipped with properly calibrated instruments; and (3) operating under Air Traffic Control-issued Instrument Clearances are legally permitted to fly. Everyone else is grounded *by law*. The restrictions on instrument flying and the level of proficiency required to engage in it are spelled out in the regulations in great detail.[12] The result is that under IFR conditions, the vast majority of general aviation aircraft which are not flown for business and therefore whose fair-weather pilots do not need or use instrument ratings, do not use the federal airways system, nor the air traffic control system.

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[10] Typical general aviation nav/comm equipment as widely used:

Type	*Price range*
Automatic direction finder	$1,088–$4,376
Distance measuring equipment	2,800– 7,000
VOR nav/comm transceivers	795– 3,400
VOR localizer indicators	400– 545
3-light marker beacons receiver	249– 320
Radar transponder	2,200– 5,000

[11] *Federal Aviation Regulations*, Part 91.

[12] *Ibid.*, Part 91, Sec. 91.105(b), Parts 95 and 97.

However, it must be understood that many general aviation pilots *are* instrument rated and have aircraft equipped with electronic navigation and communications equipment (avionics); they *do* use the ATC system under instrument conditions and as time goes on will use these facilities more and more, because they must operate on an appointment schedule and on the business aircraft is the most efficient form of transportation available to him.

Canned Instrument Flight Plans.—General aviation pilots file instrument flight plans only when they need to file them to go from one place to another under instrumented conditions. It has been stated in public communications media that certificated air carriers file instrument flight plans for every flight and that they are therefore under "positive control" at all times. Let us for a moment examine this misconception.

First of all, the premise of those who advocate positive control is that if *all* aircraft aloft were at all times operating on instrument flight plans—even under the best of visibility in good weather—it would positively guarantee prevention of aircraft collisions. This premise is erroneous, the terminology misleading, and the conclusions fallacious. The fact that an aircraft is on an instrument flight plan does not guarantee traffic separation except from other aircraft also on instrument flight plans when both are operating under actual instrument conditions.[13] The fact that an air carrier or *any* aircraft is on an instrument flight plan does not in any way guarantee it separation from any other aircraft flying—whether on visual flight plans, instrument flight plans, or no flight plans, if the weather is clear and visibility good enough for VFR. All pilots flying under VFR conditions are still responsible by the law for avoiding collisions. The results clearly, precisely, and undisputedly impose upon every pilot the legal duty to look out the windshield for other traffic.

The certificated carriers operate on published scheduled approved by CAB, on the basis of which the carriers can and *do* file in advance a series of instrument flight plans using the airline flight numbers. These are called "canned" flight plans. However, under VFR conditions most air carrier pilots, particularly those of the local service airlines, will cancel their instrument flight plans as they roll out to take off positions or they will cancel their IFR very shortly after they are airborne and proceed VFR. For the record, *all* air carrier aircraft do not fly on instrument clearances at *all* times.[14] In good weather they are not required to, nor does it always make sense when the average flight time for a local service carirer is approximately 30 minutes.[15]

How an IFR Plan Works.—There is no mystery to the operation of the system although many aviation writers and fliers try to make it sound mysterious. Suppose that an airplane pilot is going to institute an instrument flight plan from Washington National to LaGuardia Airport, New York.

Sometime prior to the flight, the pilot, as required by law, would review the status of all navigation aids and facilities along the route he would take then would notify ATC (through a flight service station, a control tower, or a direct phone call to the center) certain information including his point of departure, point of origin, routing, and requested altitude. This communication would then be sent to the Washington Air Route Traffic Control system at Leesburg, Va., which would ascertain available airspace on the routing requested; Washington ARTCC (Washington Center) would then contact New York ARTCC (New York Center) to cooperate in creating a course and altitude that would fit in with New York's available airspace under the existing and forecast traffic situation. New York and Washington Centers would strike a bargain for an airspace reservation which would be transmitted to the pilot. In the meantime the pilot would be on board his aircraft at Washington National, would call Ground Control and receive clearance to taxi out to a ramp area adjacent to the end of the active runway, where he would pull off to one side and contact Instrument Flight Plan Clearance Delivery on a special frequency. In time his clearance would come through something like this: "ATC clears November 1 2 3 4 Poppa from Washington National to Robbinsville VOR via radar vectors to Churchill,

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[13] The duty is still upon the pilot in command to be vigilant for other traffic at all times. Under actual visual flight conditions a midair collision caused by loss of communication or failure to follow controller's directions is legally indefensible.

[14] There is an agreement among the air carriers that in some parts of the country they will operate on instrument flight plans particularly on routes in the triangle formed by Washington, Boston, and Chicago. All pure jet aircraft do fly on instrument flight plans, but propeller driven local service aircraft have no such requirement.

[15] *American Aviation,* May 1967, p. 31; *Flight,* June 1967, p. 69.

Victor 123, Robbinsville. Climb and maintain 5000 ft." This means that the airplane has separation protection only as far as the Robbinsville VOR fix north of Maguire Air Force Base. It cannot proceed further into the New York area until it receives an addition ATC Clearance. In ATC lingo the Robbinsville limitation is known as its Clearance Limit. The pilot reads the message back to the controller so that there can be no misunderstanding, then contacts the Tower and receives his takeoff clearance. Immediately after take off the tower instructs him to contact Departure Control (radar) on a specific frequency, which will steer him (vector him) to a point out of the terminal area, at which time the Departure controller will inform the pilot to "contact Washington Center" on a specific frequency. This is known as a radar "hand off." Washington Center would continue to vector the aircraft until it intersected the assigned airways at Churchill intersection, identified by radio navigation equipment in the aircraft. In a few minutes Washington Center would notify the pilot to contact New York Center on a specified frequency as he proceeds up the airways past Woodston, N.J., towards Robbinsville.

In the ATCC's teams of controllers sit around large horizontal radar screens resembling glowing card tables—the great tools of ATC. Crawling across the face of these screens are many glowing points of light known as "blips," each representing an airplane, showing its position and movement over the surface of the earth. Altitude reporting equipment is not yet in service. Under actual Instrument Flight conditions every *one* of these aircraft would necessarily have to be on an Instrument Flight Clearance, meaning that they all would have to be identified and their altitude communicated by radio to the Center controllers. Alongside each blip being controlled would be a small piece of plastic upon which would be written in grease pencil the aircraft number, altitude, and flight route. These would be continually moved by hands as the blip progresses across the face of the scope. These plastic tags are known as "shrimp boats." On a console next to the controllers is a stack of Flight Progress Slips containing more detailed information on the flight than can appear on the little shrimp boat. As the airplane approaches New York Center's area of responsibility, a New York controller, watching a similar radar screen, is notified by Washington Center on a direct line communication system that an aircraft is arriving which he must handle. The pilot is then told to "contact New York Center" on the frequency that the New York controller is using. The usual way of completing the hand off is for the pilot to transmit: "New York Center: This is November 1 2 3 4 Poppa maintaining 5,000." The center identifies the aircraft and merely replies "Radar contact."

In the meantime the New York terminal air traffic situation has eased so that before the aircraft reaches Robbinsville, where the pilot would expect to go into a holding pattern he receives an additional clearance: "November 1 2 3 4 Poppa cleared to La Guardia Airport. Expect ILS# approach." At Queensberg intersection (just west of Sandy Hook) he is told, "Contact La Guardia Approach Control now," on a designated frequency. At that time the pilot contacts Approach Control, is identified, and, when cleared to do so, initiates his instrument approach.

The Instrument Approach. Under the present state of the art, there is no such thing as a "blind" landing.[16] Under conditions of reduced visibility and ceiling, instrument approaches are made on clearly and definitely prescribed regulations and criteria, the theory being that an airplane shall be delivered precisely by the system to a position approximately ½ mile from the runway threshold, at which time the pilot must be able to see the ground and to complete the landing visually. The type of approved instrument approach and the ground based equipment assigned with it may change the landing minima criteria. The final stages of an instrument approach and landing are made with reference to a special terminal chart, called an Approach Plate, which contains all the information needed for the specific type of approach to be made. Some approved instrument approaches are based on low frequency non-directional radio beacons, the position of which can be ascertained by an automatic direction finder (ADF). Other approaches are based on a combination of ADF in conjunction with a radar assist and are popularly known as Ground Controlled Approaches (GCA). This is the type of approach historically used by the military. There are VOR approaches emanating from a nearby VOR facility. localizer approaches which are

[16] The British are using automated approaches under conditions of no visibility and no ceiling ("zero zero"). However, zero zero landings have not been approved by the FAA for either air carriers or general aviation.

established by a localizer beam, bisecting the runway and extending for several miles to bring the aircraft to the proper runway heading to the airport. The most precise form of instrument approach is the ILS type; the full Instrument Landing System approach consists of (1) a localizer beam, (2) a glide slope, also detected by electronic equipment in the aircraft, (3) marker beacons, (4) approach lights, and (5) runway lights.

Marker beacons, identified by equipment in the aircraft, tell the pilot the distance he is from the airport; the outer marker (OM) is usually 5.5 miles from the end of the runway (located on its center line extension). In many installations there is also a low frequency non directional beacon co-located with the outer marker to facilitate capture of the center line extension and localizer beam.

The middle marker (MM) is located about ½ mile out. (In early ILS systems there was also a boundary marker, on the end of the runway, but this type installation has been discontinued.)

ILS approach lights consist of a high intensity lighting system including the "ball of fire" strobe light installation which facilitates the pilot's transition from pure instrument flying to the visual phase of the landing.

Some airports have more than one approach system. At many airports the pilot will know that there are ADF approaches, localizer approaches, back-course localizer approaches, VOR approaches, and full ILS approaches. When the pilot is approaching the airport of destinatiton on an Instrument Flight Plan, he is informed by the ARTCC of the type of approach being used and that he may expect. This enables him to extract the correct approach plate from his flight kit and place it on a holder for study during the approach and landing. Sometime during the approach the pilot is told to contact the tower for a final landing clearance; after having touched down on the runway he contacts Ground Control for taxi clearance to his ramp.

What About Radar? The widely expressed reliance of laymen upon radar to solve all the problems of air traffic control seems to look upon it as an electronic panacea. Unfortunately this is not the case. Radar is only one part of the ATC system. It is a wonderful tool which makes expenditious handling of traffic easier, but the ATC system is designed so that the entire system cannot fail if one of its parts ceases to function. Radar is not a panacea by any means.

In elementary terms, there are two categories of radar operations: First, is the use of primary radar, in which the radar transmits a radio signal which is reflected from an object almost instantaneously, the "echo" recaptured and measured usually as a blip on a cathode ray tube. There is one advantage of primary radar: it requires no special equipment in the aircraft to reinforce the signal. However, it has some system peculiarities and serious limitations. Frequently aircraft blips will disappear altogether from a radar screen because of some electronic anomaly. The technicians talk about scalloping, ghosting, and interference. For a long time radar operators observed returns from ground targets such as nearby buildings, TV antennas, or trees ("ground clutter," in radar lingo). This was removed from the scope by instituting a circuit which will show only moving targets, called moving target indicator (MTI).

In earlier radar, precipitation areas, thunderstorm cells, and snow showers would create an echo and block out aircraft returns. This was cured by the institution of a system known as circular polarization (CP), which effectively cut out all but the most intense areas, such as the cores of thunderstorms, but showed aircraft targets clearly. The problem with CP is that pilots frequently find themselves steered by controllers right into areas of extreme turbulence simply because the controllers' radar scopes screen out violent meteorological phenomena.

In the last few years, FAA has entered into a great program of using "secondary radar" in aircraft. This equipment, which developed from the military use of similar equipment called IFF (identify, friend or foe), is known as a radar transponder. It reinforces the radar pulse echo and enhances the blip on the radar scope, and by isolating and detecting one of a number of selected codes the ATC can positively identify the aircraft with which he is working. In case of a loss of identity the aircraft can be instantly re-identified by a special identification flare are which shows up on the radar screen when the pilot is directed to "squawk ident." [17]

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[17] The origin of this term is military. Transponder type equipment used for identifying flying aircraft was given the code word "parrot" and pilots were told to "have your parrot squawk ident."

Nearly 4,000 transponders are in general aviation aircraft today, although many radar facilities on the ground still do not have interrogation equipment which makes them effective. But transponders are not infallible. They, too, have system peculiarities: side-lobe interrogation, SSR shadowing (and resultant loss of blip), reflection problems, and garbling. FAA is now installing parametric amplifiers and side lobe suppression (SLS) modifications, but the false target problems and others caused by mixing electronic pulses from different aircraft are yet to be solved.

As the transponder comes into greater usage, new problems are developing in this technical field. Frequently upon arriving at terminal areas, pilots are directed to "squawk standby," which means "turn off the transponder." Thus we are right back to operating on raw radar primary returns. The busier the hub airport, the greater is the likelihood of being told to turn off the transponder.

II. Adequacies and Inadequacies of Today's System

Obviously today's system has demonstrated its overall adequacies in practical use, with few exceptions. The 10 busiest airports served by the carriers are suffering greatly because the carriers are transporting more passengers through them than anyone ever anticipated. The problem is complicated by the fact that the air carriers, in order to meet the demand of the traveling public, schedule their flights competitively to meet this demand. The problem of peaking is not unique to aircraft; it faces every mode of public transportation: trains, intercity busses local busses, and taxicabs.

However, except for these 10 locations neither the air traffic problem nor the passenger handling problem in the terminals is really acute, yet. However, there is a real concern by all users of the airspace that the situation will become acute in the very near future.

In the hypothetical flight plan from Washington to New York above, it can be seen that the ATC "system" works perfectly for a relatively few aircraft. But the ATC system, like a chain, is only as strong as its weakest link. In aviation the weak link is the saturation level of the system, including the airport acceptance rate and approach system saturation under actual minimum instrument approach conditions. All reasonable air carrier scheduling must be based on this criterion. It is imperative that the difference between operating under these restricted circumstances and operating under visual conditions be always separated when considering the problem.

All federal airways must begin and end at an airport. Some airports absorb a load that no one could have imagined 25 years ago.

The New York area, for instance, with three airports served by U.S. and foreign flag carriers, is literally a target at which airplanes are fired from all parts of the world 24 hours a day, 365 days a year. Air travelers stream in from places like Miami, Atlanta, Dallas, Las Vegas, Los Angeles, San Francisco, Chicago, Ottawa, London, Paris, Rome, Tokyo, and many other great urban centers. Every airplane arriving, from any direction, must be handled by New York ARTCC, which under actual instrument flight conditions guarantees them airspace separation. The burden carried by the human being who man the New York Center is incredible. It is easy to understand why the New York Center every so often must report that the system is saturated and that it therefore cannot accept any more traffic. Under actual instrument conditions there is, all too frequently, simply no airspace left.

Airplanes approaching the New York area (and New York is only an example—every one of these cities mentioned can have the same problem) must then be told to "hold" at a certain designated holding point because the air traffic control system is incapable of affording them protection in the final approach and landing phase of the flight. By weather restrictions, the actual airport acceptance rate can be reduced from 120 movements (the acceptance rate under good weather conditions) to 40 or 50. The situation is similar to the familiar one on an expressway when cars moving at 50 mph find themselves in an immense traffic jam because someone at the head of the line is driving 30 mph. The ATC system, both en-route and for controlling approaches, is handled on an individual controller-to-pilot "hand holding" basis. Each pilot is personally directed to fly at a certain altitude and along a course that will insure him separation. Every aircraft movement must be manually directed and controlled by human beings on the ground. This individual handling system will not be adequate to handle the instrument flight traffic volume in a few years. The answer is computerized automation, a subject that seems too much like Jules Verne

to be taken seriously. FAA has such a program working experimentally in simulation exercises now. By 1980 it will be a part of the system.

The People Problem.—The inadequacy of the solution of the problem of people handling on the ground is also being recognized as critical in many cities. Airline terminal buildings are constantly being enlarged; ticketing and baggage facilities are expanded to meet the demand. Yet standing in line, departure and arrival delays, and lost baggage are all sources of irritation to say the least for the airline traveler. Arrangements which were satisfactory for the passenger volume of small air carrier airplanes are no longer adequate for today's needs. Certainly they cannot be considered for tomorrow's.

III. The Needs of Tomorrow

The airport runway and ATC problem must be met if the number of air carrier and non-air carrier aircraft involved in our national air transportation system is to continue growing. But, there can be no system plan without cooperation of all concerned. Runway requirements at many airports are dictated by the type of aircraft acquired by the carriers—a unilateral management decision, frequently made without reference to the fiscal capabilities of the communities served to meet such needs. Only 25 airports will be able to handle the Jumbo Jets and the SST. Also, at the present time only 157 airports can handle pure jet equipment of the airlines.

The Needs of General Aviation.—Relatively few general aviation aircraft require runways such as those needed by the air carriers. Many communities have expanded airport capacity by relieving the traffic pressure on jet runways used by large aircraft by building 4,000 to 5,000 ft. parallel strips, which will easily accommodate by far the greatest percentage of general aviation aircraft. These runways do not require either the length or the heavy structure as those of the large jets. At Washington National the tower controllers can handle departing or arriving general aviation light aircraft traffic under visual flight conditions by directing them to land on 1,200 or 1,500 ft. of the intersecting runways which can be done without impeding the flow of heavy aircraft traffic on the long runways. Under instrument flight conditions National Airport's acceptance rate is severely curtailed and there *are* delays.

With the development of new approach aids and precision navigation systems it would be possible to use parallel runways on many existing airports simultaneously for air carrier and general aviation instrument approaches. Proper long range planning of the national airport system can solve the problem at almost every location.

People fly to an airport because they want to go to the community it serves. The reason for going is not important. The air carriers do a thriving business in carrying passengers to resort areas for fun and recreation as well as to other areas on business. The air carriers are businesses operating for profit. What is needed, therefore, is a planned program for creating a system of general aviation airports which will give access to air carrier served communities and will relieve the traffic pressure on the large airports. What is needed is a system of equally accessible airports for general aviation.

The ideal reliever airport situation can be found in the Twin Cities of Minneapolis-St. Paul. The reliever airport program planned and executed more than 20 years ago developed a ring of general aviation airports and has made it unnecessary for general aviation users to land at the airport used by air carriers. No regulations bar them; indeed some general aviation aircraft do use the facilities without any problems whatsoever.

The political problems involved with instituting such a program are tremendous. It is acknowledged that few communities want airports usually upon a highly emotional basis, but this situation must be faced directly.

The requirements of air taxi and commuter airlines which are also air carrier operations, since they also carry passengers for hire (frequently for the purpose of interline transfers with the certificated airlines) must be considered in this long range plan.

Federal Aid to Airports Program

The Federal Aid to Airports Program (FAAP) has been rendered inadequate for the very purpose for which it was formed.[18] Historically FAAP has been

[18] Although the legislative intent of Congress in passing the Federal Airport Act was to encourage general aviation through a nationwide system of good general aviation airports, the result 20 years later is that the program is approaching the billion-dollar level for 2,300 airports instead of the 6,000 originally intended; also, 83% of the total funds have been spent on airports used by the air carriers.

under-funded by Congressional appropriations and Administration policy. What funds have been available have gone largely to improve airports served by the air carriers and to enlarge runways and ramps directly as a result of the carriers' unilateral decision to institute service with heavier and more capacious equipment. General aviation has been given little consideration.

The entire FAAP has received an annual appropriation of $75,000,000—the cost of 50 miles of high speed highway. This fact certainly illustrates the inadequacies of the appropriation under the program supposedly created to establish airport facilities for the benefit of small communities.

THE PASSENGER HANDLING PROBLEM

In order to handle the volume of individual people who will be transported by the certificated carriers, a system of mass transportation of parallel capacity between the community and the airport is needed. A plan must be developed which will induce air travelers not to drive their own cars to airports. Such a system must be economical to these passengers and at the same time offer them rapid transportation. The answer, we believe, is to develop a high density modular rapid transit system using equipment that is compatible with city streets, like a bus, yet which can be integrated into a monorail or rail track system so that several units can be joined together to carry several hundred people to the airport at once. By such a system airline passengers could be collected at various points in the community, then transferred as a group to the airport, and delivered either to a particular aircraft or to a terminal building facility.

CONCLUSIONS

1. The national air transportation system depends upon a balanced interrelationship of:
   (a) Aircraft.
   (b) Airways system.
   (c) Air traffic control system.
   (d) Airport system, including general aviation reliever airports.
   (e) Airport/downtown mass transportation system.
2. The critical aspect of airport air traffic saturation is the airport acceptance rate under adverse (IFR) weather conditions, defined as the minimum instrument approach conditions.
3. The most critical congestion problem of the ATC system is based on the high traffic volume of approximately 10 urban centers, or hub airports.
4. The problem of passenger handling must be considered separately from the problem of aircraft handling by the ATC system.
5. The terminal problems on the ground are:
   (a) Adequate ramp space for air carrier aircraft at the terminal.
   (b) Passenger handling facilities within the building itself.
   (c) Public transportation of passengers between the airport and the community.
   (d) Public parking facilities for those using the airport.
6. There has never been any formulation of an integrated national air transportation system plan which would consider the needs and requirements of all aircraft at all types of communities, or of the passenger support facilities required for such an overall system.

RECOMMENDATIONS

Believing that free enterprise businessmen who have a real interest in the problems of airports and aviation safety can act together to solve them expeditiously and practically, we recommend that there be created a commission patterned along the lines of the Radio Technical Commission for Aeronautics, setting up a program whereby representatives of FAA, the air carrier industry, the general aviation industry, and the state aviation commissions unite to design a national air transportation system, giving full attention to the needs of the future growth of aviation.

We recommend further that this body make budgetary recommendations to the Congress and to the administrations of the several states involved so that such a national transportation plan may be fully funded and implemented.

Thank you again for this opportunity to testify.

Mr. SMITH. I think, Mr. Chairman, the biggest problem we have, despite all the curve balls thrown here, is to define the problem of crowded air and define the safety problem and have some idea of what we are really talking about. We have in this country some 8,000 airports registered with the FAA. Five hundred and twenty-six of those are served by the certificated carriers. For some reason or other, it has become popular for those to be called commercial airports or airline airports. They are not. They are public airports. They are public facilities paid for by public funds.

The airline fleet consists of 2,000 airplanes; they are not all flying at the same time. We have two types or, I should say, three types of aircraft flying under certification of CAB. We have the domestic trunks, there are 11 of those. They fly 1,117 airplanes according to the last statistics I have available from the CAB.

We also have the 13 local service carriers which fly 395 airplanes.

Incidentally, 97 of those are DC–3's, which is still the largest number of a single airplane type used in local service carriage. We also have 13 supplemental airlines which run about 200 airplanes, depending on what their financial status is at the moment.

The problem of the crowded air, which is what the press is pleased to call it, really exists in a very few locations.

There are 10 places in the country that really qualify for what we would call major traffic hubs and every one of these 10 places is jammed with airline traffic because these are central locations where people want to go and they want to go not only by public carriage, by the certificated carriers, but by their own airplanes.

Mr. FRIEDEL. Would you care to name the 10 airports you are speaking of?

Mr. SMITH. I put my stuff away because I thought I was going home but I will be very glad to give it to the stenographer. (Chicago, O'Hare, John F. Kennedy, Los Angeles, Miami, Denver, Phoenix, St. Louis, San Francisco, Atlanta, Cleveland.)

The fact is that you must make a complete differentiation between actual visual flight conditions and actual instrument flight conditions. The criteria, the tight part of our whole airway system comes when the actual weather at instrument conditions requires instrument approaches at a hub airport. When this happens each airplane must be separately handled and frequently there is a 5-minute interval between handling the airplanes.

Here at Washington National Airport under instrument flight conditions it is said the airport has a capability of handling 60 flights an hour. There has been an arbitrary figure put on those: 40 for the scheduled air carriers and 20 for general aviation which includes 16 air taxi operations an hour, and these air taxi operators, I submit, are also commercial carriers, although they are not certificated by CAB.

Under visual flight conditions the fact that certificated airlines are filing instrument flight plans does not mean a thing. The airport movement acceptance rate at National Airport using light aircraft under good visibility conditions goes up to 120, sometimes 130 per hour.

I have a light airplane. I fly a light twin. I am completely equipped with everything that Mr. Tipton just talked about a little while ago, including a 4096 code transponder. I can come into Washington Na-

tional Airport in VFR conditions and land on the end of a cross runway that does not interfere at all with airline traffic, it does not cause any slowdown, it does not cause any congestion. We must remember that the tight point, the most difficult part of our whole system, comes when the weather is bad. This is when the air suddenly becomes crowded because the air traffic control system just can't handle the crowd of people who all want to land at the same airport.

When we talk about positive control we are talking about another thing and there is a lot of misconception as to that. There is no such a thing as air traffic controller. This controller on the ground is not running airplanes in the air like control line models. The controller on the ground is using systems like radar, which is one of his tools, to assist the pilot, to advise him of other traffic and to help him by setting up a program of flight and reserve airspace so that under bad instrument conditions he will have an insulation of airspace about him.

If you would try to put under all weather conditions all the airplanes that use the system right now, if every one who flies in general aviation at any one time filed instrument flight plans, our whole air traffic control system would totally collapse right now. And it will be years before this situation is better. This is why when you talk about positive control it sounds good if you say it fast, but if you really understand the problems we have with the congestion, with the frequency congestion, with the controller workload, you suddenly realize that positive control, that is to say, imposing instrument flight plans, instrument flight clearances and programs for all aircraft, even under the best of weather conditions, is simply a system impossibility and it will be for a long time to come.

My airplane is equipped to fly in all weather except ice and thunderstorms. Those are the two things I won't fly in. But in many parts of the country the people on the ground are not equipped to handle me with the equipment I have. There is an airport north of here called Friendship—I think you may have heard of it——

Mr. FRIEDEL. Yes, sir.

Mr. SMITH. They do not have the interrogation equipment to use my radar transponder. When I go to Friendship, and I am in there regularly, I have a $4,000 instrument in my airplane that is valueless because they don't have the equipment that is needed to make it work. There are many other places that don't have the equipment.

A little while ago we heard Mr. Tipton recommend that every air carrier airport, as he calls it, should have a tower and ILS and a radar, and there has not been any discussion yet about what traffic volume is required before you should have all these things. Sure, it is great to have them. I would love to have all the radar help I can get. When I fly, as I did coast to coast last year three times, and to Florida nine times, and I have flown to Canada and Mexico, when I fly I use every aid I can get from the ground. I use the air traffic control centers as much as I can. But, it is surprising how often, when you get into the terminal areas, into New York, Chicago, even here in Washington, when you get in close, when the chips are down, where it is crowded, where the area is congested, suddenly the guy in the radar control tower will say, "Squawk, stand by." That means "Turn your transponder off," there are too many reinforced targets. They are cluttering up the radar scope.

Mr. Tipton gave you a statement. On page 10 there are illustrations of three radar scopes. (See fig. 5, p. 227.) On the left-hand scope there are three targets, what they call blips, indicated on a scope. This illustrates the raw return shown on radar when there is no transponder reinforcement involved. The next two illustrations, one of them indicates three transponder returns showing a double bar on the scope. When the control tells the pilot to "Ident," he pushes a button in the cockpit. This fills in the space between the two bars, that is how radar identification is confirmed. When he gives you positive identification he can say "I got you." The third one of those drawings shows three radar blips with transponder returns and longside of them are the alphanumeric codes read-outs. If you fly into New York or to Washington, or into any place where they will have alphanumerics in a few years, if every airplane in there is flashing an alphanumeric code, the scope will be so crowded with this imagery that they will be saying, "Squawk, stand by." That means we will go back to raw radar for terminal traffic control.

A lot of the technology works well when there is a little bit of traffic but when there is congestion and you need it the system becomes overloaded and fails. This is something that lay people don't consider. In instrument flying, there is nothing tricky about it or secret about it. If you follow an instrument flight plan from here to New York the first step is to get the flight service station and advise him you want to go to New York. I don't bother making a flight plan any more. I file it and say, "I want to go from Washington National to New York, your routing, and the lowest altitude I can get." At the end of the runway I am sitting there, he comes back and say "The clearance is ready." He reads me the clearance. That assigns me a route and an altitude. In order to get that the two centers, Washington center and New York, have had to strike a bargain on a piece of reserved airspace. This piece of reserved airspace is 5 miles wide. It is a thousand feet thick and it is as long as my airplane takes to go in 3 minutes, the speed of my airplane plus 3 minutes is the length of this box. If you imagine a boxcar on a track with a bird in the boxcar and another bird in another boxcar, that is the way our air traffic control system works. You each have a box of reserved airspace. When all airplanes feed into one center or one target as you must, one airport, it is obvious that the traffic moving along the track cannot be accommodated by the airport as fast as it can fly along the track. This is why you get stacks at holding points, why you get traffic delays. The traffic delays are caused by the fact that the system cannot accommodate all the people at one time.

I don't know how we are going to solve this. Automation may help but still you are going to have to get the airplanes on the runways one at a time because you can't land them in formation. This is the program. This is our plan. These meetings were called as a result of the Asheville accident. A lot of people talk about the fact that Asheville should have radar.

As I recall, there are only four airlines going into Asheville. They only have nine or 10 scheduled flights a day as I recall. It is essentially a general aviation airport. Most of the traffic is general aviation traffic. I have been in there many times, just 2 weeks, ago, in fact.

I think that what happened at Asheville has not been explained. I have analyzed it and explained it myself of my board of directors

and I will be glad to supply you with my comments to my board on this subject.

I think radar would have prevented this thing from happening but after a while you reach a point where you have to ask how much money can we expend, how much can the Federal Government put into this to assure people that there are not going to be accidents. And will it assure them? I don't think so. We have had accidents under positive control, under instrument flight plans. There is no assurance particularly if the weather is good enough for one airplane to see another. This is a problem we have to consider.

The last thing, of course, was the hooker that was just thrown about user charges. There is a move afoot I think to make people think that general aviation is not paying its own way and that the airlines are. The airlines are not. They don't pay any gas taxes on the kerosene they use to power their turbine equipment and only, incidentally, 46 percent are pure jets, and 54 percent are still propeller-driven airplanes in the airlines. The kerosene burners don't pay any fuel taxes. They don't pay any taxes at all, as a matter of fact.

You realize that the passenger ticket tax is what pays their portion of what they call the user charges. If you take the local service carriers, the 395 airplanes of the local service carriers were subsidized by the United States Government as of last year to the extent of $140,000 per airplane per year and they don't pay any user charges, the passengers pay them.

I think these facts should be known. I think that a lot of the things that have been said here today about air traffic safety, about the integration of general aviation and of the airlines, you have to get down to bedrock and understand what the problems are. Sure, we have 102,000 airplanes in the general aviation fleet; 40,000 of those are flown by professionals or semiprofessionals. We have jets. We have highly equipped airplanes. These airplanes cost anywhere from two and a half million dollars right on down to $40,000 for a single-engine business airplane. They are not toys, they are business tools. They are well-built airplanes. You cannot equip those 40,000 airplanes flying in the air that don't go to big airports. They can use the 7,500 airports that are available, many of which we are losing fast because of land development and so forth. These are the things you have to realize.

I recognize there is a shortness of time. I could spend hours on this subject. Obviously I am full of the subject. But I do think, sir, that the record of this committee should show that before any considerations are made of some of these pie-in-the-sky plans about having radar and towers at every airport that there should be some consideration of the actual fact and the pragmatic aspects should be examined very thoroughly.

Mr. FRIEDEL. Mr. Smith, I want to assure you that not only the subcommittee but the full committee knows the importance of general aviation. Just because you heard certain testimony don't think for one minute that there is any idea of putting out general aviation. I think you were a little perturbed because you heard other testimony.

I am glad you are going to submit your statement for the record. I can assure you again that we are taking all aspects. The one thing we want to do is provide safety for pilots, for the passengers and for the people on the ground. We are not going to put anybody out of business.

Mr. SMITH. Thank you, sir. I assure you I am interested in safety because I fly.

Mr. FRIEDEL. Mr. Devine.

Mr. DEVINE. I appreciate Mr. Smith's position. I look forward to reading his formal statement he will submit here. I am sure it will contain some interesting information.

As the chairman has suggested here we had hearings immediately following the North Carolina crash. Some of us insisted that futher hearings be held in order that the position of general aviation be brought out in public hearings. Of course there are facts on both sides. We want to hear all of them and to weigh them.

Mr. SMITH. I might say my statement is not that any one of us should try to solve this unilaterally. I think the way the whole problem must be solved is by a formation of a group like the radio technical commission for aeronautics (RTCA) whereby Government, industry, including the carriers in general aviation, people who are knowledgeable about the problems, will get together and thresh them out themselves and made recommendations. I think this is what is going to have to be done.

I think the arbitrary differentiation between carriers and general aviation has been distorted. Although there are times that I digress with ATA, I respect them. I know what they are in business for and that is to make a profit. I favor that. We do work together and we do have mutual respect, but I have a low flash point.

Mr. FRIEDEL. Mr. Pickle, do you have any questions?

Mr. PICKLE. No, Mr. Chairman.

Mr. FRIEDEL. Thank you very much.

Mr. SMITH. Thank you, sir.

Mr. FRIEDEL. Now we have Mr. Stanley Lyman, vice president for Federal Aviation Agency Affairs, National Association of Government Employees.

If you want to submit your statement for the record we will be glad to have it. The whole statement will be included. If there are any questions we will direct them to you and you may answer the questions and they will be placed in the record.

STATEMENT OF STANLEY LYMAN, VICE PRESIDENT, FEDERAL AVIATION ADMINISTRATION AFFAIRS, NATIONAL ASSOCIATION OF GOVERNMENT EMPLOYEES

Mr. LYMAN. Mr. Chairman, I appreciate that suggestion. I recognize that time is indeed running short.

We too, this organization that I represent, and the members as part of our organization, are concerned with air safety.

With your indulgence, I feel because we represent the heart of the air traffic control system, the guts, so to speak, the air traffic controller, the technician, and various other employees of the FAA, I would appreciate the opportunity of exploring some of the information we have.

If you decide or choose to adjourn we certainly have no objection to returning tomorrow morning and giving you this information because we feel that the information we have is vital.

Mr. FRIEDEL. We have a list of witnesses for tomorrow. We do not intend to have any afternoon session tomorrow. I am afraid that we won't be able to get to it. The committee will read every word of your

statement in the record. If we have any questions we will direct them to you and you can supply the answers for the staff to go over and the members to go over.

Mr. LYMAN. May I note that we have additional information that we haven't incorporated in the original statement.

Mr. FRIEDEL. If you have additional information how long would it take you to have it submitted?

Mr. LYMAN. I will ask Mr. Lyons.

STATEMENT OF KENNETH LYONS, PRESIDENT, NATIONAL ASSOCIATION OF GOVERNMENT EMPLOYEES

Mr. LYONS. I am Kenneth Lyons, national president of the National Association of Government Employees.

As Mr. Lyman pointed out, he is the national vice president of our FAA locals. We have national formal recognition with the FAA. Of course for the past 8 months or so we have been asking Congress to hear us relative to what we call a very unsafe condition that exists because of the undermanned FAA facilities.

Mr. FRIEDEL. The question is this: He has additional information. How long will it take to have it prepared so that we can have it included in the record?

Mr. LYONS. Tomorrow afternoon, I believe.

Mr. FRIEDEL. That is all right. You may submit that. The committee will direct questions to you and you can answer them promptly and we will have that inserted in the record.

Mr. LYMAN. You also were given some testimony today by other individuals and groups. We were just taking some notes. Again because of the complexity of the questions, the complexity of air traffic control under these conditions, we will have no opportunity of clarifying and exploring some of the information.

Mr. FRIEDEL. Yes, you will. I asked you how long would it take you to give us the additional information. If you want to clarify anything, submit it along with your record.

Mr. LYMAN. Very well.

Mr. DEVINE. I do not understand the haste involved in concluding these hearings. We are only going to be a half day tomorrow and why do we have to finish now? What is the rush? I can be here tonight. I came back here for these hearings.

Mr. FRIEDEL. If it is your wish I will come back tonight.

Mr. LYMAN. We are not inconvenienced, but we feel that the people who are performing the services are not being given an ample opportunity to be heard. I being an ex-controller, the gentleman to my right being a tower controller from Newark, can present, we feel, information that will be of vital interest to you gentlemen.

Mr. FRIEDEL. If you wish to return tomorrow, return tomorrow and we will try to work you in. If not, you may have to submit your supplemental remarks and we will have them put in the record.

Mr. LYMAN. Thank you, Mr. Chairman.

Mr. FRIEDEL. The committee will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 5:20 p.m. the committee adjourned, to reconvene at 10 a.m. Tuesday, August 29, 1967.)

AVIATION SAFETY

TUESDAY, AUGUST 29, 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. FREIDEL. The subcommittee will be in order.

This is a continuation of the hearing on aviation safety.

Our first witness this morning will be our colleague from California, the Honorable Don Clausen. Please proceed Mr. Clausen.

STATEMENT OF HON. DON H. CLAUSEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. CLAUSEN. Mr. Chairman, I want to take this opportunity to express my appreciation to you and the members of your subcommittee for holding these hearings on aviation safety and the problems relating to general and commercial aviation.

In order to be of maximum service to the committee, I should like to present a few thoughts that I have regarding the increasing airport crisis as it relates to aircraft accidents in this country.

As we discuss safety for aircraft, I will label my presentation here today as "An Aircraft Accident Prevention Plan."

I am taking the liberty of aiming my remarks and focusing attention on one of America's most pressing and, as yet, unpublicized problems—the growing crisis of airports, or lack of airports, in this Nation. Many will say that there are more important and more pressing problems facing America but I submit that unless something is done soon about this problem, air tragedies will increase in our country.

Recently, we were all shocked to learn of a midair collision which took the lives of Navy Secretary McNaughton and his family plus 79 others. To those of us familiar with this accident pattern, the regrettable fact is, that this accident and the many others like it, could have been prevented. We cannot long continue to disregard aviation and airport problems or relegate positive action to reaction each time an air tragedy occurs.

With every aspect of aviation growing at a fantastic rate, it is clear that what is needed most and needed now is an entirely new approach to our aviation problems. These problems, which I shall outline in more detail, are compounded by the fact that more people are flying—more planes take to the sky—and planes are being designed to carry far

more passengers with each passing day. Simply stated, our present systems and accommodations for handling this increased activity are just not adequate to do the job and we are failing to keep pace with the demands of our aviation industry.

I would say, in this regard, that congestion is the key word in describing our air safety problems. Congestion inside our airports, in the hangars, on the strips, in the air, over communications. Congestion is the "enemy" of aviation which must be dealt with.

As a former Navy fighter pilot, a professional pilot, manager of an airport, and now the president of the Congressional Flying Club, I have devoted many hours of study and research to the problems of American aviation. I have been both pleased and encouraged by the interest shown by other Members of Congress who have spoken to me and indicated their concern over the lack of attention and priority given to the needs of aviation.

But the problems of air safety and airspace planning cannot be resolved, in my judgment, unless and until we first develop a truly effective national airport system plan and a method for financing the plan. With the huge costs involved, coordination between all levels of government in our Federal system must be maximized and unnecessary duplication of effort and facilities must be minimized.

With land values steadily escalating and available airport sites steadily diminishing, particularly in and around metropolitan urban areas, the problem of guaranteeing access for general and business aviation-type aircraft is the most crucial and a solution must be found immediately.

For many years, I have advocated locating airstrips contiguous to highways. Lands for these strips should be acquired at the same time lands are acquired to build highways or to expand them. All that is required to accomplish this, is coordinated planning and financing.

At this point, I should like to list what I believe to be the most immediate requirements for improving aviation safety and efficiency in high-density areas such as Washington, D.C.

1. Establish integrated airport systems with proper administrative and policymaking authority such as a commission or port authority now has with a joint exercise of powers agreement.

2. Provide general aviation reliever airports in metropolitan areas, with maximum emphasis on building airstrips contiguous to circumferential highways.

3. Establish airspace zoning, with specified climb and descent quadrants and/or corridors—reserving separate quadrants for air carrier and certain quadrants for general aviation and military air traffic based on numbers of operations.

4. Accelerate efforts to provide terminal area radar, instrument-landing systems, high intensity approach light systems, terminal VOR, and communication and tower facilities.

5. Expand basic radar systems by adding secondary radar equipment designed to accommodate computers in high density areas to assist the air traffic controller establish safe separation and sustain a smooth flow of aircraft in the controlled areas.

6. Complete airline collision avoidance systems at the earliest possible date and intensify efforts to develop low-cost collision avoidance devices and low-cost radar beacons for general aviation use.

7. Designate "practice areas" including flight strips for general aviation VFR student activities.

8. Require minimum communications and navigational equipment consistent with requirements in high density areas.

9. Enhance pilot education programs through broader use of flight simulators to be acquired by flight schools, high schools, colleges, and universities to establish a trend toward professionalism in pilot training.

10. Improve and expand clear zones and buffer areas in order to permit the installation of all-weather landing systems and minimize noise problems.

In the long run, one of the most critical phases of coping with airspace congestion, is the development of effective and reliable collision avoidance systems to supplement and operate independently from the air traffic control system. Such a system has been 12 years in development and experts say we are still 3 to 5 years away from realizing this critically needed equipment. Much of this time is reportedly needed by FAA to prepare a U.S. common standard for collision avoidance equipment. Because of the vital part such a system would have on reducing midair collisions, I would urge placing this equipment development on a high priority.

In addition, much can and must be done to improve weather and terrain reporting for pilots and this can be done at very low cost. Twenty percent of our general aviation accidents occur only 5 miles from an airport and many are attributed to weather and terrain conditions. What is required in this regard, are more weather reporting stations and expanded hours of observation and reporting particularly in areas where weather and terrain pose hazardous threats to aviation.

One of our distinguished congressional pilots, Senator Peter Dominick, of Colorado, advocates requiring general aviation aircraft to be equipped with crash locator beacons. Such equipment provides automatically generated beacons for downed aircraft which will greatly facilitate locating them, thereby resulting in the saving of a great many lives which each year are lost when downed planes cannot be readily located. Senator Dominick is urging the FAA to exercise the legal authority already granted by the Federal Aviation Act to require general aviation aircraft to be equipped with crash locator beacons, and I think the proposal should be considered by this committee.

At the present time there are over 102,000 personal and corporate aircraft, compared with only 2,379 in the airlines fleet. This is a ratio of 50 to 1. Last year, there were 5,425 aircraft accidents reported in the United States resulting in 538 fatalities. Many of these accidents and deaths could have been prevented. If we are to stem the mounting tide of aircraft accidents, I urge the adoption of an aircraft accident prevention plan along the lines I have presented here today.

Mr. Chairman, I thank you and the distinguished members of this subcommittee for permitting me this opportunity to outline my views on this subject.

Mr. FRIEDEL. Thank you for your presentation Mr. Clausen. We appreciate your views on this vital matter.

At this time I would request consent to place in the record the remarks of our colleague, the Honorable James Fulton, as they appear

in yesterday's Congressional Record. Without objection, it is so ordered.

(The document referred to follows:)

[From the Congressional Record, Aug. 28, 1967]

AIR TRANSPORTATION SAFETY—EXTENSION OF REMARKS OF HON. JAMES G. FULTON OF PENNSYLVANIA

Mr. FULTON of Pennsylvania. Mr. Speaker, it is a pleasure to call the attention of the Congress and the American people to the excellent outline on air safety sent to me by an outstanding Pittsburgh businessman, Mr. R. W. Mallick. A vice president of the Joseph Horne Co., Associated Dry Goods, Mr. Mallick has flown private aircraft for many years. This long flight experience and his constant civic interest in air safety make his thoughtful suggestions and recommendations valuable to those of us in Congress and in the Federal agencies concerned over air transportation safety. I am glad to place in the Congressional Record Mr. R. W. Mallick's recent letter and the editorial from the Pittsburgh Post Gazette of August 19, 1967:

JOSEPH HORNE CO.,
Pittsburgh, Aug. 22, 1967.

Hon. JAMES G. FULTON,
House Office Building,
Washington, D.C.

DEAR MR. FULTON: I am sending to you a copy of an editorial that appeared in the Pittsburgh Post Gazette on Saturday, August 19, 1967, captioned "Air Safety Procedures Neglected". I thought you might be interested in reading it as it points a finger at both the F.A.A. and Congress.

As I mentioned in previous letters, I had mentally debated the thought of pursuing the matter any further. However, each day I see more evidence of the gravity of the situation, so I am compelled to belabor the matter further.

Mr. James Ridgeway's comment echoes what I have said repeatedly, i.e., that the F.A.A. is not doing all it can with the facilities and authority it has at its disposal. What is most discouraging is that there is no evidence of an effort on the part of F.A.A. to acknowledge the suggestions to it. Certainly, if there is no merit to them and the persons or organizations making the suggestions were convinced of it, the issue could be closed. Nevertheless, there are volumes of correspondence on the subject, from responsible sources, and it continues to remain unanswered.

It is fully appreciated that the problem is not a simple one, and that there are no readymade, overall solutions. But it will never be solved with the present "head in the sand" attitude. It is far better to do something and risk a failure than *do nothing* in hopes that the problem will cure itself. Apparently, the confusion and complexity is so great that a "wait and see" attitude exists.

To anyone who wishes to delve into the history, he will find that the following suggestions have been submitted. Some involve much time and expenditures to implement, others only a change of attitude and a will to do. I will enumerate several that could start the ball rolling.

1. Immediately provide for *voluntary* controlled visual flight procedures at all low altitudes for cross country flights as previously suggested. Last week I flew from Pittsburgh to Coudersport on a VFR flight plan. Visibility limits were legal for VFR but marginal. I departed Pittsburgh on a special VFR clearance. When I cleared the control zone, I radioed Cleveland Center to advise of my flight route and altitude which was 5,500 feet MSL. The controller asked if I had transponder or DME. When advised negative, he told me he could not give me radar service at that altitude. Yet, 5,500 feet is higher than permissible I.F.R. altitudes. I continued to monitor the radio frequency and know that the controller was not busy.

2. *Discourage* rather than *encourage* more instrument ratings for pilots until such time as the air traffic control can handle more instrument flight plans. The system cannot handle the volume of such potential traffic now.

3. Accelerate a program of new secondary airports in busy areas to handle private, executive, and feeder line and similar aircraft to reduce the load on metropolitan airports. This would not only improve air safety, but would tend to relieve ground transportation congestion, For example, the Pittsburgh area needs a new airport in the northeastern district of Allegheny County or western Westmoreland County to relieve the loads on Greater Pittsburgh and Allegheny

County airports. An adequate airport of such type can be built today for the price equivalent of *one* mile of four-lane expressway for each runway required. Most such secondary airports would be more than adequate with two runways.

4. Establish a program whereby non-essential pleasure flying and student training, usually done in the vicinity of airports, be conducted away from the traffic areas of major airports. The secondary airport program suggested above could do much to bring this about.

5. Relocate all military air operations from busy metropolitan areas. There are plenty of military airports that are now inactive to provide bases for military operations.

6. Recently FAA announced intentions of controlling VFR flights above 18,000 feet. This is fine, except the problem is between the ground and 10,000 feet. A check of the records will reveal that the collisions or near misses have all been at low altitudes. To fly above 10,000 feet requires oxygen equipped or pressurized aircraft which represents a very small percentage of registered aircraft. Let's get to the "scene of the crime."

7. Of great importance is the need to quit looking at the problem as one being associated with the commercial airlines. The commercial airlines represent only about 2% of the registered aircraft in the country. Also, it is the most sophisticated aircraft, operated by highly qualified pilots, under strict procedures. Yet, they become involved in midair collisions because of the system under which they must operate. The other 98% of the aircraft and pilots have the same right to air safety as do the airlines. We do not make special rules or enact special vehicle codes or build special highways for buses, and we should not attempt to give preferential treatment to airlines. We must improve air safety for *all* aircraft, and only then will the solution to the problem be forthcoming.

My apology for another long epistle, but I hope it will serve to stimulate someone to get the F.A.A. to *do something* other than take a defensive position. Actually, the F.A.A. is a fine organization of capable people, faced with an overwhelming problem. They need *help* not *hell*. They will learn that many people will help when they come out of their shell and quit behaving as though the problems and solutions were their exclusive prerogatives.

It is my understanding that Congressional hearings are planned to explore this all-important matter. If so I respectfully suggest that the above seven points be covered in the hearings. Perhaps in that way their merits can be determined.

My appreciation of your patience and cooperation.

Sincerely yours,

R. W. MALLICK,
Vice President, Properties.

[From the Pittsburgh Post-Gazette, Aug. 19, 1967]

AIR SAFETY PROCEDURES NEGLECTED

The public is justified in questioning federal procedures to insure air safety when there have been five major plane accidents so far this year and a number of smaller ones. The latest was the crash of two single-engined craft as they stimultaneously approached the same runway in New Hampshire recently.

There are 547 airports in this country served by airlines: 285 have no control towers and 434 lack radar which would provide a means of keeping planes a safe distance. There wasn't any radar at Asheville, N.C., where 82 persons were killed recently.

According to James Ridgeway in the August 5 New Republic, the Federal Aviation Administration, part of the Department of Transportation, is at the root of the problem. The FAA is understaffed and isn't given the money to implement technological advances. Its chief, an ex-Air Force general, William F. McKee, scarcely makes the best of what the FAA has, Ridgeway says.

He cites, for instance, the number of safety requirements that don't apply to air taxis (chartered planes for hire); no requirements for co-pilots, radar, emergency evacuation, or weighing of baggage. McKee has said the government must not place too heavy an economic burden on small operations lest they fail.

When the FAA's budget request was cut this year from $75 million to $65 million, the argument in Congress was that since the money was being poorly spent and the amount inadequate to meet the airport crisis, it might as well be trimmed.

Such a view not only contradicts logic but renounces responsibility. There should be no doubt in anyone's mind that airports serving airliners should be equipped with radar and that height-finding equipment to avoid mid-air collisions, which military planes have used since the Korean War, should be placed in all commercial planes. Crashes in the vicinity of airports can be reduced. The tragedy is that not enough attention is being given to the matter.

Mr. FRIEDEL. Our next witness will be Mr. Stanley Lyman, vice president, Federal Aviation Agency Affairs, National Association of Government Employees. Mr. Lyman, if you will introduce your associates, for the record, you may proceed.

FURTHER STATEMENT OF STANLEY LYMAN, VICE PRESIDENT, FEDERAL AVIATION ADMINISTRATION AFFAIRS, NATIONAL ASSOCIATION OF GOVERNMENT EMPLOYEES; ACCOMPANIED BY KENNETH LYONS, PRESIDENT; ALAN J. WHITNEY, EXECUTIVE VICE PRESIDENT; AND HENRY GROTE, PRESIDENT, NEWARK AIRPORT LOCAL

Mr. LYMAN. Good morning, Mr. Chairman.

Mr. FRIEDEL. You have a rather lengthy statement and if you wish to summarize it your whole statement will be included in the record.

Mr. LYMAN. We will summarize the statement, Mr. Chairman. Before I do I would like to introduce the other gentlemen that are here with me this morning.

To my far left is Mr. Kenneth Lyons, president of the National Association of Government Employees.

Next to him and to my immediate left is Mr. Henry Grote, who is the president of our local at Newark Airport and represents the Air Traffic Controllers of Newark Airport.

To my right is Mr. Alan Whitney, the executive vice president of the National Association of Government Employees.

We appreciate the opportunity of appearing before you this morning on behalf of our members in the organization which represents Federal Aviation Agency employees.

In order to be expeditious I will, as you requested, attempt to summarize our official statement that has been submitted to you previously but I would like to take the opportunity to summarize or highlight what we feel is the blood and guts of our entire statement.

(Mr. Lyman's prepared statement follows:)

STATEMENT OF STANLEY LYMAN, VICE PRESIDENT FOR FAA AFFAIRS, NATIONAL ASSOCIATION OF GOVERNMENT EMPLOYEES

Mr. Chairman, members of he subcommittee, the National Association of Government Employees appears before you today as the representative of approximately 8,000 of the Federal Aviation Administration's 14,000 air traffic controllers. Our role is to convey to you their concern for the state of the FAA's air traffic control system and to present certain recommendations designed to arrest the deterioration of flight safety in the country's airways.

Since our initial statement to Congress on this subject on March 22, 1967, a great deal has been said by other organizations and by the agency itself. The general thrust of official FAA pronouncements has been that our charges are exaggerated and unfounded. Significantly, however, we have received many off-the-record expressions of support from individuals in key positions of responsibility within the agency. They tell us that they are unable to publicly express their agreement with our general position but they hope we continue to press

our case because they recognize that, in the final analysis, sweeping measures are needed to meet the safety crisis which confronts us.

Our central conclusion, for reasons we shall explore in more detail shortly, is that the air traffic control system possesses neither the manpower nor the equipment to exercise "total control" and further, that the situation is seriously aggravated by mismanagement at the agency's highest level.

We believe that two immediate steps are required to stop and reverse the downward trend in flight safety. First, the President must replace William F. McKee as FAA Administrator with an individual who is not only knowledgeable, but expert in all phases of the air traffic control system. Secondly, the Congress—and in particular this Committee—must force-feed the agency sufficient amounts of money, back-bone and honest concern to act now, not five or ten years from now.

The situation further requires the closest Congressional scrutiny of FAA programs and policies to place the agency's mission in the proper perspective—that is, to determine whether the governing factor in the FAA's budget is going to be safety or "economy of operation."

The National Association of Government Employees filed an extensive brief last March 22 with members of this Committee charging that mismanagement, coupled with shortages of manpower and equipment, was bringing flight in the U.S. "to the point of public peril."

At that time, we called publicly for an in-depth Congressional investigation into the entire spectrum of air traffic control procedures within the FAA. We now must renew our request for a probe of FAA despite a series of directives issued May 10 by FAA Administrator McKee which were, according to the FAA, designed to maintain and improve air safety. Basic conditions which we uncovered during a six-month survey of FAA policies and practices continue undiminished. We can only conclude that the sole purpose of General McKee's May 10 orders was to lessen the pressure for action which followed the release of our brief.

General findings of our study, which was participated in by air traffic controllers throughout the FAA, include the following:

There are insufficient numbers of air traffic controllers in virtually all center and tower facilities to safely handle the rapidly expanding volume of aviation traffic.

Because of their too few numbers, controllers are developing hypertension, heart problems and other conditions which stem directly from the extreme tension and pressure of their jobs, and which could suddenly render them helpless at a critical point while handling passenger liners carrying hundreds of individuals.

There are not enough electronics technicians to provide adequate maintenance of the equipment needed by the controllers to guide and direct aircraft.

Because of this lack of maintenance personnel, it is common policy throughout the agency to forego preventative maintenance. That is, employees are told to not check equipment to prevent its breakdown, but to wait until it fails and then repair it.

Due to this vital gap in FAA maintenance procedures, it is a common occurrence for an air traffic controller to experience a radar failure during a work tour.

Controllers, through the auspices of the National Association of Government Employees, have found that the agency is forcing them to rely on out-dated and temperamental equipment—posing a definite threat of potential tragedy.

They further found that the FAA is arbitrarily phasing out vital electronic equipment at the Air Traffic Control Stations, that in many areas the agency is purchasing "factory seconds" to replace tubes in radar and related electronic equipment.

Perhaps the most unsettling of all the conditions uncovered by the survey was the higher number of unreported "incidents" taking place in the crowded Boston-New York-Washington air corridor—instances in which aircraft pass each other at distances less than the FAA's safety limits.

We found that, while five to nine such incidents are reported in this heavily-traveled corridor each week, unreported near-misses often run to as high as 20 to 25.

The principal reason why such incidents go unreported, we found, is the FAA's tendency to blame the controller for a near-miss, rather than acknowledging that these potential tragedies stem from the controllers having to handle too many aircraft at one time and the lack of adequate electronic equipment.

Experienced air traffic controllers at one large FAA facility on the East Coast reported that there is at least one "confliction", sometimes as many as five, on an average day at the facility. Most of these potential collisions, they said, go unreported.

One final example provides dramatic accent to the situation. The FAA's own surveys show that an air traffic controller should not handle more than 11.5 aircraft at a time; yet, controllers from throughout the U.S. report to us that they handle as many as 15 to 25 at a time and sometimes more.

FAA officialdom, in some quarters at least, is aware of the problem and has sounded dire warnings of what may happen if corrective measures are not taken.

A transcript of remarks made by Oscar Bakke, the FAA's Eastern Regional Director, before a September 1964 meeting of air traffic controllers in Syracuse, New York, typifies this awareness. He told the controllers that "we are overdue for another collision," and that on a statistical basis, some of the very men in the room with him at that time would be "directly and personally involved in one of the greatest tragedies aviation history has ever known and it's going to be an air traffic tragedy."

Mr. Bakke warned the controllers, "The traffic situation in the New York area is fast becoming more and more tense, very, very rapidly, and the increase in traffic throughout the agency, both enroute and terminal, is reaching serious proportions."

He said, ". . . we are now approaching an era in which air traffic control problems never have been more serious and at this very time the ATCS (Air Traffic Control System) is being squeezed to the maximum extent."

More recently, on January 11, 1966, the chief of the Eastern Region's Air Traffic Division addressed all divisional personnel in the following words: "The mounting number of system errors occurring in the Eastern Region has become a matter of great concern. I fully realize that all control personnel share this concern when a system error occurs, but I wonder how many of us have reflected on where the current trends, if continued, will take us?

"What does the term 'system error' means? Aside from the official definition, it means simply that a failure in the air traffic *control system has endangered one or more aircraft. It means that human lives might have been lost as a result.* We must never lose sight of this fact."

These remarks, coming as they do, from top management echelons within the FAA, lend strong credence to the charges of the National Association of Government Employees and its air traffic controller members.

The controllers reported examples in profusion of situations relating to workforce and equipment in direct contradiction to the public statements of the agency.

One instance of FAA economizing at the expense of safety occurred last year at the Newark, New Jersey, control tower. Controller members of the N.A.G.E. local there charged that the decommissioning of the "airport detection radar" and the "precision approach radar" caused an extremely unsafe condition on the airport's number four runway in adverse weather conditions.

The FAA replied, in effect, that the controllers did not know what they were talking about.

According to the chief of the area air traffic branch, " . . . the operation of air navigation and traffic control facilities is accomplished in accordance with Agency policy, the formulation of which results from a much broader knowledge of economic and operational considerations than may be apparent locally."

Again, sacrificing safety on the alter of economy, the official responded that, "All expenditures of Federal funds must be examined on the basis of cost versus benefit."

The official concluded by suggesting that the employees confine their complaints in the future to the facility level, rather than attempting to bring them to the attention of the agency's higher levels.

The agency response completely ignored the fact that the absence of the decommissioned radar equipment forced controllers to grant unauthorized radar approaches to runway number four in emergencies; that only the week before the union's complaint one arriving aircraft nearly landed on top of a departing craft because of the lack of the precision radar.

Another cogent answer to the FAA's claim that it maintains up-to-date equipment can be found at the Toledo, Ohio, facility.

The activity utilizes ASR–4 radar. However, the cables which connect the transmitter site to the indicator site (the control tower) continually fill up with

water. An attempt to dry and splice the old cables corrected the problem for a short time; however, the cables, once wet, corrode and short out, causing equipment failures and many costly temporary repairs.

The only adequate solution would be to replace the corroded cables. The FAA's area office, however, claims this would be too expensive.

N.A.G.E. controllers also claim that the Toledo facility's radar antenna is tilted, which would affect radar readings and cause misidentification of aircraft targets. Once again, the area office refuses to spend the money to determine if the antenna is tilted.

On the question of whether the agency is making a serious attempt to provide enough controllers to handle a growing volume of air traffic, workload and workforce changes at the agency's Little Rock, Arkansas, facility provide graphic demonstration of what is happening throughout the country.

In 1963, this facility had 19 controllers handling 112,286 airport operations and 35,524 instrument operations. Last year, 1966, the facility had only 18 controllers, yet it handled 139,586 airport operations and 47,349 instrument operations and the facility instituted expanded radar service.

This is an increase of 24.4 percent airport operations, 33.3 percent instrument operations (an additional service which requires the use of two radar controllers during peak periods), and a 20 percent workload increase in handling Air Force Traffic. This increase in traffic and service has been accomplished even though the facility had experienced a workforce decrease of 5.5 percent.

Another significant aspect of the manpower problem facing the FAA is pointed up by the fact that just last September, the area manager of the FAA's Los Angeles Area office attempted to warn the agency's Western Regional Director of the need to ward off an impending critical situation. His memorandum made the following points:

"Our professional workforce is growing older and we have not recruited youth. The average age level in ATS in the Los Angeles area is 39. We have seven employees between ages 21 and 25, 251 between 26 and 30, 279 between 31 and 35, 133 between 36 and 40, 177 between 41 and 45, and 285 over age 45.

"We need youth to be prepared for a large retirement rate which should commence in about five years. I hope we can agree it is difficult to teach an old dog new tricks and also the old dog responds more slowly when performing tricks he has known for years. With the aircraft speeds we are encountering today, a decision delayed 5–10 seconds could easily result in a disastrous event. Deficiencies in hearing, sight and reflexes are becoming more and more critical."

And still another aspect of the agency's manpower problem is typified by the situation at the Windsor Locks, Conn., facility.

Despite the FAA's official policy of mandatory radar handoffs, in which one tower or center passes off departing aircraft to another or accepts incoming flights, the agency's own stringent manpower controls make it impossible for many facilities to comply.

The Windsor Locks facility, for example, advised neighboring facilities and centers on April 21, 1967, that it would be unable to give or accept hand-offs due to insufficient personnel. This was the second instance in a week's time that the Windsor Locks facility was forced to refuse hand-offs.

For another example of the desperate straits into which agency mismanagement is forcing those responsible for the safe passage of aircraft through the nation's skyways, consider the report from the publication *General Aviation News* early this year which revealed that at one of the country's busiest and most important IFR towers, it was necessary for one of the most vital positions to be covered by a nonqualified controller—a man who had never been checked out on covering that position.

According to the publication, "This was done with the knowledge of the tower chief and the watch supervisor. It happened because there was no alternative course of action and because there was no one else to do it."

In its issue of December 27, 1965, the respected McGraw-Hill publication, *Electronics*, commented editorially:

". . . Money is only part of the FAA's shortcomings—and maybe the smallest part. Too often, the Agency has tried to freeze technology that was already on the verge of being obsolete. In the past three or four years, it has traded in its militancy on air safety for a Casper Milquetoast attitude. FAA men often seem more concerned about rocking the boat than about solving problems affecting travelers on commercial airlines.

"In the past six months fatal air accidents have been frequent and frightening. At this time, it is hard to say which is more terrifying—the collision of an Eastern

Airlines plane and a Trans World Airline jet earlier this month or the FAA's 'that's the way the ball bounces attitude.'

"After the last major air collision of 1960, the FAA tried to improve its control system. It failed, but at least the Agency was recognizing its responsibilty. After this month's collision, the FAA figuratively shrugged its shoulders and said it had a system, to be installed by 1970, that might prevent such accidents. Then it went on to less controversial matters . . ."

Concluded the editorial: "A technological society in which two space capsules keep a rendezvous somewhere in the immeasurable universe should have no problem getting safe, efficient, comfortable air transportation. But first a major change in attitude and direction is required. The FAA has to do a lot more than count the bodies after an accident."

Turnover is running high at Air Traffic Control facilities, so that the burden upon experienced personnel gets heavier. Letters from sources of NAGE locals complain of over-work, training problems and low morale at ATC centers. A typical letter recently received from an N.A.G.E. Local office at an eastern facility said, in part:

During the year 1966, we have had a considerable turnover of personnel . . . Look at the workload here at our facility. During the year, we had approximately 290,000 total flight services performed. During 1966, we had an abundance of sick leave. This means the remaining specialists had to carry the workload. This was done by the morale-breaking procedure of changing watches, being called in earlier, and no spot leave being granted. From January to May, 1966, we had a complement of 24 personnel, counting the chief. From June to December, we had a complement of 22. This meant 290,000 flight services were divided by 23 personnel, and if my math serves correctly, 23 into 290,000 equals approximately 12,750 flight services per man, that is including the supervisor.

"Are the supervisors to be classified as 'working supervisors' or supervisors? As of the start of 1966, they were supervisors, thus the 290,000 should be divided among the journeymen and assistant journeymen. Using just 19, combined journeymen and assistants, the total flight services comes to approximately 15,300 per man for 1966. In using 18 journeymen and assistants, which we did for a great part of the year, the flight services per man increased considerably.

"More qualified personnel (must be) assigned, so we can have a half-decent watch schedule and be able to have spot leave or annual leave. Morale is at its lowest point and unless we can come up with some solution, we are going to have to sacrifice safety for economy. . . . Why are personnel assigned here who require study and training, when we cannot spare the manpower to help them?"

Manpower vacancies have reached a serious point at several facilities (by FAA's own admission) in the Washington Area (among others). A notice issued by the FAA Washington office, Falls Church, Virginia, January 25, 1967, said, "Manpower vacancies among ATCS employees have reached a critical stage in several facilities . . . These vacancies cannot be filled solely by promotion actions within the specified facilities, because only a limited number of personnel are eligible for promotion. Limited vacancies at GS–10 and average grade ceilings have contributed in part to restricting some promotions in the past."

From another NAGE ATCS Local came this recent note: "As it stands now, we will have three supervisors for seven journeymen." In large red letters, the letter concludes: "We're understaffed. Especially with Summer coming on. Help!"

I could read excerpts from many other letters we have received, Mr. Chairman, unsolicited letters from "out in the field," telling of conditions that should not exist in any agency of this government, not to mention one with such vital responsibilities.

These reflections of FAA field functions, I will admit, Mr. Chairman, strain one's credulity in the light of the Federal Aviation Agency's persistent preoccupation with cost cutting. As recently as February 1966, an elaborate booklet was issued entitled, "Federal Aviation Agency Cost Reduction." It described the "Cost Reduction Program" as the umbrella covering all of FAA's diverse economy programs . . . We contend, Mr. Chairman, that what we need under such a program are more parachutes instead of umbrellas.

This booklet, whose cost of preparation and publication would have paid for a one or two badly needed added traffic, controllers, envisioned "specific cost

reduction actions which will lead to savings of $31.7 million in fiscal year 1966 and $27.8 million in 1967."

"These goals are in addition to the more than $100 million of savings accomplished since 1960," said the pamphlet.

"Hitting the 1966 and 1967 targets will require more effort from each employee—surpassing them will challenge his imagination."

However much it has challenged the imagination, it's certain that the penny-pinching program has posed a serious physical and emotional challenge to our ATCS personnel!

Another illustration of how our hard-pressed, over-worked and under-appreciated air traffic men are often taxed to the limit of human endurance, while inevitably increasing the possibility of tragic error, was contained in the NAGE–LA Newsletter (Los Angeles ARTC Center) of December 23, 1966. In the month of September 1964, said the Newsletter, the center had *39,626 operations* and a staff of 296; in September 1965, *47,066 operations* and a staff of 285; and in September 1966, *56,594 operations* and a staff of *285*. And a 17 percent increase in traffic was predicted for this year.

This sombre pattern of sharply rising operational loads without commensurate increases in personnel and adequate technological provisions is common to almost all air traffic control points in the United States today. And the crisis of need, particularly in consideration of the fact that the margin of safety in American air lanes is probably at a record low point, worsens from month to month as the gulf widens between control measures and traffic flow.

God forbid that we should be jolted into action by a series of air tragedies.

At a time when much more, certainly not less is needed, the FAA has been boasting of its cost-cutting, penny-squeezing policies. The FAA's "Intercom" bulletin of July 18, 1966 reprinted a letter from President Johnson to "Dear Bozo" (i.e., General William F. McKee, FAA Administrator) and reading in part:

"I have noted with satisfaction the excellent work which you and your associates at the Federal Aviation Agency have been doing in reducing costs and manpower while absorbing additional workload and improving service to the public.

I have taken particular note of your cost reduction program under which you saved *$47 million* during the 1966 fiscal year. These savings have been accompanied by a reduction in Agency employment of more than 3,500 employees—eight percent since 1963. The Agency has succeeded in combining economy with a safety program which has helped the commercial air carriers of the United States achieve the best safety record in the world and the best record for any five-year period in the history of American aviation. You have clearly demonstrated that outstanding performance in a critical and complex program can be continually achieved while reducing costs . . ."

The President's confidence that the "outstanding performance" can go on this way is open to serious challenge.

As always, the men and women who bear the burden will continue to give their best; but their best is no longer enough. They need help—both human and electronic help.

System errors at many Air Traffic Control Centers are alarmingly high. In May of 1966, for example, an office bulletin at an East Coast Center reports *64 system errors* the previous year.

In a review of a "serious air traffic staffing problem," the Manager of the Los Angeles Area Office advised the director of the Western ATC Region (September 13, 1966), that "the recruitment process is too slow, cumbersome, and has not been available to us during the past three years."

He further advised, ". . . potentials in airline activities are more attractive than in the FAA and many of our better people are leaving to accept employment with the airlines; equitable pay for complexity and responsibility was adversely affected when Level II VFR Towers and Level III Approach Control Facilities were created—promotional ladders are no longer attractive; we are robbing Peter to pay Paul by selecting within-grade candidates . . . "

The ATS System Error Reporting Program went into effect December 1, 1963. Statistics accumulated since then demonstrate the clear need to reduce—by such measures as added manpower and equipment and certain fundamental changes in FAA concepts—the number of errors occurring.

A bulletin issued in June of 1965 by the Boston Air Traffic Office, however, said the goal of each facility must be total elimination of control errors and solicited the recommendations of all personnel for achieving this goal "within

budgetary/manpower limitations . . ." Here was a candid admission that the Federal Aviation Agency would take necessary flight safety measures only to a certain financial point, an arbitrary budgetary constriction permitting of just so much safety and no more.

An FAA Eastern Region Air Traffic Division Bulletin (February 3, 1966) emphasized the importance of exercising "good judgment" in control procedures, and rightfully so. And the Bulletin also cautioned: "Don't get the idea that faulty judgment is limited to controllers. Radar handoff men, coordinators and supervisors can all be equally guilty of poor judgment . . ." It added that with the coming of radar in ATC and the reduction in separation standards, accurate action is more vital than ever. The notice likewise reminded that correct control actions have become even more critical as speeds of aircraft increase, with consequent great reduction in available "thinking time."

Training as well as manpower and equipment deficiencies are apparent within the Federal Aviation Agency. According to an ATS System Error/Near Mid-Air Collision Study, "the present day training efforts are not always oriented to system needs." An ATD official said in a commentary on this study: "To proceed one step further, we believe the enroute facility commonly experiences difficulty in teaching all of its people even though a particular training program is oriented to a system need. It, therefore, becomes reasonable to associate this condition with the system error potential."

Continued the official in his review: "When one reflects on the air traffic controller and his work environment, there appears ample evidence of a highly skilled group of people possessing the distinguishing qualities of conceptual ability, ability to remain stable under pressure and, probably more essential, ability to make sound decisions often under harassing circumstances when but little opportunity exists for pre-planning. He almost literally holds the life and safety of hundreds of people in his hand at any given moment. Against this background, he must retain a massive amount of information as well as the necessary control techniques to cope with any situation. He is confronted with a considerable and continuing challenge and certainly in this surrounding 'peak' form must be displayed at all times.

"We feel . . . that the controller is not given a sufficient amount of time to do all the reading and studying necessary to sustain him at knowledge/skill level expected of him by the system. Similarly, this lack of time affects the amount of training which can be administered to him—thus increasing his chance for error.

"We also feel that the prime reason for this situation rests in the area of MANPOWER ALLOWANCES, based primarily on operation needs and which in effect relegate the training activity to a 'manpower permitting' basis. This 'catch-as-catch-can' method of administering a training program in a level III facility makes it exceedingly difficult to plan, schedule, and regulate the function. Consequently, the training effort cannot commonly be directed to the area of greatest need.

"We recommend that a minimum controller training need be identified at the national level, expressed in terms of 'hours', and *established as a requirement*—and that the proper resources in the form of manpower be made available to insure completion of this recognized need. Approaching our problem in this manner also involves funding, but seems a necessary measure if we are to retain the work force at the high skilled/knowledge level expected of them, thereby minimizing the possibility of control errors arising out of this source area . . ."

If the Federal Aviation Agency has suffered from a chronic lack of funds, it has also unfortunately handicapped itself by too much of something else; too many administrative decisions and policies of the wrong kind, according to abundant evidence. Here, the over-worked, under-paid, dedicated people who keep the FAA going at the operational level can count among their blessings the oceans of red tape which serve to blunt all directives of the bureaucracy, good or bad.

To be sure, the National Association of Government Employees has a militant interest in the function and the health of the Federal Aviation Agency. As the largest independent union for government employees, the NAGE has a large membership among employees of the FAA. But we should like to draw to the attention of this Honorable Committee of the United States Congress, well-based independent opinions—as we sincerely believe them to be—and facts, all bearing in one way or another upon the administrative effectiveness of the FAA. In addition to a financial anemia, the FAA, we respectfully suggest, has been afflicted from time to time with such other ills as myopia, dyspepsia, introversion and dual personality.

The National Association of Government Employees has made numerous, close studies of conditions within the Federal Aviation Agency and finds a clear need for an immediate full-scale Congressional inquiry. Such a study should make determinations as to the safety "quotient" for the public under current FAA operational procedures and policies. The FAA, we believe, needs the same kind of Congressional investigative focus that was recently given the automative industry safety standards. There are far too few controllers on duty at traffic control centers; we need many more controllers and other personnel; many FAA facilities are seriously undermanned. This is FALSE ECONOMY, which turns our airways into casings that gamble with human lives, and which can only have the effect of constricting the growth of the aviation industry.

When anything goes wrong in the crowded skies around airports, the FAA is quick to try and make the controllers the scapegoat. But the real trouble is that too few people have to handle too many aircraft. There is never any crowd in a control room.

In the conviction that there is direct relationship between "system errors" and facility staffing inadequacies, and that all "conflictions" are not reported in an attempt by the FAA to cover up the seriousness of conditions, a large NAGE Local at a major airport recently submitted a series of questions to the membershiip—and asked for frank answers.

Overwhelmingly, these experienced staffers (ARTCC) estimated that there was at least one "confliction," sometimes as many as five, on an average day at the facility. They testified to having personally seen an average of two or three "legal conflictions" in the previous two months. Opinions as to the need for "last minute" action to avoid conflict between aircraft—considered in a Radar environment—ranged from five up to 25 per day.

Almost all expressed belief that fewer "conflictions," whether discovered or not, would be possible if staffing were increased to distribute the workload. A preponderance reported there was less than full staffing in their particular sector every day they worked!

Assistance of a handoff man was listed as a relative rarity.

Asked, "Have you ever been forced into a position where you no longer have time to pre-plan or thoroughly scan the control board in order to make the right decision?" a majority replied in the affirmative, and agreed that such situations were dangerous. Presence of handoff controller at all times would permit more time properly to scan the scope and control board, it was also agreed.

The controllers and other personnel almost unanimously believed that the Facility administrative staff was aware of the need for more personnel, and that safety was being compromised by a policy there of staffing for an 80% traffic level.

Too much traffic was almost unanimously blamed for the majority of incidents, as opposed to strip marking, lack of knowledge or phraseology.

As to whether they thought it was safer to fly through the area today than it was three years ago, a substantial majority replied: "No."

Not long ago, personnel officers in the New York area of the New York FAA Traffic Control Facility submitted confidential questionnaires to personnel in an "evaluation program." And the reaction was not flattering to the FAA.

The employee generally gave ratings of no better than "poor" or "fair" to such categories as the handling of work schedules and annual leave; policy with respect to overtime work; "spirit of cooperation" among employees; reputation of the Agency in the community; and personal evaluation of job.

This study, and other evidence, points to a serious morale problem among our over-worked controllers and other FAA personnel.

The situation, we contend, has attained crisis proportions. And what it boils down to is that there are not enough air traffic controllers to handle the growing number of flights, and, on top of this, the controllers do not have adequate modern equipment to do their jobs.

The FAA must awaken to the controllers' plight. It must acknowledge that all is not as it should be, and that if action does not come, and come soon, we have all the ingredients for further tragedies.

RECOMMENDATIONS

In the light of all of the facts, the National Association of Government Employees earnestly urges the Congress to consider the following:

1. The immediate enactment of legislation authorizing a 20% increase of Controller staffing at all Air Traffic Control Centers, Air Traffic Control Towers,

Flight Service Stations. This must be a first step, however; just one part of an integrated program to modernize the entire system.

2. The enactment of legislation authorizing a 20% increase in the electronic and technician field as it relates to Airway Facility Branch activities.

3. An immeditae cessation of the arbitrary "phase out" of vital electronic equipment at Air Traffic Control Stations.

4. Enactment of legislation implementing an "ad hoc" standing committee comprised of active journeymen Air Traffic Control specialists who will be assigned a continuing role of submitting recommendations concerning air traffic control procedures to Congress yearly.

5. A Congressional requirement that all air traffic electronic computers, control systems, and their allied equipment will be inspected and maintained on a continual "preventative maintenance system rather than the present system which requires equipment failure prior to maintenance being performed.

6. Additional funds for the updating and purchase of modern Radar and Electronic equipment for all types of Air Traffic Control.

Thank you for your kind attention, Mr. Chairman and members of the Committee.

Mr. LYMAN. The National Association of Government Employees appears before you today as the representative of approximately 8,000 of the Federal Aviation Administration's 14,000 air traffic controllers. Our role is to convey to you their concern for the state of the FAA's air traffic control system and to present certain recommendations designed to arrest the deterioration of flight safety in the country's airways.

Since our initial statement to Congress on this subject on March 22, 1967, a great deal has been said by other organizations and by the agency itself. The general thrust of official FAA pronouncements has been that our charges are exaggerated and unfounded.

Significantly, however, we have received many off-the-record expressions of support from individuals in key positions of responsibility within the agency. They tell us that they are unable to publicly express their agreement with our general position but they hope we continue to press our case because they recognize that, in the final analysis, sweeping measures are needed to meet the safety crisis which confronts us.

Our central conclusion, for reasons we shall explore in more detail shortly, is that the air traffic control system possesses neither the manpower nor the equipment to exercise "total control" and further, that the situation is seriously aggravated by mismanagement at the agency's highest level.

Mr. DEVINE. Mr. Chairman, I think you suggested to Mr. Lyman that he might summarize this and he is reading it in detail. I read this whole statement last night; I don't know whether you had an opportunity to read it or not.

Mr. FRIEDEL. No; I will read it. I hope that you will keep on safety.

Mr. LYMAN. Again, I will. I don't intend to read through the whole statement, I was just trying to bring us to a point where I could divert from our prepared text and then go from that point.

As I say, one of the immediate steps we feel needed to improve safety is the review of information that we have had made available which is the fact that we have mismanagement within the agency, mismanagement at the highest level, and that we feel the first and immediate step is the replacement of the managerial people within this agency to correct the serious deterioration which has come about in the Federal Aviation Agency. We feel the only way this can be

done is by removing General McKee and his deputy administrator, David Thomas, removed and replaced by articulate gentlemen who have an up-to-date understanding of what is developing within the FAA.

We filed an extensive brief as I pointed out on March 22 of this year, and at that time we went into great detail in the number of midair near misses that were occurring throughout the country, the fact that there was lack of preventative maintenance in electronics.

Mr. FRIEDEL. How many near misses did you report?

Mr. LYMAN. We talked about, on the east coast in particular, the "Golden Triangle," as it is referred to by the Federal Aviation Agency, the Boston-Newark-Washington air corridor. We have information that shows anywhere from five to nine near misses being reported within this triangle and we have additional information documented by people in the various facilities within the east coast area that shows we have near misses occurring unreported at the rate of 20 to 25 per week, depending on the weather conditions at the time.

Mr. DEVINE. What separation do you feel is necessary to call it a near miss?

Mr. LYMAN. A near miss, as far as the system itself goes, is anything less than the standard separation.

Mr. DEVINE. Is that a thousand feet?

Mr. LYMAN. It could be less than a thousand feet, depending on radar and depending on the separation they are using. They have a 3- to 5-mile separation. Three miles from the antenna site and 5 miles if you are beyond a certain point. So anything less than the three or the five or anything less than the thousand feet could be a near miss. It depends how close the aircraft comes.

Mr. DEVINE. Twenty to 25 a week unreported in this New York-Boston-Washington corridor?

Mr. LYMAN. Yes. These have been, as I said, compiled by the controllers within this eastern region area.

We also have information within a brief we have produced, information that shows that the electronics people have been handicapped to the extent where they are not allowed to implement a preventative maintenance program to the electronics equipment but rather it is being done as the equipment fails, there is no standard procedure.

If they have a piece of electronic equipment to work on for a particular day, this is their assignment for that day and if they report to the facility or location where this equipment is located they theoretically are not supposed to work on any additional electronic equipment in the building or in that vicinity.

Mr. FRIEDEL. Would you be a little more specific? You speak of electronic equipment. Give us some examples. You are talking generally. Give us specifics so we can try to follow it.

Mr. DEVINE. I agree with that, Mr. Chairman. That is a very serious charge, "Employees are told not to check equipment."

Now, if you have any information like that, we would like to have names, dates, places, and times, because that is a very serious charge and we would like to know about it.

Mr. LYMAN. We realize this is a serious charge and we say it comes from the electronic technicians themselves who are told "When you

report to *x* facility to work on radar equipment or whatever piece of electronic"——

Mr. DEVINE. If you have names, dates, times, and places we would like to have them.

Mr. LYMAN. Fine. We will be happy to give that to you, sir.

(For information requested, see p. 301.)

Mr. LYMAN. Also we have instances on record where the flight service station employees—and this would concern, gentlemen, the Aircraft Owners and Pilots Association—have become so understaffed and overworked and that they are not able to adequately give flight briefings, give weather information that would be of vital interest and of vital need to the private aircraft owner, to the corporate aircraft owner who depends on this service.

Mr. FRIEDEL. This is because of the shortage of men or because these men work overtime?

Mr. LYMAN. No; this is because of the shortage of men and that does not exist only in one location, it exists in all locations throughout the country. The fact that one man is being asked to give a pilot briefing, which would be as an aircraft owner or pilot reports to the facility across a desk, he is looking for various pieces of weather information, this individual is attempting to give this man a briefing and at the same time the telephones are ringing and he is expected to answer the telephone, to give additional information through this telephone.

He is being called upon to provide two or three services as one individual where there should be at least two or three people to handle that.

Mr. FRIEDEL. One man where?

Mr. LYMAN. This is in the flight service station, sir.

Mr. FRIEDEL. What about the tower?

Mr. LYMAN. In the tower we have the shortages of people where they are again asked to double up on their positions and we have the same shortages in the air traffic control centers and we have doubling up and sometimes tripling up of positions.

When we talk about control centers and radar environments which was discussed yesterday, the radar handoffs, it is a fact that the aircraft is supposed to be given constant radar coverage and is being handed off from one facility to another which is a separate and distinct function of the air traffic controller.

I would like to read for the record some information that we have that does not appear in our prepared text but which has come to us as we have constantly tried to update our information. This deals with radar and radar coverage and radar handoffs. Again radar handoffs are a mandatory function required by the FAA. It says you will do this as an air traffic controller:

We have operated under a radar concept for almost 1 year. (This is a facility out in Los Angeles now.) During this time both management and employees have struggled to reconcile procedures with reality.

The order from within the agency itself recently established new handoff communication release procedures which presume the existence of requirements for handoffs. This was left to the facilities.

It appears that only good news has been reaching Washington headquarters. The radar concept can be defined simply. In every case a radar handoff must be made before an aircraft enters an adjoining center or an adjacent facilities air space unless prior coordination is perfected.

The procedures for meeting this requirement are extremely complex. The overlapping responsibilities are more complex. Yet policies continue to dismiss the mechanics of the concept by simply making the controller responsible for the handoff.

Mr. FRIEDEL. Who is making that statement?

Mr. LYMAN. These are our people in Los Angeles giving us information as it pertains to the process and policies that have been in effect in the western region which apply to all centers around the country, sir. I am trying to give you the information as we have it.

Mr. FRIEDEL. Is this from an individual?

Mr. LYMAN. This is from a group of controllers, not any single one but a group of our controllers who are in the field in Los Angeles.

Mr. FRIEDEL. These are charges that are very serious.

Mr. LYMAN. We will be happy to provide the committee with the names and times and information to substantiate this information.

Mr. FRIEDEL. I hope you can, because I want to make it clear that I, for one, very strongly believe in unions, but I want to know if you are representing one group and another union group. If this is it, we don't want to be used for a forum for a membership contest.

I would like you to be very specific on the charges that you are making sir.

Mr. LYMAN. Again, we will, sir. We are not using this as a platform in order to obtain members for the National Association of Government Employees.

This subject is one that to myself and to Mr. Grote here is one of vital interest. Mr. Grote still remains as an active air traffic controller, I only recently have left the Federal Aviation Agency. I have been active air traffic controller in Boston for years, had flight service experience for a number of years outside the Boston area.

This is a subject that vitally interests me, is of vital interest to the people that are performing a service to you, as a Congressman that flies the airways; they are not interested at this time or at any other time when they start compiling this information in a membership drive.

We have been very successful within this organization for membership without attempting to use an elaborate procedure such as we have here to be heard before Congress.

We feel the information we have should be heard because it has been suppressed for a long time.

Mr. FRIEDEL. Any charges you make, I want made specifically, and no generalities.

Mr. LYMAN. As I say, the information I am reading to you now comes from the Los Angeles center but applies to every center around the country. The reason I am reading this document——

Mr. FRIEDEL. Who gave you that information?

Mr. LYMAN. The air traffic controllers of the Los Angeles center. This outlines the procedures.

Mr. FRIEDEL. One controller or three or 10 or five, whatever?

Mr. LYMAN. This is the thinking of some 160 controllers in the Los Angeles center.

Mr. FRIEDEL. We would like to have names.

Mr. LYMAN. I will give you the names of the people that put this together as one piece, but we will be more than happy to give you the names of specific controllers that have information that will substantiate this information from their location plus any other names

from any other centers around the country which will substantiate the same facts that I am presenting to you here this morning.

Again to go on, the agency has told the controller, and the controller agrees, that radar environment is both inevitable and desirable and there is no argument with this.

The handoff, however, is basic and no controller will deny this either. The radar concept gives a license as well as responsibility to the controller. While a controller must hand off before the boundary that he is responsible for, unless prior coordination we spoke about is in existence, he also may climb, descend, or alter the course of any aircraft within the airspace that he is controlling and will despite any other information as presented to him by written air traffic control strips without coordinating these changes in any flight, altitude, direction, without any other control.

He can do this as long as the aircraft he is controlling is within his responsibility or within his area.

Not one controller in 100 however, and we again will give you the names and times around the country, not one controller will exercise this total control nor will he exercise this license for the simple fact it is not a safe operation.

Thus, something must be wrong and the controllers know it is wrong.

We have overlooked the mechanics of attempting to operate in a complete radar handoff and we do not have the personnel nor the equipment to operate in a complete radar environment. In order to have a prior boundary that handoff must be not some of the time or even most of the time, but all of the time, and this is a fact that no controller will argue with you about.

Radar coverage must be adequate throughout and sectors must be large enough to permit accepting and making simultaneous handoffs. This is not the case today. There must be a sufficient amount of personnel at the sectors all of the time and not some of the time to make these handoffs, because the agency has adopted a principle around the country within the centers and within the tours of telling one controller, "You do the actual following of the aircraft and in addition divert your attention to accomplish a radar handoff to the adjacent sector, to the adjacent tour, to the adjacent facility."

When one man attempts to divert his attention from the radarscope to push those magic buttons, he now diverts his attention from his immediate duty because he now has to look at the button, he has to wait for the other man on the end of the line to answer and nine times out of ten, we can again produce information and facts, nine times out of ten the man on the other end is doing the same thing, he is now diverting his attention because he hears a voice calling him, and he has to leave his primary duty to accept the handoff and relieves the primary duty and he is no longer providing the service that he was there for in the first place, which is the basic separation of these aircraft.

Mr. DEVINE. What you are doing, Mr. Lyman, you are supporting your charge in your statement here on pages 2 and 3, that there is an insufficient number of air traffic controllers, there are not enough electronic mechanics and you would like to have more personnel?

Mr. LYMAN. That is right.

Mr. DEVINE. I notice in the New York Times article, dated July 31, that the FAA, which you condemn in its management, has already re-

versed their trend on budget personnel reduction and are seeking 700 new traffic controller jobs for the present fiscal year.

Has anything developed on that?

Mr. LYMAN. To our knowledge, we recognize there has been some recruiting and hiring within the agency but again, the information that is coming to us from the various facilities which recruit is that it is not proceeding in the manner in which the agency indicated a full scale recruiting but just on a scattered piecemeal attempted recruiting to patch up one loophole here and let the other two or three go.

Mr. DEVINE. I would like to reiterate what our chairman, Mr. Friedel, said here that we will not be used as a forum for any dispute between you and the Air Traffic Control Association, which apparently is a competing union.

I notice on the first page of your statement here you say you represent 8,000 out of 14,000 air traffic controllers. In their prepared statement that will be given next, they say they represent 5,000 out of 12,000. So I see a dispute here right now.

We do not want to be used to get in any inter-union dispute, that is not our function. We are interested in air safety and air safety alone.

Mr. LYMAN. First, sir, we are not here to dispute or argue with any other group. The ATCA is not a union; we are a union. The membership again matters not. I will not use this as a platform to argue membership. Why they wish to pick up numbers, we have no idea. And we are not interested in talking numbers. Right now we are talking air safety.

Mr. DEVINE. You make the point there is an insufficient number of air traffic controllers and electronic technicians. I don't believe you should belabor that any further.

Mr. LYMAN. You have some information that says the agency is attempting to make some corrected changes, and I would like to, in turn, read to you an agency document which is a sendoff in the Miami area and other centers around the county. This is off an agency teletype, by the way. It starts off:

> Due to the shortage of funds, the following actions will be implemented immediately: Stop all recruitment immediately, defer commitments to the extent possible.

This is the Miami area.

Then it goes on and it says, "Defer all procurement except essential items."

We wonder what are the essential items they refer to.

Mr. DEVINE. You are formerly an FAA personnel——

Mr. LYMAN. Yes.

Mr. DEVINE. When did you leave?

Mr. LYMAN. I officially left on medical separation 60, 65 days ago, but up until that time I was an active air traffic controller.

Mr. DEVINE. Did you leave under any circumstances other than medical?

Mr. LYMAN. No; strictly medical reasons because of high blood pressure and nerves and I was taking medication that would affect judgment in the case of a radar environment.

Mr. DEVINE. How long were you there?

Mr. LYMAN. I started with the Federal Aviation Agency in 1955.

Mr. DEVINE. And you were there for 12 years?

Mr. LYMAN. That is right; first, time in flight service stations and then in 1958 I transferred into air traffic control center operations, and was with the center from 1958 until the time of my separation.

Mr. DEVINE. Where?

Mr. LYMAN. In Boston.

Mr. DEVINE. Boston?

Mr. LYMAN. Yes.

Mr. DEVINE. The man immediately to your left?

Mr. LYMAN. Mr. Grote remains as an active air traffic controller at the Newark tower.

Mr. DEVINE. At the Newark tower?

Mr. LYMAN. Yes, sir.

Mr. DEVINE. Anybody here from the Washington tower?

Mr. LYMAN. No. We have nobody here today from the Washington tower, although, again, the information that Mr. Grote has—and we hope to have time to give you—also would be representative of the Washington tower and any other tower around the country for the same conditions exist not only at Newark but around the country.

As I said this is an agency directive to stop the recruitment, stop procuring material, defer maintenance projects and so forth. Then we come to another——

Mr. FRIEDEL. Mr. Lyman, I thought we had an understanding and I want to be very fair with you.

You said you would summarize your statement and you are going far afield with other things. I did not know that you were going to take this time. We will never get to another witness this morning.

I just would like to be as courteous as I can, let you get all the information in the record. The only thing I ask you to do is to be specific rather general. If you are going to read all these letters, if you want it in the record, I will put it in the record for you, but just try to get down where you are claiming there is not enough personnel and try to keep to that and make recommendations where you feel that this would help safety.

Mr. LYMAN. Well, we do in our prepared text, as you know, at the end of our statement, have our recommendations that we feel will bring about immediate corrections and it does talk about immediate increase of personnel, 20-percent increase, across-the-board, tower, center, flight service center, and electronics people.

We also feel that a standing committee should be formulated by the Congress to be made up of active air traffic controllers to work in conjunction with the managerial people of the FAA, so that the views and information that are of interest to the controller will be heard by management within the FAA and will be presented to them by people that have a firsthand knowledge and not rather rely on information to be fed into management of the FAA by other management officials who only want to pass the good word along as it has been their practice in the past, but rather pass the good and the bad along to the higher managerial people within the Federal Aviation Administration.

Mr. FRIEDEL. Have you submitted these recommendations to the FAA, Mr. Lyman?

Mr. LYMAN. We have submitted these on numerous occasions, Mr. Lyons and I both.

Mr. FRIEDEL. In writing?

Mr. LYMAN. In writing and also verbally to the Administrator and also to Mr. Thomas, on two occasions.

Mr. FRIEDEL. The ones you submitted in writing, did you receive an answer?

Mr. LYMAN. I don't recall. I would have to defer on that one to Mr. Lyons.

Mr. LYONS. We did. They accepted the brief that we sent to the FAA but we heard nothing further relative to our recommendations.

Mr. FRIEDEL. How long ago was that?

Mr. LYONS. I would be guessing now. I would say about 6 or 7 months ago. I don't know exactly.

Mr. FRIEDEL. You have not received a response?

Mr. LYONS. Other than that it was received by the FAA, that was the only response.

Mr. FRIEDEL. You made studies and recommendations?

Mr. LYMAN. Pardon?

Mr. FRIEDEL. And were they making studies of your recommendations?

Mr. LYMAN. No, that it was received, but no response as pertains to the merits of the recommendations made by the organization.

Mr. KUYKENDALL. Mr. Chairman, in line with your remarks, I appreciate you and Mr. Devine making it clear that we don't want to be parties in your dispute here—I think the tone of some of the statements made in your remarks would indicate a degree of animosity between your organization and the FAA because at the bottom of page 2 you made a charge, and I am going to ask that this be substantiated—you have charged someone with a criminal act here and I think it should be brought out as to who you mean.

I think that you should be able and ready to support that with names. We want them here.

Mr. LYMAN. It just so happens I will give you one specific. We will give you the additional information. Colorado Springs, Colo., July 19, 1967. This is an FAA document from a supervisory electronic technician.

> Operating short of personnel. We may not always have a man available to take care of your problems so be patient and we will take care of the equipment failures as soon as we can.

This is one specific piece of paper.

Mr. FRIEDEL. Who was that signed by?

Mr. LYMAN. This was signed by a supervisory electronics technician out at Colorado Springs.

Mr. KUYKENDALL. Sir, if you think what you read is the same as what you put in your statement, I would like to be the prosecuting attorney against you in court sometime because that is not the same thing.

No one was told to let a piece of equipment break down.

Mr. LYMAN. No, no.

Mr. KUYKENDALL. You said that.

Mr. LYMAN. I said perform the preventative maintenance only after it has failed.

Mr. KUYKENDALL. You said it right here.

Mr. LYMAN. That is right. When the piece of equipment fails, then you perform the maintenance on it.

Mr. KUYKENDALL. Let it fail and then fix it?

Mr. LYMAN. When it has failed, then fix it.

Mr. KUYKENDALL. All right. You charged the FAA management let a piece of equipment fail.

Mr. LYMAN. If you are in the room and you are working on another piece of equipment and you look across the room and a gear is going to fail and your project for that day is to work on X over here, but Y is failing, you are telling these people, do not work on Y, only work on X. That is correct.

Mr. KUYKENDALL. I hope that regardless of what anybody ever tells you that as long as I am flying an airplane around and you look across the room and see a piece of equipment failing that would endanger human life that no boss in the world would keep you from fixing it.

Mr. LYMAN. Now you are getting to the point that I did not get to because we are trying to summarize and that is exactly what is happening because you have professional and dedicated electronics technicians.

That is right. They are acutally being forced into a moonlighting situation.

Mr. KUYKENDALL. FAA would let a piece of equipment deliberately fail and endanger human life?

Mr. LYMAN. In order to satisfy statistics that show that this piece of electronic equipment fails only seldom. Yes, we have that information.

Mr. KUYKENDALL. And you have information that they deliberately let the equipment fail and endanger human life?

Mr. LYMAN. Encouraging the equipment to fail because these people are not working on it. When you have a technician in that room, this technician has a responsibility in his own mind when he looks across that room and he sees an indicator that that equipment is getting ready to fail, he moonlights but does not record that in his official record because disciplinary action is then effected by his immediate supervisors to the point where he does not report it.

So as you say, as a pilot we are getting a service from him which he wants to give to you but he is giving it to you not because he is told to but because of the fact he is there. He knows what the consequence is going to be and that is correct.

Mr. FRIEDEL. What do you mean by "the consequence?" If he reports something, he is going to be reprimanded?

Mr. LYMAN. If he works on a project that he was not scheduled——

Mr. FRIEDEL. He is going to be reprimanded?

Mr. LYMAN. That is correct. And we will give you this information. We will give you the specifics.

Mr. LYONS. Mr. Chairman, if you will, last year at the eastern regional meeting of all of our locals of the AFS groups or the systems maintenance employees, it was brought to the attention of the head of the eastern region that equipment is not being maintained properly. As a matter of fact, the presidents of these locals informed the head of the eastern region that we have been moonlighting on equipment; that they themselves have been checking on it although they are not supposed to perform preventative maintenance.

Preventative maintenance is to check material before it breaks down. Now they had quite a few outages but they were told they were not

to do this because they did not have enough help and there were further cutbacks at that time; is that correct?

Mr. LYMAN. That is correct.

Mr. FRIEDEL. Wait a minute. You said they did not have enough help. But if a man is there will he be reprimanded?

Mr. LYONS. He is not supposed to do it, Mr. Chairmman, and this was brought up, that many of the employees will perform preventative maintenance even though they are not supposed to do it.

They will when they go out in the field and they will look at other equipment they feel can break down, whether it is tacon or any of the other equipment. They were told they were not supposed to do this, they were not supposed to perform preventative maintenance. They were only supposed to perform the actual outages to repair material or equipment that broke down.

Mr. KUYKENDALL. Mr. Lyman, I would like for you specifically to give us the name of one person in the management of FAA that has told directly any person in your organization that they were not to perform critical preventative maintenance that stared them in the face. I would like names. I don't want any more opinions, I don't want any more "they said," I want a name and a place.

I think I can begin to understand a little bit here why your communications with FAA have broken down and some of the charges here.

Maybe they are going to make the same charges back. That is unfortunate, but it is unfortunate this situation exists of an absolute breakdown in communications. This is no place to be making this kind of charge.

Mr. LYONS. I will gladly send to you, Mr. Congressman, the date of the meeting held in New York——

Mr. KUYKENDALL. I don't want a meeting; I want the name of the individual.

Mr. LYONS. Yes; I will give you the names of the individuals present. I believe we have a summary of the report as made by the FAA and we will submit that to the chairman and the full committee.

Mr. DINGELL. If the gentleman will yield, I think you should submit that to the chairman of the subcommittee here. I think we also would like to have whatever minutes there are or a summary of the discussion or discussions that took place, and have these things fully and appropriately.

Mr. KUYKENDALL. We know that there is a shortage of maintenance personnel. We know that any management of any organization when they have a shortage of personnel has to put in priorities.

If you were running the organization you would put in priorities, we know this. Now this is probably up to that point. I think it is unfortunate that you have specifically put in this one short statement of saying, "Let it break down." Let it break down.

Now this is the unfortunate thing. You have made a direct charge which is very, very criminal and this is the unfortunate thing here.

We know there is a shortage of personnel and this is one of the purposes of the meeting, to ask for recommendations that the personnel be increased.

I happen to be one that is going to join in the recommendation that it be increased, if I have an opportunity to. I will vote on appropriation for it to be increased, but the thing that disturbs me most here

about this testimony is the matter of these broad charges without the specifics that we in this committee want and Mr. Dingell said, to be most specific, we are not interested in a meeting where someone is told that because of the shortage of maintenance personnel we must put on priorities.

We want an example of someone that is either reprimanded or told not to do critical maintenance personnel on a piece of equipment at *x* times and *x* place that would endanger human life.

Mr. LYMAN. Again, as Mr. Lyons indicated, we will be happy to give you specific occurrences from the east coast and also the central and also the western regions.

One other view. When we talk about electronic equipment failures, as an individual flying, the thinking of the technician is opposed to the FAA's thinking.

Mr. FRIEDEL. What are you talking about?

Mr. LYMAN. I am talking about electronic equipment failure. We talked about moonlighting and this has been implemented and the agency in turn says their equipment does not fail. We are providing the maintenance to keep our equipment working.

They come up and they say 98 percent of the time equipment is available, there are no failures. They use this figure. However, this again is based on the moonlighting fact. They turn around now and they have an order out which eliminates complete shifts of electronics people on specific days.

In other words, you can be flying—I don't know, Mr. Congressman, if you are a pilot or not—you can be flying a specific day. As you indicated you certainly would hope that somebody was available to monitor the electronics equipment to determine whether it was operating normally, and yet the agency has adopted a policy on specific shifts to eliminate all the people so that the machinery is now operating itself without anybody monitoring the equipment. The man is home, they adopt this on a holiday, they reduce this down. The records show that 98 percent of the time the equipment does not fail but again we will show you where it does fail more than that and that it is not available 98 percent of the time.

Again, if you were flying on a holiday I think you would like to have somebody down there watching your equipment, somebody doing routine maintenance. Yet it says routine maintenance can be deferred on holidays in order to allow employees to pursue their interests.

The equipment is available 98 percent of the time. Therefore failure on a holiday is highly remote. Well, the equipment fails holidays or any other days. Again, this is just one instance of where this whole thing has come down the line.

I know it is difficult for somebody to correlate in their mind the fact that a man is told to not do this, do this, and forget the other. It is difficult but it is not difficult for the controller to be told to provide radar separation, provide the handoff and do a few other functions because there is nobody there, make it work.

These people are making the system work for all practical purposes. The system should have fallen on its face a long time ago. You can only extend productivity, which is a favorite word of the FAA, to a point. You, as a Congressman, can only divert your attention to *x* amount of duties before, after that time, somewhere along the line,

you are going to derogate something in your decisionmaking. These people—that controller, the flight service station individual, the electronics individual—are responsible for immediate decisionmaking.

The electronics man and flight service conceivably has a little more time to correct an error but the controller who is separating aircraft and being forced to spread himself so thin that decisionmaking is affecting his responsibility for your safety and my safety and anybody else that is flying is affected.

If they are not providing the service, than we have the information that this maintenance is not being provided and affects your safety.

Mr. FRIEDEL. Mr. Lyman, is that your statement? Is that your case?

Mr. LYMAN. This, basically, is the case. As you asked we have the recommendations. Again, we feel, as you indicated, we need an immediate increase in personnel, we need an immediate increase in equipment. There is not backup system of radar equipment available to these people, so when we talk equipment we are talking an addition of x amount of additional radarscopes to provide a backup system capability for these people.

Mr. FRIEDEL. Now furnish the specifics that we requested.

Mr. DINGELL. Mr. Chairman.

Mr. FRIEDEL. Mr. Dingell.

Mr. DINGELL. You are alluding, I assume, to the series of circumstances referred to in the statement of the eyewitness beginning at the bottom of page 2 and going down to about the middle of page 3, wherein the witness has cited the inadequacy of electronics technicians, and of the FAA maintenance procedures; that controllers through the auspices of the National Association of Government Employees have found that the Agency is forcing them to rely on outdated and temperamental equipment; that the FAA is arbitrarily phasing out vital electronic equipment at air traffic control stations and in many areas purchasing factory seconds to replace tubes in radar and related electronic equipment; and the high number of unreported incidents where aircraft passage show a distance less than FAA safety limits. I believe you are asking for specifics on those items?

Mr. FRIEDEL. Yes.

Mr. DINGELL. Very well. I hope it will be received for the record.

Mr. FRIEDEL. Thank you very much.

Mr. LYMAN. Thank you, Mr. Chairman.

(The information requested follows:)

STATEMENT OF THE NATIONAL ASSOCIATION OF GOVERNMENT EMPLOYEES ON FAA ELECTRONICS EQUIPMENT MAINTENANCE POLICY

(The following information is submitted, as requested, for inclusion in the record of hearings conducted by the Subcommittee on Transportation and Aeronautics of the House Interstate and Foreign Commerce Committee relative to aviation safety.)

In our prepared statement, we described a situation, brought to our attention by maintenance personnel of the Federal Aviation Administration, in which a critical lack of trained personnel is forcing facilities to forego needed preventative maintenance on electronic equipment. Subcommittee members requested more detailed information on this matter.

As a case in point, we submit the following report from maintenance employees of the FAA's Buffalo, N.Y., facility.

Employees cited directives issued in 1964 wich, they state, are being carried out to this day, indicating that the problem has been with us for some time.

The principal document referred to was issued over the signature of John Hanlon, area supervisor of the Cleveland Systems Maintenance Area Office, and entitled "Project Focus".

Pertinent excerpts follow:

"The Cleveland Systems Maintenance Area Office is implementing a Maintenance Schedule Improvement Program, the purpose of which is maximum efficiency in utilization of manpower while assuring completely adequate operation of services and facilities. Under the Program, Sector personnel will accomplish most maintenance procedures according to schedules developed locally, based on local conditions. One of the key points in operation of the Program is a policy of NOT attempting to hold facility or system parameters to center-of-tolerance values, but to take corrective action only when an out-of-tolerance condition is found or when one is imminent.

"Success of the Maintenance Schedule Improvement is essential, if the Cleveland Area is to assume the additional workload to which we are committed. However, success of the program depends completely on the whole-hearted cooperation of Sector technicians and their complete acceptance of the program. The inspection process involves measurement of system and equipment parameters. Very often, in the past, inspectors who have found a parameter near the edge of tolerance have adjusted it to its nominal value during the inspection.

"FEG (Field Engineering Group) personnel who conduct Electronic and FED inspections will support the Cleveland Area Maintenance Schedule Improvement Program and will conform to guidelines established by the program. They will provide a feedback to the Area Office regarding Sector participation in the program. Specifically, inspectors will:

"a. Include in Section 1 of the Inspection Report a statement regarding the extent and effectiveness of Sector participation in the Maintenance Schedule Improvement Program.

"b. Refrain from taking action on making adjustments when departures from center-of-tolerance conditions are noted during inspection so long as an out-of-tolerance condition is not found or is not imminent. Doing so might obscure justification for altering a maintenance schedule.

"c. Apply adjective ratings to facilities inspected, based on utility, functions and reliability of operation. Adjective ratings will not be lowered by any conditions which are found to be in tolerance, even though they are near or at the edge of the permissible area.

"In summary, Sector Chiefs and all other technicians are being asked to adopt new maintenance philosophies, which are considered a radical change by some of them. *Evaluations conducted by FEG engineers should in no way reflect an evaluator's opinion that perfection of equipment operation is favored over an operating condition the evaluator thinks should be improved, but which really doesn't need to be. Reports should not reflect disapproval of equipment operation, which is not at center-of-tolerance conditions as long as out-of-tolerance conditions are not found.*" (Italic supplied.)

Again emphasizing that this philosophy continues in effect, maintenance employees comment as follows:

"Mr. Hanlon told the technicians to closely monitor their equipment to determine when it will fail, then repair it just before it does fail. In electronics, this is not only impossible, but utterly ridiculous.

"On one of Mr. Hanlon's trips to Buffalo, he encouraged doing the monthly monitor checks on the Instrument Landing Systems without removing them from service. In his own words, we should, on sunny, clear days, shift the course, go to broad alarm condition, and act without notifying the pilot.

"By checking past records, you will find some airports that ran 100 percent availability month after month, but still recorded their routine work as being done. This is cheating to make the availability time look good. This same point was brought up last March 21, 1967, in Syracuse at the ILS (Instrument Landing System) conference.

"You will also note in his directive (Hanlon's) that he instructed his inspectors to close their eyes to all but out-of-tolerance conditions. This is still done today, very few facilities fail an inspection. We hope this will help in the testimony and if we can assist in any way please let us know."

A further case in point comes from Boston's Logan International Airport. Employees at this facility comment as follows:

"Under the FAA's Reduced Preventive Maintenance Program, monthly time limits have been placed on site and situation. This includes time spent on preventative and corrective maintenance.

"The policy at AFS–411 Logan International Airport is that if the allotted time for a site is used up during the month and some of the equipment at that site has not been routined for that month, it will not be routined. The only justification for looking at this equipment is that it is failing or has failed. At Logan ATCT, there is one transmitted for the primary frequency of departure control. This transmitter doesn't receive the proper routines according to agency handbooks because (1) there is not a back-up transmitter for this frequency, and (2) there has not been a midnight shift for communications since May 1965, even though traffic between midnight and 0800 has doubled and tripled. The NAVAID section at AFS–411 is constantly being monitored regarding time spent at sites. Several times, marker sites of the Instrument Landing System have had scheduled preventative maintenance, but all the time allotted for this site for the month was used up. This task was put off until the next month.

"The safety of the flying public has been jeopardized by putting time limits on maintenance at the Airways Facility sectors. You cannot put time limits on preventative or corrective maintenance and have a facility operating at peak efficiency."

A shortage of maintenance workers is the principal ingredient in another problem area, this one at the New York Air Route Traffic Control Center.

As reported by employees at that facility, "Presently, at the New York ARTCC, there are only two qualified engine generator men. If there is a trouble at night, a WB–9 building maintenance man, who is not qualified to certify the powerplant and related switchgear, must perform the task of transferring the center from commercial power to emergency power. If he encounters any problems beyond his technical competence, the New York Center could very possibly be without any power, or in effect, be of no use to any aircraft which normally rely on this critical station.

"Recently, the New York ARTCC was utilizing the emergency powerplant when both engine generators developed trouble, forcing the engine generator man to revert back to commercial power. Fortunately, commercial power was available, and also an engine generator man happened to be available."

Another typical example of degradation of maintenance programs because of lack of employees occurred at Colorado Springs, Colo. The supervisory electronics technician of the radar/communications unit there advised air traffic control tower and Weather Bureau personnel, by memo dated July 19, 1967, that repairs of equipment outages would simply have to wait. Text of the memo follows:

"Beginning on or about July 24, the Radar/Comm crew will become involved with installation of the ASR–5. We will transfer Joe Vegh to the installation crew for the duration of the project. This transfer, during the annual leave season, leaves the crew two men short.

"Operating this short, we may not always have a man available to take care of your problems, so be patient, and we will take care of the equipment failures as soon as we can."

Note the employees, "This is one of the reasons for poor air traffic control service. The ASR–1 radar that we are using here was out-dated years ago, and as the above letter states, there is nobody to maintain it. If there is a near mid-air or a collision tomorrow, it is nobody's fault but the FAA."

Evidence is at hand which indicates that things will get much worse before they get better. In the minutes of the Kansas City Area Chiefs Conference, February 13–17, 1967, Warren C. Sharp, Airways Facilities Division Chief of the FAA's Central Region, is quoted as saying, "Improved maintenance techniques are still being evaluated in an effort to determine optimum levels of maintenance. Less than 24-hour watchstanding on ARSR facilities has been proposed as a means of improving productivity."

This statement has a commendable ring to it, but the employees who would be affected by such a program offer the following observations on the possible consequences of such a cut back:

"If for some reason the high voltage goes off at the ARSR (Air Route Surveillance Radar) site and the circuit breaker drops out, who is going to reset it? If the equipment is changed to the standby units by remote control, who is going to see that it is operating at peak performance? We believe that we should not sacrifice safety for the sake of saving money or, as quoted above, improving productivity. Surely, we want to improve in productivity or in any other area where it is needed, but we should not take the safety of peoples' lives too lightly."

The minutes of the same area chiefs conference further note that "the three percent annual productivity increases are expected to continue."

Respond the Kansas City electronics technicians, "How long can it be declared that we have a productivity increase of three percent and thereby cut the number of employees by the same amount? We would think that after a facility has been established for a period of two to three years, there would be no further productivity increase there. Furthermore, as the equipment gets older, it requires more maintenance. So, even though we might have a productivity increase, we very well might need more men rather than to decrease the staffing by the same amount as the productivity increase."

Another problem is the phase-out of electronics equipment which air-traffic employees believe they still need to fulfill their mission.

Report workers at the Airways Facilities Branch, Trinidad, Colo., "Several weeks ago, our subsector chief and our local FSS (Flight Service Station) chief were notified that the region's plant and structures section has decided to discontinue and remove all standby emergency generators from Flight Service Stations 'in the interest of economy.'

"It will probably cost several thousand dollars to remove and rewire each facility. It will not do away with any technicians since our work load will be affected very little by removing them. About all that will be saved will be the few gallons of gas and oil per month it takes to keep the unit in good operating condition.

"However, there is a great possibility of air tragedy occurring due to emergency power not being available.

"For example, on April 22, our FSS experienced a 2½-hour power failure. If the emergency power plant had not been available, the communicators would not have had any communications with the aircraft in the area. While Trinidad is not extremely busy, there were three inbounds and one outbound during this period. Loss of communications could have resulted in a collision.

"Also, our station is equipped with Direction Finder equipment to render assistance to pilots who become lost or disorientated during the freak weather conditions which occur in our area regularly. On April 29, one communicator had three such problems.

"It is during these unusual weather conditions that air traffic needs the most assistance; it is also during these times that we experience most of our commercial power failures. So, you can see what problems we are going to have in air safety if management gets their way and removes our standby emergency power plant."

According to employees at New York, more potential trouble threatens because of another instance of equipment phase-out. They report, "FAA has all its eggs in basket with the only capable radar at Kennedy Airport.

"In the event of a breakdown of the Kennedy radar site, there would not be enough air coverage with the backup Palermo and Benton radar systems.

"The FAA discontinued service of the Montauk radar site which would have served as an excellent backup of the Kennedy radar site."

A final point on which subcommittee members requested further specifics was the subject of unreported "incidents" taking place, instances in which aircraft pass each other at distances less than the FAA's safety limits.

Because of the very fact that such incidents go unreported, it is extremely difficult to assign figures to the numbers of times they occur. However, in a survey of N.A.G.E. members, we found that, by the air traffic controllers' own estimates, they happen with alarming frequency.

Controllers at the New York Air Route Traffic Control Center reported that there is at least one "confliction," sometimes as many as five, on an average day at the facility. Most of these, they said, go unreported.

Mr. FRIEDEL. Our next witness will be Mr. Clifford P. Burton, executive director of the Air Traffic Control Association.

STATEMENT OF CLIFFORD P. BURTON, EXECUTIVE DIRECTOR, AIR TRAFFIC CONTROL ASSOCIATION; ACCOMPANIED BY JAMES HILL, GENERAL COUNSEL

Mr. BURTON. Thank you, Mr. Chairman.

If you wish, I can summarize my statement; however it is only some six pages long, so I am at your disposal, Mr. Chairman.

My name is Clifford P. Burton, and I hold the position of executive director of the Air Traffic Control Association.

On my right is Mr. James Hill, general counsel of the association.

At this point I would like to mention that Mr. Hill is a former Deputy General Counsel of the Federal Aviation Agency and I formerly held the position of Deputy Director of the Air Traffic Service and in that capacity I have some working knowledge of the problems that the agency goes through in trying to get budgetary approval of its request for personnel and equipment.

In my statement I mention 5,000 of the 12,000 aircraft traffic controllers. We do not include in that 12,000 figure flight service station personnel but of our 5,000 members we can authenticate this by records which are kept through the computer at the Service Bureau Corp. and we can make our roster available to the committee to prove the actual number of members we have in our association, and how many we represent.

We do not maintain that we represent the other 7,000 of the 12,000 controllers or whatever exact number it is.

We are an independent, nonprofit professional organization dedicated to the advancement of science of air traffic control.

Our statement, Mr. Chairman, does not deal specifically with equipment. We have read the testimony of the previous witnesses, ATA, the AOPA, and others, and we believe all the goodies in the world are included in those statements as to equipment.

Our particular thrust deals with the recognized shortage in personnel, the rapid growth of traffic, and what must be done to correct this situation.

Our statement quotes in full an editorial in our journal of January of this year, where we really pointed up this problem. We did not wait until an accident occurred to point it out.

We also recognize that during the past 4 or 5 years the economy pressures that have been on the agency, and that many people in that agency recognized this problem, yet there was not too much they could really do about it.

Our concern now is over the fact that in the last 4 or 5 years the traffic has increased rapidly, it has been handled by increased productivity on the part of the controllers to almost the breaking point.

We recognize the shortage in nearly every facility in the country. The difficulty now arises with the fact that the pipeline is empty. There are no new bodies coming into the system in time.

It will take at least 18 months, 15 to 18 months to train a body in a low activity facility, 3 to 5 years in a busy one.

So the pipeline needs to be filled up.

At the present time, as I found in my tour through the Western States and through the central part of the country, there are a few new bodies coming into the system but not in any great numbers, and they are largely composed of retired commanders, colonels, and sergeants. We think there should be an all-out effort at the present time to recruit new and qualified personnel.

We specifically recommend immediate acquisition of around 2,000 for training purposes. We also recognize that while it would be desirable to rapidly expand in the electronics field and commission new radars, new facilities throughout the country, that this cannot be done

with the present work force, and it would drain off the qualified people from the existing facilities, now working shorthanded.

We think the first order of business, insofar as safety is concerned, is to get the bodies on hand to handle the equipment and the facilities in existence today. Certainly it would be desirable according to ATA's statement that we have more radar, more towers, more ILS, et cetera, but we must have the people to maintain them, so the particular thrust of our testimony is in the personnel field.

We work closely with the FAA on these problems. We have seldom, if ever, sent a recommendation or a communication to the FAA that they have not answered it, however, it has not always answered to our satisfaction.

Many times we quarrel and we quarrel quite strongly and quite bitterly, but at the same time we have confidence in General McKee and Mr. Thomas, and we feel that they can get this job done, that they can get out of this dilemma if they are given some immediate support.

I speak now of the Appropriations Committee as you cannot get things done without money.

So in our statement, Mr. Chairman, we have three areas which we think should be given priority attention: One is the immediate acquisition of 2,000 personnel, and I use a round number of this——

Mr. KUYKENDALL. What page?

Mr. BURTON. That is on page 6.

Major emphasis on the airport construction program because quite obviously if you have no place for the airplane to land, we cannot handle them and the traffic controllers have to chop them off—restrict traffic.

An accelerated implementation program on the national aviation system is now underway by FAA.

Here, again, Mr. Chairman, this cannot be accelerated unless there is money in hand to do it. When you add to that, of course, the recommendations of other associations that have appeared before you on additional radar, additional towers, additional lights and facilities, and so on, again it comes down to a matter of money.

So we are pressing you strongly, Mr. Chairman, to urge the Appropriations Committee to get behind the FAA and give them the money that they need to do the job.

We do have confidence in the administration to get the job done, we expect to quarrel with them in the future as we have in the past, but at the same time we are trying to cooperate with them.

Basically, Mr. Chairman, that is the thrust of our statement.

Mr. FRIEDEL. The three recommendations we have here. What do you estimate the total cost would be?

Mr. BURTON. I have not gone into the matter of cost on these at all, Mr. Chairman, but I would say it is quite astronomical particularly in the airport area and in national aviation system.

I think they have ordered most of the computers, radar, and other electronics that are very, very expensive. Of course, if you take the average salary of a controller and multiply by 2,000, that would give you a pretty good figure, but we have not done so.

We can come up with a rough estimate but we have not attempted to do this. I would say it would be at least $200 or $300 million.

Mr. DINGELL. Would it be beneficial for the subcommittee to have the benefit of the cost estimates not only on these recommendations but also on such other recommendations as the subcommittee will receive in the course of the testimony?

Mr. FRIEDEL. Well, we will try to get the figures. I want to say this: I am greatly impressed with the shortage business, the need for more men. I wonder if we can get 2,000; but at least we ought to get a start on it.

Mr. BURTON. Mr. Chairman, I had a little experience on this about 10 years ago. I was then a division chief in CAA and I had air traffic control and communications. At that time I urged quite strongly that they hire at least 25 percent more personnel for on-the-job training, pointing out the rapid increase in traffic that has then—that was then forthcoming and that we would be caught shorthanded and with a low experience level.

This happened, and suddenly CAA started hiring people off the streets and getting from well, wherever source they could. So I think the total cost to the taxpayer was far greater by waiting and then accelerating the program that was if they had hired these people at the time. The mood was evident.

I think the same situation exists today that eventually the taxpayer and the public will benefit by getting these people on the job as quickly as possible.

Our great fear is that the job is getting too strenuous and so difficult that it is not attractive any more. We are not getting the right kind of bodies into the pipeline. We have recommendations before the Civil Service Commission today and to the FAA to do something about it.

So whether or not they are given the authority and funds, I think they will still have a very, very difficult time in getting the proper kind of material into the pipeline for training purposes.

Mr. FRIEDEL. Mr. Devine?

Mr. DEVINE. Mr. Burton, the previous witnesses said the turnover was running high in air traffic control. Can you give me any specifics on that? Are you losing a lot? Are the oldtimers dropping out or what?

Mr. BURTON. I do not believe the turnover rate is high, I do not have the specific figures. But when we were conferring with the FAA, during the past year, this was pointed out.

We attacked the morale problem, and one of the responses that we got from the agency was that the turnover rate in the service was quite low. We accepted their figures. I don't remember what that figure was.

Mr. DEVINE. You suggested on page 2 that when an air traffic controller reaches age 40 his proficiency decreases—I suppose that is everybody, not just the aircraft controller.

Do you have quite a few in that category?

Mr. BURTON. I don't know what the average age is, probably 37 to 45, but one of the FAA's own studies indicates that their peak efficiency in this field wherein split-second decisions are needed, that they begin to go downhill at about age 45.

It is a safety business and we are talking about increased safety. I think it is different than sitting behind the desk.

Mr. DEVINE. Have you had any tower experience yourself?

Mr. BURTON. Not tower experience. I was brought up in an air route traffic control center and I have been in ATC nearly all my career. I retired in 1965 as the Deputy Director of Air Traffic Service.

Mr. DEVINE. How long where you with the FAA?

Mr. BURTON. Oh, about 22 years all together, and then my military service on top of that.

Mr. DEVINE. Do all the FAA personnel end up in unions?

Mr. BURTON. Pardon?

Mr. DEVINE. Do all former FAA personnel end up in unions?

Mr. BURTON. I represent a professional association, sir, not a union.

Mr. DEVINE. Thank you.

Mr. FRIEDEL. Mr. Pickle?

Mr. PICKLE. I have not had a chance to read the testimony. I will do so.

Mr. KUYKENDALL. Mr. Burton, you mentioned the term "bodies" and I think that is of great concern to all of us, about where these bodies will come from.

About what educational level can handle this job with proper training at any time, high school graduates or would it require college?

Mr. BURTON. That question arose during a transportation workshop that I attended recently headed up by General Shriver and it was the consensus there that if they shot for, say, the college graduate, we would probably lose more people than we could retain. So you need the sharp high school graduate, 2 years of college, but not necessarily all college graduates. You need somebody that is real sharp and fast.

Mr. PICKLE. What age would you like to have?

Mr. BURTON. As young as possible.

Mr. PICKLE. You are talking about maybe 20 years old.

Mr. BURTON. Twenty, 22 years old; right.

Mr. PICKLE. Now what are you doing to try to retrieve the young draftees and enlistees after a hitch in the Air Force that have had this experience?

Specifically, what are you doing to try to get these folks the day they walk out, or maybe 60 days before they get out?

Mr. BURTON. What we have done as an association is ask our members to contact their friends and their friends' children and so on, who are in that age bracket, to urge them to make a career in the air traffic service. If I did not make myself clear, Mr. Pickle, I am sorry.

Mr. PICKLE. I am talking about the young fellow that is sitting in a tower down at Orlando, let's say, who is 23 years old and is going to get out in 90 days. He has had a couple years of good experience.

Now, are we—when I say "we," I am talking about this as our joint problem—are we doing anything specifically to contact that man ahead of time? Industry does, you know that, and in fact they try to pirate him, frankly, and I don't blame them.

Are we doing anything specifically to get that fellow to come with us or me directly upon his separation from the Air Force?

Mr. BURTON. I don't think there is any organized effort, sir.

Mr. PICKLE. Do you think there should be.

Mr. BURTON. I think there should be.

Mr. PICKLE. All right. You mentioned the retired person. I would suggest probably that there are a great many more of these young

fellows that are getting out after one hitch available than there are the retired people and that the person that is retired has a partial income at least, and he might not be quite as eager as this young fellow.

Now, would you suggest a formal school for these people in strategic locations throughout the country?

Mr. BURTON. We have supported an air academy, I don't remember the Congressman's name who is sponsoring this, but we are a strong supporter of the FAA Academy at Oklahoma City, and we think that should be expanded and used to a greater extent than it is.

Mr. PICKLE. All right.

Mr. BURTON. We think colleges and universities should sponsor courses which would lend itself to bringing people into this kind of business.

Mr. PICKLE. Now one last question and maybe I can say this a little better than you can:

I do not know whether there are any airline executives here. Why don't we encourage the airlines themselves to maybe run some institutional-type advertising in the flying magazines or possibly in other type magazines, more or less glamorize this job?

You have seen one of the major life insurance companies that runs, "Would you like your son to be an engineer? Would you like your son to be a doctor? Would you like your son to be this?"

See, I am a career salesman, I spend my entire life selling and I continue to sell. It seems to me that we need to glamorize this job some by advertising, by pointing out the tremendous responsibility for the public good that is available to the person that serves here.

I think it was just mentioned by my colleague, Mr. Brown. I wonder if the better people seek out the less pressure control areas than are in the high pressure control areas. My guess is that you have your best people in the high pressure because the right kind of person responds to pressure properly and responds to challenge.

The type we need is one that wants more responsibility, that wants an opportunity to serve, that wants to moonlight if it is necessary to save lives. So I think we ought to build up a challenge, the opportunity to serve through possibly encouraging, even industrial-type advertising by private industries, aircraft companies, and airlines companies to help you with your task.

Mr. BURTON. I would agree with you, Mr. Pickle.

I would like to point out one other thing: The O'Hare tower, the busiest in the world, perhaps, except Saigon, others are now catching up to it, it qualifies for a level 3 on one shift alone and jobs become open at grade 11 at other locations, which is one grade below the controller level at O'Hare, they are bidding out from O'Hare into the lower level activity to get less pressure and so on.

So, if we are going to glamorize it, I think we have to have a degree of compensation that makes it a practical one. Then I think we can progress, there must be some incentive to progress from the lower levels to the next higher levels.

I think there is one further step. If we recognize that their efficiency goes down after age 45, there should be some way we can take care of these people.

We for 10 years now have been working on an early retirement bill. We are now working with Senator Monroney and his staff, however, we are not making much progress.

There is no place for these people to go when they can no longer control traffic, there is no market for their skills.

Mr. KUYKENDALL. Mr. Burton, let me interrupt.

You know, back when I joined the Air Force, an old man of 28 could not even get into the Air Force. Anybody that was 25, could not go to the combat fighter plane. The only reason we did not have any pilots over 25, we didn't have any.

We later found out that the best fighter pilots we had in Korea were 35. Of course now 10 years later some of these guys are still fighting and they are 45 or 50.

Are you possibly overestimating the wearing out of these guys as they pass 45? I hate for guys that are approaching the age you and I are to admit they are too old to do something, sir.

Mr. BURTON. I don't think I am overestimating it. I think the psychological examination that the FAA was conducting turned up about 200. Mr. Hill can probably speak on that a little more accurately than I can.

We are dealing with the safety business. The fighter pilot is out to kill somebody and if he gets himself killed that is just another casualty, but when you have a jetliner with 125, 150 people, it is pretty serious business.

Mr. KUYKENDALL. I find it difficult to understand that a man is perfectly capable of flying at 55, but is not capable of helping direct the tower that is bringing the SST in. I will take your word for it.

A few years ago we thought of useful occupations and found out that that was only because the youth were in it. I hate to think about trying to do something about a business here when you are wearing somebody out when he is 43 years old.

Mr. BURTON. I have one more new bit of information that might throw some light on it.

Recently, Mr. Huntley narrated a program, "The Coming Revolution in Aviation." And he was interviewing a TWA pilot I believe it was and the TWA pilot stated, "I would rather have my job at the controller's salary than the controller's job at my salary."

And he was an overseas pilot making $25,000 and $30,000 per year because pressure on the controller is continuous for an 8-hour period.

Mr. KUYKENDALL. I know a lot of people would not want my job at my salary.

Mr. FRIEDEL. Any other questions?

Mr. Pickle?

Mr. PICKLE. No questions.

Mr. FRIEDEL. I want to thank you, Mr. Burton.

Mr. BURTON. Thank you.

(Mr. Burton's prepared statement follows:)

STATEMENT OF CLIFFORD P. BURTON, EXECUTIVE DIRECTOR, AIR TRAFFIC CONTROL ASSOCIATION

Mr. Chairman and members of the committee, my name is Clifford P. Burton and I hold the position of Executive Director of the Air Traffic Control Association, and I have with me Mr. Jim Hill, General Counsel of the Association. We appreciate very much the opportunity of testifying before this Committee

on the important subject of air safety and would like first to acquaint the Committee with the origin and growth of the Association. It was formed in 1956 and is composed of approximately 5,000 of the FAA's 12,000 air traffic controllers. ATCA is an independent nonprofit professional organization dedicated to advancement in the science of air traffic control. Although composed principally of active air traffic controllers, its membership also includes pilots, private aircraft owners and operators, aviation industry organizations, engineers, and manufacturers. The Association is also a Corporate Member of the International Federation of Air Traffic Control Associations.

Mr. Chairman, we listened with great interest when General McKee and Mr. Thomas, together with members of the National Transportation Safety Board, testified before this Committee on air safety. The questions posed by members of this Committee to these witnesses raise many issues on air safety and, in particular, stressed the possible need for radar and control towers at all locations served by air carrier aircraft. Comments of the Committee indicated to us that if the agency would just come forward and present a case for what it needs, sympathetic consideration would be given to these requirements. However, press reports now indicate that the agency is encountering great difficulty in obtaining funds even to maintain the present system. We understand that the agency's F.Y. 1968 budget request sought no new towers or radar, but nevertheless was cut by the House Appropriations Committee. A discussion of air safety becomes academic in the light of the economy pressures that are being exerted on the agency.

Air safety, in the next decade, cannot be provided merely by maintaining the present air traffic control system. The Committee will undoubtedly hear the same general tenor of statistics repeated by many people. They show that generally, by any standard of measurement, air traffic has more than doubled in the period of less than the 10 years that the FAA has been in existence. They show further that it is expected to more than double again by 1975. Air carriers anticipate a future annual growth rate of approximately 12%, compounded FAA Annual Reports for past years all repeat the same fact, that the number of aircraft handled by air traffic control facilities have increased at a yearly rate of approximately 15%, and were handled at no increase in the size of the controller work force. The controller work force today handles more than twice the number of aircraft annually than it did when the FAA was created in 1958. Today the system is stretched to the limit of its endurance.

The Civil Service Commission Classification Standards for controllers created in 1958 contemplate that the busiest towers and centers are those which will handle more than 100,000 instrument operations annually. Today, there are some that have 500,000, and FAA estimates that by 1975 there will be 12 ARTC centers that will handle one million operations per year, while seven others will hit the 600,000 mark. The pressure and tensions which this increased work volume is causing to controllers has become an increasing concern to FAA. The agency last year subjected all controllers to a psychological evaluation and found 200 to be suffering from tension sufficiently severe to require a full psychiatric examination. Of these, 15 were retired for disability and an additional number were required to obtain treatment. A recent FAA medical report discloses that a controller's proficiency commences to decrease at age 40, and shows that the average controller age will exceed 40 by 1972.

Controllers are not the only ones affected by air traffic growth. Air carriers and their passengers are also affected by it. At one time passengers could expect delays during bad weather. But in recent years probably every member of this Committee has experienced air traffic delays at the Nation's larger airports even in the best of weather. These delays derogate from the one principal advantage of this mode of transportation—speed, and are estimated by the air carriers to cost them $50 million per year in added costs.

But the most important consequence of the increasing saturation of the airspace is not delay or inconvenience, it is the effect upon air safety. The Nation's growing air traffic volume simply cannot continue to be handled with safety with existing airports, existing ATC facilities and equipment, and the existing size of the controller work force.

We suppose that all witnesses before this Committee will agree that the Nation urgently needs more airports. Some persons propose more air carrier airports at larger cities; others propose the segregation of small aircraft to new satellite airports. Whichever is done, new airports are urgently required to reduce the present saturation at larger cities. The Federal Aid to Airport Act authorizes the

FAA to make matching grants to local communities for airport construction and improvement. For many years the Congress appropriated $75 million annually, as this was roughly equivalent to Grant in Aid requests which were received. But as the airport crisis has increased, the volume of requests for aid has increased and has backlogged. For F.Y. 1968 FAA received 778 requests, totaling $339 million. The answer of the House Appropriations Committee to this emergency was to reduce the agency's $75 million request for fiscal 1969 to $65 million.

We pointed out in our editorial in the Journal of Air Traffic Control in January of this year the need for immediate action to acquire additional personnel to meet the rising tide of air traffic within the the next 10 years. The editorial is entitled, "The Folly of Fiscal Brinkmanship," and we should like it quoted in full for the record.

Anyone with more than 10 years in aviation remembers from first hand experience the rag-tag condition of the nation's air traffic control system in the middle fifties. Despite an explosive increase in the number of flights using the system, the Civil Aeronautics Administration lagged a decade behind. With each passing year, aviation's thundering progress further magnified the system's stagnation.

It took the Curtis Committee, RTCA, the Airways Modernization Board, sundry other committees of "experts" and—most of all—several bone-chilling air tragedies to finally convince the lawmakers and the fiscal planners of what every air traffic controller and pilot had known for years—that the system was woefully short of both trained people and modern equipment.

When the dozing Department of Commerce finally woke up to the fact that air traffic demands could not possibly be met with people already on the payroll, they were already five years late! The ranks of experienced air traffic controllers were decimated by the sudden addition of new facilities and services. And, alas, there was no one to fill the gaps because there never had been an intelligent and foresighted plan for recruiting and training replacements.

Well, everyone knew that the government had been caught with its collective pants down. But there was no time for fault finding. While the sharp-penciled fiscal planners fidgeted with their ledgers and scratched their heads in dismay, CAA mounted a frantic recruiting and training program. To say that recruiters occasionally took some liberties with the entrance standards would be a gross understatement. For the prospective controller, a warm body that could see lightning and hear thunder was almost as good as holding three-of-a-kind in stud poker!

It took a lot of time, money and sweat—and not a little luck—to bring the new recruits up to speed while also running the system safely. The controller workforce, growing from 4,111 in 1955 to 12,333 in 1960, was more than tripled in size in five short years. Somehow the system survived and things gradually began to pick up. But, in the meantime, the industry and the traveling public suffered mightily. How much, no one will ever know because fiscal planners never keep those figures.

An ominous note was struck at the recent ATCA National Conventional in Miami where the current phenomenal growth in aviation proved to be the number one topic of discussion. This onrushing tide of aviation activity is, even now, placing tremendous demands on the air traffic control system. Over the next five years, it will make the growth wave which nearly swamped the system in the middle fifties look like a mere ripple.

Since 1960, there have been less than 700 new air traffic control positions added to the system. Yet, in the same period, no less than 94 new ATC facilities have been commissioned. Viewed against the skyrocketing activity in aviation, these figures become almost incredible.

Nevertheless, we find that the government's fiscal planners have again pruned away the possibility of anything but negligible hiring in the coming year. Undoubtedly, they are banking on automation to bail them out of this predicament. If that's the case, they are either ill-informed or someone has led them down the garden path!

It's hard to imagine that those who are knowledgeable in the business of air traffic control would advise the fiscal planners that automation, particularly at the outset, will suddenly enable the current corps of controllers to cope with vast increases in air traffic. Insofar as sheer numbers of flights are concerned, there is scant evidence that automation of ground facilities alone will increase the overall capacity of our air transportation system. Certainly not when the automation of ATC facilities is being accomplished piecemeal, and at a snail's pace. And certainly not so long as our airports continue to be such big bottlenecks.

Even if automation is eventually as successful as the most optimistic engineers rosily predict, it is still more than five years away for most ATC facilities.

Anyone who thinks that future automation will eliminate the current urgent need for more manpower in air traffic control is simply whistling in the dark. The long-range impact automation will have on ATC manpower needs is, at best, an educated guess. But the impact of recruiting and training new controllers now is a precise matter. Even the cost-benefitniks should be able to figure so simple an equation.

We have today a serious manpower shortage in the air traffic control system. This year's false economy may well be reflected in the tragic headlines of tomorrow.

One year ago, on this same page, we closed our editorial with this question: "No doubt the recent accidents will spur things along, but must improvement always come only as the aftermath of tragedy?"

Aviation history is on the bring of repeating itself. While everyone else in aviation is moving ahead vigorously, planning for the future and preparing for the greatest expansion the industry has ever known, the air traffic control system is again on the brink of slipping several years further behind. Shades of the fifties!

It's time to stop this nonsense about personnel freezes and niggardly savings in an agency that is so critical to both the national defense and the safety of the traveling public. If FAA cannot immediately begin to gird the controller ranks with talented and trained young men, the next decade will be another ignominious example of the folly of playing fiscal brinkmanship with air safety.

In our view, there are three major areas requiring immediate attention:

1. The acquisition of at least 2,000 additional air traffic personnel to be placed in training to fill the presently existing gaps and to gird for the coming expansion.

2. Major emphasis must be placed on an airport construction program, which I understand will be reviewed in depth by a Senate subcommittee this week, under the chairmanship of Senator Monroney. The Congress must understand that an expanded airport system will necessarily also entail additional air traffic control facilities, equipment and manpower.

3. An accelerated implementation program on the National Aviation System, now underway by FAA. This program, however, cannot be accelerated unless the Appropriations Committees of the Congress recognize the need for immediate action and provide funds for this purpose.

In summation, Mr. Chairman, we have confidence in the Federal Aviation Administration to get the job done if it is given the support it needs, unhampered by cost effectiveness experts who place economics ahead of all other factors, including increased safety. I should add, Mr. Chairman, that this Association has had many disagreements with the Federal Aviation Administration, and we expect to have many more in the future. At the same time, we recognize the limitations placed on the agency by the Administration, the cost of the Viet Nam war, and other factors which dictate an economy program not compatible with the purpose of this hearing which is, as I understand it, "Increased Safety."

Mr. FRIEDEL. Is anyone here from the Air Line Stewards and Stewardesses Association? Is Donald Madole, Esq., National Press Building, here?

(No response.)

Mr. FRIEDEL. Well, the meeting will stand adjourned, subject to the call of the Chair.

The hearings will be continued at a later date.

(Whereupon, at 11:10 a.m., the subcommittee adjourned, to reconvene subject to the call of the Chair.)

AVIATION SAFETY

TUESDAY, MARCH 26, 1968

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 committee will now come to order.

Today the Subcommittee on Transportation and Aeronautics resumes hearings on aviation safety. This series of hearings commenced in the first session of the 90th Congress.

As Chairman Staggers of the full committee said at the outset, aviation safety is one of the most important matters within the jurisdiction of the Committee on Interstate and Foreign Commerce.

There were several interested parties from the aviation community that we did not have an opportunity to hear in the first session.

It is hoped and expected that we will be able to afford an opportunity to the remaining witnesses today and tomorrow.

Beyond that, we will keep the record open for 5 legislative days in order to receive any further statements on this subject.

The subcommittee fully appreciates the importance of this matter and also the active concern of Government, industry, and private parties with respect to aviation safety.

We shall hear first this morning from our colleague and member of the full committee, the Honorable Donald Brotzman. Please proceed as you wish, Mr. Brotzman.

STATEMENT OF HON. DONALD G. BROTZMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Mr. BROTZMAN. Mr. Chairman, I am pleased to have this opportunity to present a statement on the problems of aviation safety. Certainly the increased use of air carriers by the traveling public and the demands on the airlines for faster and more efficient service have drawn attention to the need to carefully review flight procedures and safety regulations. I am pleased that these hearings are being continued and that they are covering a wide range of problems in the aviation industry.

I know that this subcommittee has heard expert testimony from witnesses on nearly every aspect of aviation safety. My own comments will be limited to two areas which I think the committee should fully investigate.

First, I will address my comment to the problem of airline pilot training. Particularly, careful consideration should be given to the matter of pilot training in and around commercial airports. The tragic crash at New Orleans on March 30, 1967, demonstrated the need for new policies or, at the very least, a review of the present regulations for pilot training programs.

Last April—nearly a year ago—I suggested that several surplus Air Force bases could be converted into airline flight training fields. Existence of such training fields and regulations requiring their use could have averted most of the loss of life in the March 30, 1967, crash.

There is a small but definable possibility that any takeoff or landing will result in an emergency. But when emergency situations are created aboard the aircraft for training purposes, the probability of a mishap on that flight is increased.

It seems to me that the use of surplus airbases in low-density population areas could present every weather and runway condition needed. Such fields would not have to handle 100-percent training flights, but they certainly would minimize the hazard involved with those flights in which takeoff and landing abnormalities are simulated.

I also think it is important to encourage a greater use of ground simulators. United Air Lines maintains an extensive ground simulator training program at Stapleton Airport in Denver. I am personally familiar with the work which United is doing there and I think it is important and necessary to continue this type of training for airline pilots. However, it may always be necessary to provide some inflight training and, with this fact in mind, I called to the attention of the Federal Aviation Administration my suggestion that surplus airbases be converted into training centers.

I received a very favorable reply from the FAA on this suggestion and I am including, as exhibit A, the reply from William F. McKee as a part of this statement. I hope that the committee will give careful consideration to the possibility of working with the FAA in establishing flight training centers at surplus bases, particularly in view of the favorable response I have had on this suggestion from the FAA.

The second area of aviation safety with which I am concerned is the area of private-aircraft operations. It has become evident that the filing of flight plans prior to cross-country flights is a must, if rescue operations are to be effective, and yet pilots are not now required to file them.

In the State of Colorado there have been nearly 150 crashes of private aircraft in the last 25 years. The situation is particularly tragic in Colorado because many of these pilots do not fully realize the problems connected with flying in a mountainous terrain and the constantly changing weather conditions over the mountains.

On March 17, 1968, the Denver Post published an article by Mr. Ed Mack Miller, a flight instructor for United Air Lines Flight Training Center in Denver. Mr. Miller has done an excellent job in outlining the problems faced by the private pilot over Colorado and has made several suggestions on what steps should be taken to provide more adequate training and regulations for private pilots.

I have submitted, as exhibit B, a copy of the article, in the hope that the members of the committee will have an opportunity to review it and consider some of the suggestions it holds out.

EXHIBIT A

DEPARTMENT OF TRANSPORTATION,
FEDERAL AVIATION ADMINISTRATION,
Washington, D.C., May 5, 1967.

Hon. DONALD G. BROTZMAN,
House of Representatives,
Washington, D.C.

DEAR MR. BROTZMAN: Thank you for your letter of April 7, 1967, suggesting means of enhancing safety in airline pilot training.

We support and are working toward both your proposals, namely, (1) accomplishing as much training in simulators as available equipment and the state of the art will permit, and (2) utilizing military surplus and noncongested airports for training.

Examples of where such airports are and will be used follows:

1. Pease Air Force Base, Portsmouth, N.H.
2. Grant County Airport, Moses Lake, Washington (formerly Larsen AFB)
3. James Connally AFB, Waco, Texas.
4. Palmdale Product Flight Test Installation (USAF Plant No. 2), Palmdale, California
5. Peconic River, Calverton, N.Y. (USN facility leased to Grumman Aircraft Co.)
6. Mid Continent International Airport, Kansas City, Mo.
7. Barnes Municipal Airport, Westfield, Mass.
8. Otis AFB, Falmouth, Mass.
9. Caldwell-Wright, Caldwell, N.J.
10. Atlantic City Municipal Airport, Atlantic City, N.J.
11. Dulles International Airport, Chantilly, Va.
12. Walker Air Force Base, Roswell, New Mexico

To stimulate more effort toward these objectives we have met with representatives of the airlines and airline pilot associations and internally the FAA is channeling efforts toward optimum use of not only these airports but other airports with relatively lower populated areas.

We have been working with the Department of Defense and the airlines on the problem of using surplus bases for airline training..

The most successful example is Larsen AFB (now Grant County Airport, Moses Lake, Washington) which is jointly financed by a manufacturer, airlines, FAA and local government. Work is now underway with regard to possible use of Walker AFB, Roswell, New Mexico.

At the present time, much of the training is accomplished at remote airports although the aircraft and crews are based at large city airports. For example, in the Denver area, training flights are dispersed to Colorado Springs, Pueblo, Casper, Cheyenne, and other airports in the area.

In the meantime, we are working with the airlines and pilot groups to provide additional safeguards for the protection of persons on the ground and aircraft crews when performing necessary training maneuvers. As a longer range solution, we are urging maximum use of current simulators and the development of more realistic simulators to reduce air training time.

I think our efforts are very much in line with your suggestions which are appreciated and we will welcome others.

Sincerely,

WILLIAM F. MCKEE, *Administrator.*

EXHIBIT B

[From the Denver Post, March 17, 1968]

HOW WE CAN STOP "MURDER IN THE MOUNTAINS"

(By Ed Mack Miller[1])

Several years ago, a 43-year-old businessman flying a light plane left Tuscon on a January day for Denver. In midafternoon, he called Trinidad radio and reported his position as near Alamosa. A few minutes later he called back and said

[1] Ed Mack Miller is a flight instructor for United Air Lines Flight Training Center in Denver and is part owner of a private flight instruction school, Aero Training Academy, in Denver.

that he was a bit groggy from being at altitude too long and he wasn't quite sure where he was.

With the aid of Flight Service Station (FSS) personnel, he regained his orientation, and said he was going to climb to cross the mountains near Salida.

Trinidad radio advised of heavy cumulus buildups along the entire front range, and advised that flight by Visual Flight Rules (VFR) was doubtful. The pilot told FSS that he had adequate fuel and would turn back to Alamosa if he could not maintain VFR across the range.

He was never seen alive again. Seven months later the wreckage of his plane was found by a hiker in the Sangre de Cristo mountains at an elevation of 12,000 feet.

That tragedy was just one of the nearly 150 aircraft crashes in Colorado in the past 25 years. Most of them have occurred in the mountains. Hardly a week goes by that the Civil Air Patrol is not called out for another search. Witness the local headlines: Two Lost Planes Defy Hunters . . . Five Dead in Wreck of Plane . . . CAP Resumes Search for Illinois Airplane . . . Major Search Begun for Wyoming Plane . . . Lost Plane Found Near Mt. Elbert . . . Air Search Under Way for Iowa Man . . . CAP Searching for Downed Craft . . . Crash Near Aspen Kills Four.

An oversimplified, and yet really quite accurate formulation of the problem (that variously has been called "murder in the mountains" and "suicide in the scenery") places Colorado's imposing array of mountains pitted against low-horsepower aircraft, overloaded with four people and lots of baggage. Add the ingredients of wind and weather, and the odds are on for death before the plane ever takes off.

Experienced mountain pilots are up in arms against the carnage. They say that most of the accidents are needless and that too much money is being spent and too many lives are being endangered in fruitless search missions.

"The government won't let you cross large bodies of water without clearance, briefing and survival equipment," says Warren E. White, former Air Force and airline pilot and currently president of Aero Training Academy, which operates light aircraft out of both Stapleton and Sky Ranch airports. "Why are inexperienced pilots from the flatlands allowed to take off and kill themselves and loved ones—and precipitate massive searches—without any type of control?"

Says Rocky Warren, Colorado's famous bush pilot who has been flying the Rockies in light airplanes for more than 20 years out of his base at Gunnison: "Mountain flying in light airplanes is perfectly safe, if you know the terrain, the weather and your equipment—and know when to stay on the ground." Warren received his training from the late, great Eddie Drapella, who logged more than 22,000 hours "over the rocks" in small planes, and only had one forced landing in that entire time.

Many flight schools offer mountain flying courses; aviation magazines publish articles on the nuances of high terrain flying; and the Public Utilities Commission for several years has offered free a pamphlet put together by Ray Wilson, Colorado's "Mister Aviation," entitled *Do's and Don'ts of Mountain Flying.*

But the transient pilot, hurrying to the ski slopes or en route to a blast in Las Vegas, rarely stops to think that his plane won't perform as it did back East or out West at sea level.

The pattern is tragically classic. He staggers off Stapleton International Airport, wondering why the old bus won't handle like it did off his home field, why it took nearly twice the runway to get airborne.

He remembers that he should have filed a flight plan, but this leg of the flight is so short and the weather does look good, bright and sunny, if a bit windy. Those saucer-shaped "lenticulars" over the front range are the only clouds in the sky, odd shaped, stacked just like hotcakes. Perhaps he has to circle a few times before he tackles the high mountains.

Soon he discovers the plane just won't get over the coulds. So he decides to go underneath, up a canyon. In the canyon, suddenly, the turbulence is fantastic. The plane drops a hundred feet like a free-falling safe, jumps up two hundred. "We're getting our brains knocked out," he says grinning weakly, "but we should be out of it soon." He tries to look confident so the passengers won't be frightened, but the churning air, breaking across the ridges like water over Niagara, is shaking their teeth loose.

The plane isn't climbing too well and the canyon is getting narrow. Fighting the bucking, wind-tossed plane, he tries to turn back. The horn that warns of an impending stall is making its death rattle now. He must tighten up the turn or

hit the canyon wall. There is a sudden stall, and the plane falls straight into the forest below. There is one great tearing crash—and silence.

So often the last call recorded is the brave statement by the pilot: "No sweat. I think I can make it . . ." The men at the FSS stations get that sick feeling in the pits of their stomachs when they hear it. They've heard those words so often.

Senator Peter Dominick of Colorado, himself an experienced pilot, has led a fight in the Senate to improve weather reporting services in the mountains and to require installation of crash locater beacons in private aircraft as a method of finding survivors.

"From 1964 to 1966 in Colorado alone," Senator Dominick said, "349 general aviation accidents resulted in 81 fatalities. Many of these accidents were caused by weather closing in on the pilot. Most often this happens because complete weather information is not available on a current enough basis, or is not available at all . . . Anyone who has flown in the mountains," he adds, "knows how critical weather information can be."

Dominick's proposed changes include new weather reporting stations at Nucla and Walden, and expanding operations at Montrose, Gunnison, Salida, Aspen, Durango and Alamosa. Remarking on the omission of this program from the Weather Bureau's budget for 1968, Senator Dominick said: "The Air Force alone has incurred a cost of $112,208 for each person saved through search and rescue operations, but the Weather Bureau appears unwilling to spend a third of that amount to help prevent these accidents."

On the floor of the Senate, Dominick said he has won support of many pilots throughout the country for the mandatory installation of crash-locator beacons, costing about $200, in private aircraft as a way of saving lives.

"It seems ridiculous to me," he said, "to have the FAA, time after time, state that they are not going to do anything about crash beacons because they have heard some objections from some of the aviation people who do not wish to pay that much money. I certainly must say this makes little sense from the taxpayers' point of view, from the point of view of human suffering, or from the point of view of the country at large, in our effort to try to use updated technology to provide aviation safety at its best."

A leader in the fight to stop the "hail of light planes into the mountains" is Ted Bryant, supervisor of flight operations training for United Air Lines and Republican state representative, who is chairman of the interim Aviation Committee of the House of Representatives. Bryant introduced a resolution which requests the FAA to require filing flight plans on all flights except those which are less than 30 minutes in length or less than 50 miles in distance.

The resolution was approved unanimously by both houses and was sent to the FAA. Bryant has suggested the FAA should consider subsidizing the installation of crash-locator beacons in all present aircraft, with manufacturers being required to install them in new planes. He points out that the Air Force spent $59 million in fiscal 1966 on search and rescue missions, and that this amount could be reduced to a fraction if locators were made mandatory.

Recognizing that these regulations may not be adopted by the FAA, Bryant has asked that they be considered by the legislature's Aviation Committee for possible state action.

Rick McCoy, a Frontier captain and part owner of a flying school, says: "Many schools operate in the Denver area with most of their training planes never flying farther than 20 miles from the traffic pattern. It doesn't make sense to put $200 beacons on them—but I definitely feel they should be on all cross-country airplanes."

McCoy suggests that a certain number of the "beeper" radios be purchased by the state and made available to aircraft embarking on a cross-mountain flight. A small deposit and user's fee would be charged, the deposit being refunded when the unit is turned in "on the other side of the hump."

He says 100 units could be bought by the state and placed at key airports on either side of the mountains. The cost would be infinitestimal compared to the expense of just one search mission.

McCoy also believes that every plane should be equipped with an inexpensive "see-me" kit that would contain rolls of toilet tissue (for stringing through the trees or around the terrain by survivors of a crash), black and orange crepe paper for the same purpose (on snowy areas) and gas-cartridge ballons with radar-reflective foil.

"These aids would make aerial spotting infinitely more simple," he says. "I have been on many search missions, and can testify how difficult it is to see wreckage in the trees or on a snowy plateau."

Added could be cheap mirrors for signal flashing and a batch of Fourth of July sparklers or auto flares. An entire kit of these items—even bought retail, could hardly cost more than a few dollars. At a fraction of the cost of searching for just one downed plane, every flying service in Colorado could be given such kits by the state. Line boys refueling transient planes headed mountainwards would be obliged to give the kits out—along with pamphlets explaining the rules for mountain flying. Like the beepers, the kits could be dropped off on the far side of the mountains at the end of that leg of the flight—or could be purchased at cost by planes continuing over more rough terrain.

Rocky Warren contends that "any competent pilot" should be able to make a successful forced landing in the mountains, particular in the winter. If he does, the next question is survival.

"We always carry a flashing mirror," he says. "It really works if the sun is shinning. We also carry a bright orange 'glo-cloth' which can be seen for miles, and special fire-building materials we know will work, even in a high wind."

I feel that, in an effort to eliminate highland flying tragedies, a system similar to the dispatch system used for years by the airlines ought to be employed.

The airline dispatcher is a man who is an expert in his area of flight and its particular meteorological problems. The captain and the dispatcher both must concur that the particular flight can be operated with absolute safety before it can depart.

If this system were put in effect for general aviation, a number of Port of Entry airports would be designated. Operators at these airports (men who know their area) would be designated as dispatchers (on a fee-per-flight-worked basis) and would have to concur with the pilot heading for the mountains that the flight was safe before it could depart.

He would make sure the pilot had and emergency survival kit, a "see-me" kit and crash beacon aboard, check the weight and balance of the aircraft, the fuel aboard, the density altitude, the winds and weather, and go over the best route with the pilot, making sure he had current maps and approach charts, and was appropriately rated for the condition of flight, had operable radios and de-icing equipment (if needed) and a good knowledge of emergency field and radio frequencies.

There would be established, in Colorado and other mountain states, Mountain Identification Zones (MIZs) similar to defense areas where the pilot can fly only if he has met minimum equipment and flight plan qualifications.

For the pilot trained in mountain flying, a special "mountain rating" (a blue card, perhaps) could be issued that would make him his own clearing authority—not subject to dispatch restrictions.

The right of the state or federal government to require this type of control would be based on reducing the heavy cost to taxpayers for aircraft search and rescue operations. The government does not allow ill-prepared or indiscriminate flights into the Alaskan back country. There is no reason it should continue to allow something intrinsically more dangerous: the flying of small planes *over* large mountains, a practice which has proved more hazardous and more costly of rescue than flight into either the Arctic or over the Atlantic or Pacific.

Some time back I was sitting in the cockpit of a Boeing 727 at Stapleton, ready to call for taxi clearance, when a light plane with six persons aboard came into view, taxiing eractically.

The pilot had a problem: With all the passengers and baggage, the center of gravity was so far aft that the airplane kept tipping back on its tail. When this happened, he was unable to steer the plane (accomplished by turning the nose-wheel). It was apparent that if his airplane had that much of a problem on the ground, it would have more of a problem flying—and that, if he was headed west, his chance of clearing any hills, much less mountains, was poor, weighed down as he was.

However, neither the tower nor any interested spectator had the authority to stop him.

Too often an inexperienced pilot will resent any advice and go on anyway—carrying the people he loves most to an unnecessary fate.

A sensible legislative program will save the government a mint of search and rescue money—and many personal heartbreaks (and headbreaks) will be averted.

A glance at a map locating airplane crashes in Colorado since 1942 will quickly—and dramatically—delineate the problem.

How many more needless "tragedies in the trees" are we going to countenance before we get down to business?

When are we going to decide to use the common-sense system the airlines adopted years ago?

How soon are we going to insist that "I think I can make it" isn't good enough?

Mr. FRIEDEL. Thank you, Mr. Brotzman, for your interesting and informative remarks.

Our next witness this morning will be Mr. Lloyd H. Weatherly, Jr., manager, Catapult and Arresting Gear Division, All-American Engineering Co., Wilmington, Del.

STATEMENT OF LLOYD H. WEATHERLY, JR., MANAGER, CATAPULT AND ARRESTING GEAR, ALL-AMERICAN ENGINEERING CO., WILMINGTON, DEL.; ACCOMPANIED BY MR. MacBRIDE AND MR. BENSON

Mr. WEATHERLY. Mr. Chairman and members of the subcommittee, I am pleased to have the opportunity to testify today and I have brought with me Mr. MacBride on my left and Mr. Benson on my right to assist me.

My testimony is intended to establish the state of the art in the field of emergency arresting gear for use on civil airports, and point out current plans and programs for the installation of this equipment.

First, I wish to establish the need for arresting gear on civil airfields, and in support of this contention let me cite the following incidents:

(*a*) On November 1, 1967, a Pan American 707 skidded off the end of a runway at Logan International—one hurt.

(*b*) On November 2, 1967, a Seaboard World DC–8 rolled off the end of the runway 22L at Kennedy International—none hurt.

(*c*) On November 5, 1967, a Cathay Pacific DC–8 crashed into the harbor on takeoff from Hong Kong and broke in half—one killed.

(*d*) On November 6, 1967, a TWA 707 aborted a takeoff at Cincinnati and rolled off the end of the runway and burned—11 injured; one subsequently died.

(*e*) On December 3, 1967, a Pan Am 707 ran off the runway at London Airport and got stuck in the mud—none hurt.

These overrun accidents occurred during a 6-week period. They are nothing new. On April 15, 1964, the Nation's press reported three overruns in New York in a 12-hour period; two at Kennedy and one at LaGuardia.

It can happen anywhere, anytime; a Vanguard at London in 1965—36 killed; a Convair 240 at Tokyo in 1964—20 killed; a 707 at Orly in Paris in 1962—131 killed.

The cause of these overruns varied: brake failure, asymmetric thrust reversal, water, slush, or ice on the runway, power failure on takeoff and other factors affecting aircraft operations.

Arresting gears are not a panacea to airport safety. Actually, all they do is stop an aircraft when it is unable to do so by itself. They do not eliminate the emergencies but they are able to substantially reduce the effects resulting from these incidents.

The history of arresting gear goes back a good many years with the U.S. Navy being one of the first to use land based arresting gear.

They were followed by the U.S. Air Force and the Royal Canadian Air Force. More recently, nearly all the air forces in the Western World have adopted arresting gear. Military aviation has used a number of engagement systems including a "pop-up" barrier, a hook and cable, and a net.

Arrestment of large transport aircraft also is not new. The application of arresting gear to civil aviation began some 10 or 11 years ago. The Federal Aviation Agency sponsored a feasibility test program in 1958 to evaluate the possibility of arresting multiengine transports.

This program culminated in 1962 in the arrestment of a tailhook equipped Boeing 720. From 1962 to 1967—a 5-year period—there was no progress toward adoption of arresting gear for civil use.

The latest development in the field of civil emergency arresting gear has been a test program sponsored by the French Ministry of Civil Aviation.

This program has been oriented toward evaluation of the feasibility of use of a nylon net to engage a multiengine jet transport. A net, capable of engaging a Boeing 707, has been designed and built, and was tested in the United States in October and November of 1967.

The French Government and the French Ministry of Civil Aviation are continuing their program with the actual engagement of a Caravelle scheduled to take place at Toulouse, France, in the near future. The French are so convinced of the necessity for arresting gear protection that a net system is being installed at Toulouse prior to the flight of the French/British supersonic transport.

The recognition of the requirement for arresting gears for civil airports is not a purely national prerogative as evidenced by the subject appearing on the agenda of the Fifth Air Navigation Conference of the International Civil Aviation Organization, which met in Montreal, Canada, from November 14 to December 15, 1967. During this conference France and the United Kingdom stressed the development of arresting systems and were ready to lead in the establishment of criteria and a "civil operational requirement."

The United States, through participation in a preliminary working group, eliminated the statement of a "civil operational requirement" from the working group report. The United States, while stressing interest in the development of any safety device, including arresting systems, convinced the meeting that, in the absence of a "civil operational requirement," further action beyond advice would be premature.

The state-of-the-art has reached the point where arresting gear, capable of stopping today's large civil transports, is available now. However, there is no program or plan in existence in the United States today to authorize the use of arresting gear on civil airports.

The position of the Federal Aviation Administration, according to an article by Ed Hudson in the New York Times of October 6, 1967, was that the FAA had never taken action to require the use of arresting gear; also, that officials believed that "equivalent safety" could be provided at less cost by other approaches, including grooving runways, to increase breaking effectiveness and developing better thrust reversers for jet engines.

These improvements are certainly in order but they are not going to prevent overruns.

The Air Line Pilots Association has endorsed the use of arresting gear. However, the association, in commenting on the use of emergency arresting gears, is quite positive in stating that their adoption should, in no way, affect runway length criteria, and I wholeheartedly agree.

The advancement in aircraft design, including supersonic transports and air buses, does not point to a decrease in the incidence of overruns, but with higher performance and heavier aircraft we can expect more overruns.

The points to be remembered out of this short presentation are:

1. Overruns are a problem.
2. There are arresting gears in existence today capable of stopping civil air transports.
3. No positive action is being taken, except by the French Government, to place arresting gears on civil airfields.

I predict that within the next 2 years you will see a net arresting gear installed on Orly Airfield in Paris, France.

Mr. FRIEDEL. Thank you, Mr. Weatherly for your very precise statement.

When you speak of the arresting gear system, are you speaking of the system that we see on aircraft carriers?

Mr. WEATHERLY. It is a modification of such a system, yes. It is an energy absorber placed on either side of the runway and an engaging means placed on the runway. The aircraft will engage this engaging means and in further moving down the runway the plane will have its energy absorbed and brought to a safe controlled stop.

Mr. FRIEDEL. You say on page 3 in your statement: "A net capable of engaging a Boeing 707, has been designed and built."

Can you tell us by whom it was built and whether it was tested?

Mr. WEATHERLY. An arresting gear to stop a 707 was designed by American Engineering under contract with the Federal Aviation Agency. It was built first with a hook being put on a FAA 720. That hook was first evaluated at the naval test facility at Lakehurst, N.J. The arresting gear was then installed and tested at our test base in Georgetown, Del., with dead loads and then tested with a Boeing 720. This work was done in 1962. That was the finish of the test program.

To support this, Mr. Chairman, I would like to show you a very short movie clip.

Mr. FRIEDEL. I would like to ask you a few more questions before we see the movie.

How would the arresting gear be operated? Would it be controlled by the pilot in the cockpit and how many different nets would have to be up for the system that you speak of on the runway?

Mr. WEATHERLY. For a net system which is the system currently under test and under consideration, particularly the one by the French Civil Air Ministry can be used in either of two operational modes.

You may either have a rapid erection system which is capable of being erected at the command of the pilot or the tower, or you may have a net at the end of the runway within the allowable minimums erected on the upwind end so that any aircraft landing or taking off will have protection at the upwind end of the runway.

With a net already erected, you then would have no choice to be made by either the pilot or the tower as to when the net would be called for. Both systems are in use by the military. Some have rapid erecting

systems, some have nets erected at the upwind end. When the wind changes, you lower one end and raise the other.

Mr. FRIEDEL. Do you know at what airports the Air Force is using the net?

Mr. WEATHERLY. Our Air Force is not. They are in use by air forces in other than this country. The U.S. Air Force does not use them. The French and German Air Forces are using the net system. The English Royal Air Force and Danish and Norwegian Air Forces, the Swedish and the Swiss Air Forces, the Israeli Air Force, the Australian Air Force, all have some net systems and there are a few others.

Mr. FRIEDEL. At various fields of these different governments?

Mr. WEATHERLY. Yes, sir.

Mr. FRIEDEL. You may proceed with the testimony.

Mr. WEATHERLY. The movie clips are taken from military and civil test films. The film starts with shots of a hook equipment.

(At this time the film referred to was shown.)

Mr. WEATHERLY. Here the F–4 is being arrested in the United States and then the German system.

This is taken in El Centro, Calif. This is the erecting gear at the side of the runway. This particular arresting gear is used by the U.S. Marine Corps.

We are now taking a picture of an F–104. He has just engaged it.

This is a German 104. This film was taken in Germany during the past year.

We will move down on the ground and see a similar arrest on the ground.

Mr. DEVINE. Is that arresting gear causing it to veer from the centerline?

Mr. WEATHERLY. The tail hook is slightly off center so he drifts off center.

This runway arresting gear meets NATO criteria. The runout is about 270 meters. He does get a little drift to the side here.

This is the first Mirage test into a net. This is a dead load simulating the aircraft going into a net at our test plant in Delaware. This was evaluated prior to use by the Swiss Air Force after these tests were successful.

You now see a Mirage aircraft going into the net.

Here is a French Mistier going into the net. This particular operation took place at Istres test base in the southern part of France.

This is FAA's C–131 first evaluation of equipping a commercial transport with a tail hook.

This once and for all established that a civil air transport can withstand the loads imposed by an arresting gear.

The FAA's own Boeing 720 going into a model 3500 arresting gear is shown here.

You see the tail hook picking up the pendant. The runout is 1,650 feet whereas one of these model 3500's is installed now at the naval test facility, FAA test facility at Atlantic City, N.J.

This is a dead load built full scale to simulate the mode and wings of a Boeing 707 going into the net this past November at our test base in Delaware.

The runout on this particular equipment was 1,000 feet after engagement of the net.

Mr. FRIEDEL. How fast was it going?

Mr. WEATHERLY. The maximum speed run in this test was 130 knots.

Mr. DEVINE. Is there any other braking device?

Mr. WEATHERLY. There is a braking device on either side of the runway. There are no brakes on the dead load so we had pretty positive proof of no pilot slipups.

During the testing of the 720 tail hook in the model 3500 arresting gear there was no braking used by the pilot in the tests you say.

Mr. DEVINE. What material was used in the net itself?

Mr. WEATHERLY. The net is a nylon webbing. It is nylon webbing of individual bands of 7,000-pound force.

We have a number of vertical elements so you distribute the load completely over the leading edge of the wing surface.

Mr. DEVINE. Wouldn't the jet engines ingest a portion of the net?

Mr. WEATHERLY. No, sir. We have run these tests on military aircraft and the civil transport dead load and we completely duplicated the engine cells and we have never even had one. The construction is such it pulls off the cell. We put initial tension on the cell.

You can see that the state of the art is such that all of the military services have gone to an arresting system to prevent these overruns.

The U.S. Air Force has estimated now that there are some 250 "saves" a year accredited to the arresting gears now used by the U.S. Air Force. With the U.S. Navy the number of "saves" are appreciably higher.

Mr. WATSON. Mr. Weatherly, I have been impressed with your testimony and I am quite surprised that nothing has been done subsequent to 1962 in the implementation of this arresting equipment for civilian use.

You mentioned earlier that a number of foreign air forces have it. Most of our military bases have some type of arresting equipment—primarily the cable arresting equipment. They do not have the net equipment but they have arresting equipment.

I personally have been on an aircraft when we had to abort a takeoff and we ran off the end of the runway.

You have given us some impressive figures here as to the number of lives that have been lost on these aborted takeoffs. On page 1 under example *c*, you say, "On November 5, 1967, Cathay Pacific DC–8 crashed into the harbor on takeoff from Hong Kong and broke in half—one killed."

Had it left the runway to such a degree that your arresting equipment would not have had any effect anyway?

Mr. MACBRIDE. Mr. Watson, we got photographs from UPI that showed the skid marks, going right off the end of the runway.

Mr. WEATHERLY. The runway goes right to the edge of the water so the aircraft was braking about maximum braking when it went into the water and broke in half.

Mr. WATSON. Thus far, do you mean to tell me that FAA has demonstrated no particular interest in proceeding with this arresting equipment but rather that they are still looking for improvements in reverse thrust and other factors?

Mr. WEATHERLY. A New York Times article of November 13, 1967, states:

> Transportation Secretary Alan S. Boyd persuaded the agency to take another look at the value of arresting gear to prevent aircraft from rolling off the ends of runways.

He also convinced the agency to soften its plan to oppose the use of runway barriers at international airports—a proposal expected to be supported by the British and French at a meeting of the world's major airlines in Montreal next week.

The arresting gear devices come in two basic concepts. One is a nylon net erected at the end of a runway to trap a plane. The other is a hook-and-cable device long in use by the military, particularly on aircraft carriers.

Mr. WATSON. You are in the business of catapulting and arresting equipment. What is the approximate cost of the equipment that you are speaking of here today?

It does impress me from these examples, and from what we see at Air Force bases, that we are not dealing in astronomical cost at all.

Mr. WEATHERLY. No, sir; not at all.

A system which would protect the full range of aircraft you could expect would be in the range of $250,000 for complete installation.

Mr. WATSON. We are not dealing with very much money. I am disturbed that the FAA has apparently not proceeded to look into this further since 1962 when apparently it was proven that the arresting equipment on a Boeing 707—I assume that is a tailhook—cable equipment was effective in arresting that.

Mr. WEATHERLY. They did proceed in one step. They put out a specification, which I have with me now, they put out a draft copy of the specification, invited industry to come in and comment on the specification, went further with a finalized spec and solicited proposals against this specification.

After receiving these, I quote from another New York Times article on Saturday, April 10, 1965, which was roughly 1 year after the solicitation which is headlined "Safety Decision Put Off by FAA."

It starts out:

A year has passed since three airliners skidded off slippery runways at New York airports in one 12-hour period, endangering the lives of 223 passengers and crew.

It also goes on to quote further:

Senator A. S. (Mike) Monroney, Democrat of Oklahoma, who is chairman of the Senate's Aviation Subcommittee, thinks the delay has been long enough.

"The time has come," the Senator says, "to cut the red tape and put this onto the runways that are most frequently used by high-performance aircraft (jets). I think it would be a very practical thing to do and it should have been speeded up."

Mr. WATSON. You are on the House side, in all deference to the other side, and we have a very determined chairman of this subcommittee.

I have only one thing and then I shall yield to the expert. We have a pilot on my left here.

On page 2, in paragraph 4, you state the figures of 131 killed. All of these were in reference to the aborted takeoffs?

Mr. WEATHERLY. Yes, sir.

Mr. WATSON. After studying these particular accidents, do you believe that the arresting equipment would have substantially reduced or eliminated the loss of lives in these accidents?

Mr. WEATHERLY. There is not a single one of those in the presentation this morning which would not have been prevented in my opinion.

The particular one you refer to of the 131 dead, this is the accident which had the people from Atlanta that were in that Boeing 707 that

went right off the end of the runway through quite a bit of real estate before it finally stopped.

Mr. WATSON. I am not looking for any commissions from your company, but I want to see us push forward in this particular field.

Mr. DEVINE. Would any substantial structural changes be necessary in the airframe to engineer in these hooks so that when they are arrested at a reasonably high rate of speed it would not pop all of the rivets and tear up the airframe?

Mr. WEATHERLY. Yes, sir, there is engineering required. I will tell you about the 720 on which we put the tailhook. Part of our contract and program with the FAA was to put a tailhook on that 720. That installation including the weight of the tailhook and the necessary plates hooked to the fuselage weighs 240 pounds which is the weight assigned to one passenger and minimum baggage.

So, there would not need to be an appreciable modification. That included the structural changes, the doubler plate that went on it. It is a matter of distributing the plate over a small contact surface.

Mr. DEVINE. Would this apply to your DC–9, 707, and 880?

Mr. WEATHERLY. It would be much lighter on the 880 and DC–8 and 707 would be in this order of magnitude.

These other smaller aircraft would be lighter and smaller.

Mr. DEVINE. Pretty soon we will be talking about 747's.

Mr. WEATHERLY. It would be a little bit hard but we might be knocking off a passenger and a half or a passenger and three-quarters in weight for this.

Mr. MACBRIDE. May I add something, Mr. Devine?

Mr. Weatherly did not mention 727's and United Airlines has had the structure of the 727's in their fleet strengthened or had the capability, the hard point designed into their models.

Mr. WEATHERLY. For every aircraft delivered to their airlines.

They already have this structure ready to put a tailhook on.

Mr. DEVINE. Do you mean Boeing changes the specs on United's 720's?

Mr. MACBRIDE. Yes, sir. If we are talking about a net arresting gear there are no structure changes. Any aircraft can take the arrestment by net.

Mr. WEATHERLY. Our concern for recommending a net system when you look at this aspect is if we have a net system not only can we take our own transports but then those other transports that will be using our international airports in this country can then be saved from going off the end of the runway because we certainly cannot control whether these aircraft have tailhooks installed or not.

Mr. DEVINE. Is a net type of device practical for a piston engine with propeller?

Mr. WEATHERLY. The U.S. Navy has tested this particular equipment and were asked this by the press at the presentation of our test program last November and Mr. Walter Kaufman of the Naval Air Engineering Center at Philadelphia answered with a very positive "affirmative."

It will catch the propeller system. The result is the propeller cuts some of the vertical straps in the immediate vicinity of the propeller but we don't use those straps to cut the aircraft.

We use the straps outboard of the aircraft which are against the wing surfaces at the time.

Mr. FRIEDEL. What size aircraft are used in the net systems in the foreign air forces?

Mr. WEATHERLY. What size net?

Mr. FRIEDEL. Yes.

Mr. WEATHERLY. For the military system the net is about 20 feet in height and usually extends beyond a runway 180 feet wide and 10 feet on either side of the runway.

In military aircraft at the present time they go up to some 65,000 or 70,000 pounds that I can imagine at the moment for the military nets.

There is already the large net which has already been built and it has been tested by Aerzur of Paris, a French corporation for the French Civil Air Ministry, so the scaling up of a structure certainly would not present any difficulty.

Mr. FRIEDEL. We hear a lot about 747's and I understand they weigh upward of over 700,000 pounds. Would the present nets handle that size aircraft?

Mr. WEATHERLY. It is quite an economical structure. Three elements will handle the 707 and DC-8, which is in the 350,000-pound range. It is only a matter of adding additional elements which are all installed on the same erecting equipment to then give the additional strength. For the energy absorber on either side of the runway it is only a matter of increasing this by doubling the number of energy absorbers or sizes of it.

It is a known art.

Mr. FRIEDEL. I want to thank you, Mr. Weatherly, and the gentlemen with you.

Our next witness will be Mr. W. F. Maready, from Winston-Salem.

STATEMENT OF WILLIAM F. MAREADY, ATTORNEY, WINSTON-SALEM, N.C.

Mr. MAREADY. Mr. Chairman and members of the committee, it is a unique American privilege for a citizen to be invited by his Congress to give his views on the subject matter of proposed legislation. I am sincerely grateful for the opportunity.

I am a practicing attorney who owns and pilots a private airplane and also uses the airlines from time to time. I do not represent any organization or interest. My presence here arises out of my concern as a citizen for safety in aviation both private and commercial.

In spite of the fact that I am from Winston-Salem, I have no connection with Piedmont Airlines.

My comments will deal primarily with the subject of collision avoidance.

Following two very tragic midair collisions last year, much has been said and written on the subject. Much of this has been constructive. A great deal of it has been uninformed, misleading and extreme. There has been a questionable tendency to look for blame and the search has resulted in colored judgments and opposing views which often go to the extreme.

We have seen this reflected in the news media and in the views of those who represent special interests.

Thus, we have seen the users of our skies divided into the two separate camps of commercial aviation and general aviation.

This is a regrettable circumstance and overshadows the fact that we are all striving for what is best for the country. We should approach the problem in that spirit.

It is patently obvious that both commercial aviation, with 2 percent of all aircraft, and general aviation, with 98 percent of all aircraft, make substantial contributions to the commerce and mobility of our Nation.

It is also a fact, albeit unrecognized, that there is no appreciable difference in the fatality rates of private and commercial aircraft on a per-hour basis.

Certainly, both interests must be recognized and the differences reconciled. In doing so, we must act with reason and with the interests of the American people as the ultimate consideration.

With this preface, I would make the following observations:

1. It has been proposed that private and commercial aircraft be segregated at our busiest airports. I would join in the spirit of this proposal but would alter it by proposing segregation based on the relative speeds of aircraft.

It seems to me to be too clear for argument that a jet passenger liner with a cruise speed of 500 or 600 miles per hour has no business in the same traffic pattern with an aircraft with a cruising speed of 150 miles per hour or vice versa. I have no desire to be in either aircraft under such circumstances.

Of course, where such segregation of traffic is effected, ample provision must be made in the terminal area for all categories of aircraft.

Of course, this would meet the objection of the Aircraft Owners and Pilots Association to the effect that private aviation should not be deprived of the use of airports because all such airports are built with tax dollars.

No such segregation is either necessary or desirable at the vast majority of our airports because the volume of traffic at them allows for more spacing between the aircraft.

2. I would urge the Congress to undertake a crash program of installing radar facilities at all airports used by jet traffic, particularly passenger airlines.

Unquestionably, radar is the most effective safety item in aviation today. Without it, the only anticollision method available, both to the jetliner and the Piper Cub—and it has been that way ever since the Piper Cub—is the rule of seeing and being seen—a method limited to the capacities of the human eye.

This is not adequate because we are involved in a situation where the capabilities of the machine far exceed the capabilities of man.

To illustrate, on a headon collision course with a jet aircraft traveling 600 miles per hour, a typical propeller-driven aircraft—and I am referring to my own—will close with it at the rate of 775 miles per hour or 1,137 feet per second.

From 3 miles apart, the closure will take about 14 seconds. If the two pilots are lucky enough to see each other at this distance, the chances are that their eyes will be unable to perceive the relative position and course of each other until they are much closer together.

By that time, the chances are that neither of them will be able to take effective evasive action.

In the case of two jet aircraft meeting each other, the example becomes even more emphatic. It would be futile and meaningless to seek blame for the tragedy which might follow.

It would be much more meaningful to consider that the real reason we have not had more such accidents is because of the tremendous mathematical improbability of two aircraft happening to occupy the same airspace at a given moment under a very big sky.

In so considering, we would have to conclude that such mathematical improbabilities include a vastly remote but nevertheless very definite probability.

Many jet liners are now being routed through airports which have no radar facilities. On a climb to altitude from such an airport the pilot is, to an appreciable extent, flying blind in that he is unable to see aircraft which may be approaching from various vertical and horizontal angles and which may be on a collision course with him.

It is practically impossible for the pilot to see an aircraft overhead and on a cruise course approaching at a high rate of speed from either the side or from the rear.

As the two aircraft converge, their respective fields of vision change rapidly and while each pilot is able to see where he is going, he is unable to see the converging aircraft until an instant before collision.

In considering this, we must remember that the pilot's cone of vision from the cockpit remains constant in relation to the airplane. The trouble is the airplane is moving constantly and at a very high rate of speed.

This difficulty with vision on a climb-out applies not only to the airliner but it applies to my Bonanza and it applies to most other aircraft. Depending on the types of aircraft involved, the rate of closure under these circumstances can be up to around 1,000 miles per hour.

I, therefore, respectfully submit that routing a jet liner into an airport without radar facilities may bear some resemblance to positioning artillery near an airport and then at periodic times during the day and with closed eyes firing the artillery into the air.

This is not an extreme comparison to make. The projectile from a howitzer will close on its target at the rate of approximately 900 miles per hour. Thus, we are talking in terms of closure rates of two airplanes which compare to the closure rates of a howitzer and its target. We are also talking in terms of projectiles; that is, airplanes, meeting each other which cannot see each other without radar facilities.

Considerations like these should place the danger in proper perspective. It seems to me that radar facilities for the use of such sophisticated machinery is not merely desirable—it is absolutely essential.

3. The absence of more balanced use of radar facilities may be accounted for by the fact that man developed the airplane thinking only in terms of its environment being open space.

Our technicians have brought us to the point where electronic equipment can fly, navigate, and land an airplane with very little assistance from the pilot.

While developing such technology, we have failed to think in terms of the fact that the open-space environment is no longer so open.

We have now been alerted to this and we understand that anticollision devices are being developed.

The development of anticollision devices will represent progress but we can easily be misled by the amount of progress which they will represent.

The primary collision danger is at and near airports. At a busy airport, the aircraft are of necessity in close proximity to each other.

Because of such close proximity and the limitations on the man flying the airplane, the value of an anticollision system is, therefore, minimized.

Apart from the specific action which can be taken to reduce collisions, it is my judgment that holders of pilot certificates should be required to renew them periodically.

For reasons which are apparent, this is required in most States in the case of a license to operate an automobile.

A pilot's certificate is now issued for life, subject only to passing a periodic medical examination. The same considerations which made this advisable in the case of an automobile are multiplied many times over in the case of an airplane.

The Federal Aviation Agency recently has proposed that certain areas of the country be designated as high-density traffic areas. All the aircraft entering such areas would be under positive control and the pilot be required to follow instrument flight rules.

I take this to mean that the pilot would have to hold an instrument ticket or instrument rating when entering such an area.

I agree with the philosophy behind the proposal but I disagree with the requirement that the pilot be required to hold the IFR ticket. There are hundreds of pilots—and perhaps I should have said thousands—who hold a private license and who are safety conscious to the point that they do not desire to get an instrument ticket simply because it would permit them to fly legally in adverse weather conditions.

These are pilots who are qualified to get the rating but do not want the problem of temptation when weather conditions make flying much more hazardous.

It does not seem that a requirement that all pilots obtain an instrument rating in order to fly in certain parts of our country would promote the cause of safety.

It has been and honor and pleasure to appear before you today.

Gentlemen, that completes my remarks. As I say, I do not profess to be the expert. These are the views of a layman.

Mr. FRIEDEL. I want to thank you for your very fine statement and the spirit of your testimony.

I do not have any questions.

Mr. DEVINE. I have a couple of questions. I would first like to correct the record.

My colleague from South Carolina indicated I am a pilot. I am not a pilot, although I am in the air a good bit of the time.

I would like to compliment you for presenting your views in this matter as an attorney-pilot.

On page 3 of your statement you say you would urge the installation of radar facilities at all airports used by jet traffic particularly passenger airliners.

Are there a great number of airports that do service jet passenger aircraft that do not have radar at the present time?

Mr. MAREADY. It is my information there are, Mr. Congressman. Asheville, N.C., did not have radar. There are a number of smaller airports being served by feeder lines that do not have radar.

Mr. DEVINE. They do service jet passenger aircraft?

Mr. MAREADY. Yes, sir.

Mr. DEVINE. I would be interested in knowing from the Federal Aviation Agency the number of airports that do service the jet passenger traffic without radar equipment.

Mr. FRIEDEL. I understand in one of our previous hearings it was brought out there are quite a few airports that do not have radar and we are trying to get them to speed up the installation of radar equipment that have commercial jet passenger service.

Mr. DEVINE. Mr. Maready, toward the bottom of page 5 of your statement, you say the primary collision danger is at and near airports. I am reminded of the one at Hendersonville, N.C., and Urbana, Ohio. These were not in the immediate proximity of the airport; is that not correct?

Mr. MAREADY. The accident in Asheville occurred, as I understand it, immediately after the jetliner made its left turn out of the traffic pattern. This was some miles from the airport, however, within what would have been radar range of the airport, and, of course, within just a minute or so from takeoff.

Mr. DEVINE. The only other one I recall offhand in the immediate proximity of the airport was the United-TWA crash over Brooklyn as they were approaching Idlewild but I think mid-air collisions generally occur in noncongested areas, do they not?

Mr. MAREADY. They certainly do and the one over the Grand Canyon was such a situation. However, as I understand the Urbana collision, the airliner was in the let-down stages of its flight.

Mr. DEVINE. Again, thank you for taking the time to appear before our committee. I think your testimony is quite valuable.

Mr. FRIEDEL. Thank you, Mr. Maready.

Our next witness who will be the final witness for today is Mr. William A. Jennings, director of aviation safety, Airline Passengers Association. He comes all the way from Burlingame, Calif.

Mr. Jennings, we welcome you to the committee.

STATEMENT OF WILLIAM A. JENNINGS, DIRECTOR OF AVIATION SAFETY, AIRLINE PASSENGERS ASSOCIATION

Mr. JENNINGS. Thank you, Mr. Chairman.

I shall give a brief background of the Airline Passengers Association.

The Airline Passengers Association—APA—has a membership of approximately 12,000, the majority of which is composed of professionals and business executives.

The beginning of the APA can be traced back to July 1960. It has been the consistent policy of the association to speak up on matters dealing with aviation safety.

GENERAL POLICY

At the outset, it is important that the general policy of the APA be known. The association takes the position that there is no legitimate justification for compromising aviation safety.

Much is heard about the cost of modifying present day aircraft and designing future aircraft so that the degree of safety of their operation will be improved. Particularly this is heard in regard to improving the crashworthiness or survivability characteristics of present day aircraft.

Air carriers, airframe and component manufacturers, and airport operators should not be heard to complain that such improvements will be costly, for it is the passenger who ultimately will bear the economic burden of these beneficial changes, either in the form of tickets or taxes.

The APA believes that every aspect of airline operation should be directed to obtaining the ultimate in safety for the passengers, particularly when the compromise of safety might result in short term economic gain by reason of load factor or other cost of operation.

The stress for maximum utilization of cabin interiors for optimum passenger seating is an example where economic interests must be balanced by the primary responsibility for passenger safety in the event of an evacuation. The Government has recently taken the first of many important steps to insure that evacuation considerations will be implemented by manufacturers and air carriers. Much more remains to be done.

Where safety results in reductions in efficiency and economy, it simply means a relative increase in the cost of operation, the economic burden of which will utilimately be borne by the passenger.

It must be realized that safety is no accident. To assure that the passenger will arrive alive will require the coordinated efforts of Government, industry, and the flying public.

LETHAL THREATS POSED TO PASSENGERS BY TOXIC CABIN MATERIALS

In the past 6 years, 174 passengers have perished in accidents which the Federal Aviation Agency Administration calls "survivable". The APA feels that one of the factors that has contributed to this high death rate in survivable accidents is the fact that most modern airliners can be lethal gas chambers when afire. The aviation industry has been aware for some years that the materials contained in commercial airline cabins release toxic gases upon thermal decomposition.

It has been relatively recent that the exact nature and quantities of these gases has been made known. Hydrogen cyanide, which is used in California and other States in their prison gas chambers, is generated in large quantities by the burning of certain acrylic materials commonly found in rugs, seats and other interior appointments.

Tests run in mid-1966 by the Airline Pilots Association, together with supporting airline organizations, showed concentrations of hydrogen cyanide of at least 50 times the lethal level. The National Bureau of Standards pinpointed some of the substances which contained high hydrogen cyanide concentrations.

The Armed Forces Institute of Pathology, which does studies of victims of air disasters for the National Transportation Safety Board, admitted that hydrogen cyanide was present in the tests run on the bodies of the three astronauts who were the victims of the Apollo disaster at Cape Kennedy. Tests for hydrogen cyanide and other toxic substances have not been routinely run on these victims of aviation disasters.

The Cleveland aircraft fire tests established that the life of a passenger may be endangered by the presence of these toxic fumes even during the 90-second escape period recently established by the Federal Aviation Administration.

In addition to hydrogen cyanide other gases that the passenger in a burning airliner faces are hydrogen chloride, phosgene, carbon monoxide, carbon dioxide, hydrogen fluoride and nitric oxide, which are also released from the materials used in the cabin interior.

This toxic environment can dehabilitate or take the life of a passenger rendering him incapable of following the established evacuation procedures.

The Cleveland fire tests showed that there would be an extended period of time well beyond normal evacuation times during which the temperatures of the cabin environment would not reach incapacitating levels.

On October 24, 1968, new standards are being put into effect by the Federal Aviation Administration concerning the cabin interior materials. These standards only concern flameproof criteria and do not take into consideration the problem of toxic gases. The APA feels that there will be continuing threats to the safety of all aboard commercial aircraft until a requirement is established for nontoxic materials.

The APA is sufficiently concerned about this problem to air travelers that it has undertaken a special investigation at its own expense of the status of *Air Force One*, the aircraft in which the President and other dignitaries regularly fly.

The results of the analysis of the interior materials of *Air Force One* will be released as soon as they are made available, hopefully by the conclusion of these hearings.

We hope to discover whether the red carpet treatment afforded these officials is not a potentially lethal one.

We have taken the liberty of attaching a bibliography to this statement which, we feel, is a good summary of the literature on these problems.

(Bibliography referred to follows:)

BIBLIOGRAPHY COMPILED BY THE AIRLINE PASSENGERS ASSOCIATION

"Post Crash Survival Considerations", Bernard C. Doyle and John J. Carroll, Air Transport and Space Meeting, April, 1964.

"Human Factor of Emergency Evacuation", Stanley R. Mohler, John J. Swearingen, Ernest B. McFadden and J. D. Garner, Air Transport and Space Meeting, April, 1964.

"Discussion of the Post-Crash Fire Problem", Flight Safety Foundation (FSF), December, 1962.

"Structural Design for Fuel Containment Under Survivable Crash Conditions", P. M. Nissley, General Dynamics/Convair, AD 609 615, August, 1964.

"Feasibility Study of Turbine Fuel Gels for Reduction of Crash Fire Hazards—Final Report", Ken Posey, Jr., The Western Company Research Division, February, 1966.

"Synthesis of Aircraft (Crash) Fire Rescue, and Evacuation Technology", H.G.C. Henneberger, Aviation Safety Engineering and Research, July, 1964.

"A Study of the Flammability of Magnesium", Paul Boris, Systems Research and Development Service, FAA, April, 1964.

"Principles for Improving Structural Crash Worthiness for STOL and CTOL Aircraft", William H. Reed, et al, U.S. Army Aviation Materiel Laboratories, June, 1966.

"Design, Development, and Evaluation of a Crash-Resistant Fuel System Installation", W. Buckson, et al, All American Engineering Company, U.S. Department of Commerce, December, 1965.
"Crashworthy Design Principles", D. L. Greer, FAA, September, 1964.
"Flammability and Smoke Characteristics of Aircraft Interior Materials", John F. March, E. B. Nicholas, J. E. Demaree, U.S. Department of Commerce, January, 1964.
"Protective Passenger Smoke Hood" 39 Aerospace Medicine 177, February 1968.
"Joy Ride in the Sky: Safety Takes Back Seat", George B. Parker, Institute of Aerospace Safety and Management, University of Southern California, Trial Magazine, August-September, 1967.
"A Study of Air Transport Passenger Cabin Fires and Materials", John F. Marcy, National Aviation Facilities, Experimental Center, December, 1965 (U.S. Department of Commerce).
"Some Properties of Flameproof Fabrics", Marjorie Sandhozer, National Bureau of Standards, American Dyestuff Reporter, Vol. 48, No. 2, pp. 37–41, 1/26/59.
"Thermal Decomposition Products and Burning Characteristics of Some Synthetic Low-Density Cellular Materials", Bureau of Mines Report No. 4777.
"Evaluation of Interior Materials for the 707 Airplane", Boeing Aircraft Co., Document No. D6–1084, 1957.
"Cabin Fire Incident and Investigation TWA Boeing 707–131, Plane 7739", Trans World Airlines, Inc. Engineering Report No. 1203.
"Flight Fatalities Studied," by William J. Reals and Richard E. Danielson, Journal of The Kansas Medical Society, August 1963, pp. 354–357.

Mr. JENNINGS. The recent "skyjacking" experienced by National and Delta Airlines again emphasizes the need for effective steps to prevent such occurrences and to minimize the risk to passengers when a berserk passenger creates an en route flight emergency.

President Kennedy and former Director of the Federal Aviation Administration, N. E. Halaby, proposed special regulations, some of which were adopted.

The APA feels the following additional steps should be taken to insure greater security of aircraft.

1. A special transponder code should be set up to notify air traffic control facilities that the particular aircraft is undergoing a skyjacking operation. This would not require the use of radio communications but would be a signal receivable by Federal Aviation Administration ground radar facilities.

2. Uniform standards for training and arming of flightcrews should be established. At present, some airlines permit side arms at the pilot's option. Apparently no airlines pay for or provide for training in the use of such side arms.

3. A uniform standard should be adopted for devices allowing the flight crew to observe the passenger compartment through a one-way mirror or peephole. Use of such a device should be mandatorily required before the flight engineer or other crewmember opens the door. Doors should be bulletproofed with openings for a pistol from the cockpit side like an armored car.

At present, some flightcrews do not look before opening when a knock on the door occurs which presumably is a stewardess.

4. Uniform radio code signals or code words should be adopted to notify persons on the ground in contact with the aircraft by radio indicating a skyjacking is occurring.

5. Training should be given to flightcrews using hypothetical skyjacking situations such as a stewardess or passenger hostage.

6. Dehabilitating weapons such as some gases currently used in riot control and other military chemical agents can incapacitate an assail-

ant without the risk of gunfire. Such a device might be installed adjacent to the cockpit door for release rendering a potential cockpit intruder harmless without the risk of gunfire.

The past skyjackings have resulted in injury to flightcrews and in at least one instance possibly resulted in the death of 43 people.

The costs involved in protective or educational programs for installing necessary devices is minimal.

The APA highly urges that this reoccurring problem be given immediate attention.

Mr. FRIEDEL. If a man wants to skyjack a plane and he puts a gun at the stewardess' head and he seizes the pilot, would the pilot let him shoot the stewardess or open the door and let him in?

Mr. JENNINGS. Every situation has to be judged on its own facts. But at the present time we don't know of any training being given flightcrews in such hypothetical situations.

Some criteria of good judgment is needed. It is important that the captain exercise the best judgment possible for the safety of his aircraft.

We think this should be skulled around and discussed with various alternatives.

Our recommendation No. 6 does give a possible answer for the man who has gotten a stewardess or a passenger as a hostage in such a situation.

In the recent Delta Airlines situation, the stewardess was coming up apparently with some coffee or something for the flightcrew, gave a rap on the door and the door was immediately opened. The skyjacker was seated in the first-class cabin up front. He then took this opportunity when she had this tray and she opened the door with her foot and he went right in behind her.

At the present time, even those airlines that have peephole devices aboard their aircraft in discussing it with flightcrews, generally what occurs when the rap comes on the door, the flight engineer is seated at his position which is behind the first officer, he reaches over and opens the door.

It is a rare occurrence when that flight engineer goes up to the peephole to identify. That could be potentially almost any person. We think it should be mandatory that the flightcrew identify the person at the door before opening the door. Large one-way mirrors may be more useful.

The next potential idea for reducing such a risk would be a dehabilitating weapon, one that would not necessarily kill but would at least incapacitate without too much danger the person who is the assailant at the cockpit door. A double-door entry could make an enclosed space for this purpose.

We talked about toxic gases in airplanes that could be a danger. This might be one that would be a solution that would dehabilitate the potential intruder.

The use of gunfire aboard aircraft, of course, presents a potential hazard. We have checked reports of the major airframe manufacturers and a random bullet penetrating the skin of a fuselage of a jet at altitudes where you might worry about rapid loss of pressure apparently will not affect the structure of the aircraft and will not cause any major accident if a gun goes off.

We feel the number of lives taken in the past by this activity, together with the fact that apparently Castro would like to build his own air force out of the airlines that are being operated today by keeping the aircraft that get to Cuba, we think it is a problem that should be given renewed attention.

Mr. FRIEDEL. I want to thank you, Mr. Jennings, for your statement. You have a lot of good suggestions. I should like to stress one thing I heard on the radio this morning where the FAA does not have any regulations but they allow people to take the border patrol school course and have a kit and tear gas and a pistol.

I am wondering, with all of these things, if a gun is at a stewardess' head, what should the pilot do—jeopardize all of the other passengers? The man knows if he is brought back alive he is subject to the death penalty under the act we passed so he would not care if he loses 100 of them. Some planes do have armed men up front.

Mr. JENNINGS. They may have reinstituted that practice, begun in 1961. I think we should train these crews in the various alternatives; give them some situations and perhaps test their judgment because their judgment is going to be involved. Crews deserve to not be totally at the mercy of the hijacker.

Mr. FRIEDEL. This committee went to the FAA installation at Oklahoma City. It is very impressive and I want to assure you that the FAA is trying to find out all it can concerning toxic fumes and heat.

In the report of our committee, page 2, members of the Subcommittee on Transportation and Aeronautics in October 1967 saw a demonstration of an experimental smoke and fire protective hood where the wearer could be subjected to intense flame without injury.

We saw them get into the water and inflate little tanks—people could survive. There are a lot of worthwhile things that are going on in the FAA that the public does not know offhand. I wish everyone could have a chance to get out to the installations at Atlantic City and Oklahoma City.

I am very proud of what the FAA is doing on research in safety.

Mr. PICKLE. Mr. Jennings, I was not here to hear all of your testimony and I am wondering if your testimony covered this question I have.

You say a bullet penetrating the skin of an airplane would not cause any structural damage. What would a bullet do with respect to pressurization within a plane?

Mr. JENNINGS. I would assume it would cause a decompression. The laws of physics would take care of that.

Mr. PICKLE. I don't want to be misunderstood, but say you assume it would cause depressurization. I assume that to be true, but how severe would it be?

Would it instantly collapse the people in the cabin?

Mr. JENNINGS. There have been a number of decompressions in military and civilian aircraft. At the present altitudes most of our general aircraft operate 24,000 to 39,000 feet, the decompression does not result generally in injury.

If there are loose objects and there is a large hole, it will suck things out that way but generally it causes a large bang, then there is a cloud that forms in the cabin, a cloud of moisture condensation.

The breath is then exhaled out of the occupants and they must use other available oxygen. There was one decompression that was kind of interesting on human reactions that one of the major carriers had where they had a decompression of 103 passengers aboard.

When the oxygen masks came down that they always demonstrated when you get aboard the flight, out of the 103 passengers there were only three who understood the instructions or were aware of what to do.

The others were not injured because they made a rapid descent to where other oxygen was available.

Mr. PICKLE. You say then a bullet fired in the air which punctured the skin of the frame would cause no more damage than the normal loss of air pressure?

Mr. JENNINGS. From what I understand, and this question was asked by the Air Line Pilots Association about 1963 of Lockheed and Douglas, and perhaps Boeing as well, and their engineers felt it would not cause——

Mr. PICKLE. What would you expect to happen if a bullet hit a fuel line or a fuel tank or any part of the electrical circuit?

Mr. JENNINGS. We know what happens when a red-hot turbine blade hit a kerosene fuel tank in San Francisco. Captain Hines was the captain who brought the airplane in with about half of one wing gone. They said it couldn't fly but he flew it anyway and he landed it at Travis.

It caused an explosion which blew a portion of the wing off, so perhaps a bullet would do the same thing.

Mr. PICKLE. Do you say if a bullet hit the fuel line it might not blow up the plane?

Mr. JENNINGS. I really couldn't answer your question, Mr. Pickle.

Mr. PICKLE. With respect to skyjacking, I like your idea of putting transponders in the plane.

Mr. JENNINGS. They are in there already.

Mr. PICKLE. This is action that would report what was taking place. How can we prevent the skyjacking?

Do you have a specific recommendation in your testimony as to how that can be done?

Mr. JENNINGS. I don't see where there is any means at all to prevent a berserk passenger from getting on the aircraft.

The only thing is remedial steps you can take once he is on the plane.

Mr. PICKLE. We are reaching the point where this is more than an emergency matter. We have to find some kind of answer to protect both the pilot and the passengers.

If this means penal action, if we could ever get our hands on them, I think that is required. Perhaps we ought to cancel their citizenship, seek out extradition papers if we have relations with a country and if we don't serve notice that if that man ever comes back he will be prosecuted to the fullest extent of the law.

Mr. JENNINGS. I think the pattern has pretty much developed, those people involved in skyjacking are very desperate. They sometimes appear to be under drugs. As Mr. Friedel said, they are under potential death penalty under the present law and I don't think you could draw

and quarter them and cut them into little pieces—you are not going to discourage their getting on an aircraft.

Mr. PICKLE. Thank you, Mr. Chairman.

Mr. FRIEDEL. Mr. Devine?

Mr. DEVINE. Thank you, Mr. Chairman. Mr. Jennings, I might point out to you the members of this subcommittee made a trip last fall to Oklahoma City and witnessed tests on toxic materials from cabins of particular aircraft.

I think literally millions of dollars are being spent in research in this area, not only by the FAA but also by United Airlines and other certificated carriers who are vitally concerned with safety and survivability of passengers.

Getting to your skyjacking recommendations, I think that there might be some resistance relative to suggestion No. 2 and suggestion No. 6 because I doubt very much whether even the Air Line Pilots Association will want a bunch of two-gun jockies up front carrying guns.

They are not charged with the responsibility of guarding the aircraft against pirates and invaders, and we may create more problems than we would solve if we indeed trained pilots who have the primary responsibility for the safety of the aircraft. Particularly the dehabilitating type of weapons that have been used, of course, by police in some types of riot situations. However, they have run into situations where the user has also been the victim and if he would use some type of dehabilitating gas that blows back on the pilot and copilot, someone still has to fly the plane.

I think we will have to weigh thoroughly the possibility of arming the crew of aircraft to prevent skyjacking.

Mr. JENNINGS. I might mention within the state of the art as far as bullet proofing material is concerned, there are presently available and have been for a number of years lightweight armor that could be used for bulkhead or cockpit doors that would prevent any shots being fired from a person on the outside who couldn't perhaps get in but wanted to shoot it out.

That is available now but it is not being used and there is no established requirement for it.

Mr. FRIEDEL. Thank you.

The hearing is now adjourned and we will meet tomorrow morning at 10 a.m.

(Whereupon, at 11:45 a.m., the hearing was adjourned, to reconvene at 10 a.m. Wednesday, March 27, 1968.)

AVIATION SAFETY

WEDNESDAY, MARCH 27, 1968

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 please be in order.

Today the Subcommittee on Transportation and Aeronautics will continue public hearings on aviation safety.

I believe that we have only three or four witnesses scheduled and I expect that we can conclude this series of hearings today.

Our first witness this morning is Mr. F. Lee Bailey, acting executive director, Professional Air Traffic Controllers Organization.

Mr. Bailey, you may proceed.

STATEMENT OF F. LEE BAILEY, ACTING EXECUTIVE DIRECTOR, PROFESSIONAL AIR TRAFFIC CONTROLLERS ORGANIZATION

Mr. BAILEY. Good morning, sir.

The Professional Air Traffic Controllers Organization, on which I should like to give a brief background because it is a new organization, was formed as a result of the feeling of certain controllers in the New York area which has unique problems because of its operation of three major airports within a very small area; that a new organization was needed because the system of air traffic control at least from the controllers view was rapidly falling behind the demand placed upon it and approaching a critical condition.

They requested that I act as general counsel in forming an organization, not just in that area but across the Nation, and to promote their aims.

Since January when the organization held its first meeting in New York, we have visited about 12 of the major facilities across the country.

The membership is now at 4,000 and is growing very rapidly.

The controllers have pretty well reduced their major problems to a state where we can describe them with some degree of accuracy.

The basic problem and I know this has been said in other ways but I think strictly from a controller's point of view is that the job of the air traffic controller has shifted much more rapidly than he has been able to keep pace with that shift.

That is to say, whereas 10 years ago an air traffic controller was more of an adviser who received reports from pilots and then advised other pilots as to the reports he was receiving, he is now a man who accomplishes positive control through electronic aids and is in control of the airplane most of the time.

The pilot must accomplish the landing and spend hours in between those events cruising at an altitude where there is relatively little to do. In that circumstance, he is not under continuing pressure.

I might say, in addition to representing these gentlemen, I will speak with one hat for general aviation, since I own a flight operation, including a school and a charter service, and with one hat for the professional pilots point of view, including the airlines and business jets and larger business planes since I own one of those and I am rated to fly it.

The controller being under continuous pressure as he is often called upon to perform tasks which we think are beyond his capability because of constant overload of the system which promises to go up as rapidly as it has in the past few years in the next few years.

The controller is very often handling more traffic on his scope than he can safely handle, and he is fearful this will not come to general attention except by such events as the Grand Canyon incident and other events which immediately commanded a great deal of attention.

First of all, there is a lack of adequate and competent personnel. Air traffic control work is no longer attractive to young men. This is a special breed of young men, we feel. He is a man whose decisions must be very very rapid, much of the time more rapid than the pilots in the cockpits.

He must not make any mistakes. He must carry a tremendous amount of information in his head because the radar that we have at many of our facilities is not adequate and it is not as good as could be provided.

I notice from earlier hearings that no requests, or substantial requests, for improvement in the radar systems have been made.

There is equipment which can take a tremendous load off the controller. As it is now, he may have to remember the identities, airspeed, general headings, and altitudes of 30 or 40 targets.

I rather doubt that a human being can do this for a long period of time, as controllers are now required to do, without suffering some impairment in efficiency.

There is equipment which can print out this information so he can direct his attention to other matters. It is operating in some areas, as you know. We think it could be installed on a much wider basis and at least those airplanes which are in the professional category could be required to have the equipment which would report in as I have described.

In addition to that, because of the vast shortage of personnel and I think that this is critical and that the agency will probably concur, the controllers are now working mandatory 6-day weeks in some areas, while pilots are limited by law to 100 hours a month.

That being the limit, the agency feels, at which one can maintain top-level efficiency to manage an airplane. Controllers are working three and four times that amount. I rather think that the exigencies of

their job could be demonstrated physiologically and psychologically as great, if not greater than, the exigencies of the cockpit.

In any event, because of that these men are burning out and I shall say by age 40 most of them feel they are becoming too brittle to handle the frontline jobs at the high-density areas because of the pressures day after day. There should be some study made and effective limitation placed upon the number of hours a controller is alllowed to work by law.

I shall report just as an example, just very recently as I flew into St. Louis to pick up some controllers to take them to Florida, I was told a man named Tyson, 32 years old, died of a heart attack.

He had just had a physical and was told he was in excellent health. Statistically, as you may know, heart attacks with people of this age—and I will be sensitive about it since I am not much beyond that—are very uncommon.

The warm bodies that are being herded in to fill the empty spaces in air traffic control, simply because qualified personnel cannot be had, requiring the overtime, are going to put the Nation in serious trouble when they graduate to the frontline and the controllers who are now just barely meeting the stress of the system are either retired or gone for some other reason.

The controllers who formed this organization and who lead it state very frankly that people are now being pushed up through the ranks who do not have the necessary speed or independence of judgment to perform this very delicate task. They are being carried simply because there is no convenient or practical way for controllers to wash one another out.

We think, therefore, a system of checking such as is used on professional pilots is appropriate to the business of air traffic control. That is to say, if one were to bring a frontline controller, a highly qualified man from one facility to another to run periodic checks on the individual controllers operating in their positions and to flunk them if they can't handle it before they demonstrate their incompetence by smashing two airplanes together, that a substantial burden would be taken from those who are now carrying people who cannot carry the responsibility.

The air traffic controller, in our judgment, is a man who should know much more about the business of flying than he now does.

There is a story that is often pushed around that an air traffic controller is by and large a pilot. I do not believe this is so. A few are; many, many are not.

I noticed from reading the report of the testimony of another witness in the Chicago area some controllers said they would not fly because they could see on their radar what the inherent dangers are.

I don't think this is so and I think in the future the Government is going to have to require the air traffic controller to be a person who received formal education in the business of air traffic control at a university and I understand some of these are under study but none are available, that he be at least a private pilot with an instrument rating and more important, that he periodically spend time in the air.

I have suggested that the air traffic controller is many times flying the airplane and I think this can be suitably demonstrated by describing a typical flight.

I make them every day averaging 1,000 miles a day or better, most of the time in the cockpit. From the moment we light the engines we have almost no decisions to make.

We are told in what direction to take off, what headings to follow, at what altitude to fly, and then at a comfortable altitude we are then told to hold that altitude. We depend on these controllers when we are in the soup, so to speak. We are powerless to do anything about where other aircraft are.

A more dangerous position results when there is possible obscuration. When we are under positive control but flying through clear air where other aircraft are not, we have the dual responsibility of carrying the controller's commands absolutely and at the same time being on the lookout for a noncontrolled aircraft which may be in the area and over which he exercises no jurisdiction, indeed, with which he is probably not in contact.

The heart of this system is today, and always will be, in our judgment, the individual at the radar scope.

If there is trouble, the rapidity with which he can provide a solution to a pilot who can do no more than follow his commands because even though he has an emergency he can't tell who he is going to hit if he heads directly toward the runway.

The other day, in coming into La Guardia when the weather was bad and we were in a stack of airliners, five light airplanes were lost over an overcast, four were recovered, one was landed at La Guardia by an air traffic controller who talked him down.

I listened to this entire procedure and the pilot was not instrument-rated. Fortunately, the man at the other end of the microphone could see into that cockpit from his own experience and dictate, moment by moment, just how the controls should be moved to put the airplane on the ground.

The FAA has limited to a large extent—and our quarrel is not basically with the agency but we think this is a bad mistake in approach—the FAA has limited the extent to which a controller may fly.

They may have imposed the following restrictions although there is a program called SF–160 which permits controllers to ride in airliner cockpits in the jump seat where they can observe what is going on inside the cockpit, the redtape involved, and the restrictions imposed usually limiting a controller to one flight per airline per year at his terminal discourages controllers from putting the time in the air.

I have talked with the airlines and many airline pilots and they would be delighted to have controllers aboard any time they would come but they are sharply inhibited from coming.

Mr. FRIEDEL. What regulation is that?

Mr. BAILEY. The Agency has imposed that limitation. In addition, the Agency has imposed, if an off-duty controller wants to fly, he may not fly for hire, give instruction or take charter flights.

Our position is that every moment an air traffic controller spends in the air makes him a better and more valuable controller because, as he gives his order, he can see what is happening, he can appreciate what confronts the pilot when he is asked to reduce to the given air speed which is near the stalling speed.

When the pilot declares an emergency he can cooperate more closely with him in getting that airplane on the ground more safely.

A burnt-out air traffic controller is not a likely prospect for any other kind of job. He is one of the most highly trained and skilled specialists in the narrow field that our society promotes today.

On the other hand, if at age 40 he is no longer suitable to run a high-density scope or the "boards" as they are called in the profession of air traffic control jargon, if he had both flight experience and the appropriate ratings, he would be a most valuable pilot.

As an employer who employs nine pilots and runs various operations, I would be very quick to hire such men more so than some who are ignorant of air traffic.

We think some required education of the pilots about what the front-line of traffic is all about should be mandatory in the ratings.

I will not give a commercial license to anyone who takes an instrument rating although the Agency permits this. We will not give a license to anyone until they have been in the towers and observed the operations.

We think a pilot ought to know what loads he imposes when he comes into a high-density area and asks for a sudden clearance.

We feel he should know what happens in those IFR rooms when he declares a priority and asks to be landed immediately. Just as controllers must spend more time in cockpits, we think the law should require that pilots spend more time in air traffic control.

Whereas there used to be a domination by the pilot in an advisory capacity by the controller, there is in fact a partnership in all controlled aircraft.

We take nothing from any of the pilots. Indeed, I think that that is a highly skilled profession and must continue to be so.

On the other hand, there is no way to move an airplane, at least a big one, in the United States today without a successful partnership between an air traffic controller and a professional pilot at the controls.

Unlike the pilot, the controller has no copilot. If he makes a mistake it probably won't be picked up in time.

Unless the personnel shortage, which is the most critical problem, is alleviated, the controllers have two decisions.

They can either permit the increase in traffic to further overstress the system until collisions began to occur and people are willing to pay great attention or they can exercise their responsibilities to absolutely refuse to take that additional traffic into existing facilities and thus curb the annual increase.

Their feeling is that judgments as to where the limits of safety may be are daily judgments in a rapidly expanding system and it is their responsibility to make those judgments and to live with them, not the responsibility of those higher up or further out in the Agency who are not familiar with any individual scope on any given day.

For that reason, in the exercise of their responsibilities, they take the position that they should and will in areas where the operation is really existing only on the resilience of an able young man who is able to operate overstressed for long periods of time but should not be doing so, but when he finds he is losing some of his targets or that near misses are occurring, he should at that time refuse to take another handoff until his radarscope is in control.

I should like to see exhibited before this committee a videotape with an audiotape of air traffic controllers operating a radarscope or operat-

ing from the tower at something like O'Hare, where an airplane is taking off every 17 seconds and I understand that record was set the other day.

There is what is called the slowdown. These are thought to be demonstrations by the controllers who have long been frustrated about their positions and crying for some kind of help.

However, it is ironic to note that a slowdown is no more than obeyance to the regulations.

If the regulations were to be enforced at Los Angeles, Chicago, and New York today; if the separation supposedly required were to be enforced, the air traffic into each of those areas would be dropped substantially as a matter of physical limitation on any day where a bad day required the controllers to bring every airplane in and out of those airports.

If the controllers' position and status can be improved to the point where young people capable of doing this kind of work are willing to do it, and are willing to go into air traffic control so that the conscription now being conducted is not necessary—and I may say even that is not adequate to fill the ranks—then better equipment must be obtained, a little more realistic approach given by those who are in the business of constructing airports without bothering to find out whether the airport is operable.

As a recent example, various city fathers in New York and New Jersey are having great dissertations on whether they should place an airport in Morristown or Saulberg or elsewhere. They are not mindful of the fact that there is no air left in New York to bring additional planes to that area.

In addition to that, New York cannot stand a further increase in traffic. It is handling all it can handle now without crossing the lines of safety. Unless an airport is activated from the present holocaust north of the Kennedy and La Guardia Airports it is not going to be operable.

The failure to provide a guide slope path at 150 and 190 knots and anything built today can fly at those speeds but most aircraft cannot fly at both. Unless this method is used much concrete, money, and time is being wasted.

An air traffic controller cannot be made overnight. Now they are reaching the front line in something like 4 years.

This is probably the result of need rather than qualification in many areas. We could not provide an adequate number of air traffic controllers if we were given unlimited funds and the willingness of every qualified person in the United States in order to meet the current demand in less than 2 or 3 years, and that would take some optimism.

Therefore, the position of the controllers is largely this: that the system is operating today, and, as you know, it is not in a state of panic and we do get, by and large, airplanes in and out of major terminals.

On the other hand, it is necessary that everybody approaching New York, the Kennedy Airport, must anticipate a 1-hour delay on the average when the weather is bad. The average over a period of a year is 20 minutes at Kennedy. I believe it is the highest in the country and that is average again on good days where all aircraft land on schedule.

This is simply a limitation in the system. The controllers have gone as far as they can without running a substantial risk of collisions in order to even go this far.

Even where the collisions do occur, they are not the fault of controllers; it is because they lack the proper equipment and because they are too busy to afford advice to airplanes that are on the way to their way of making a mistake.

Let me cite an example. Some time ago Eastern Air Lines in a Constellation collided with a TWA—I believe it was a 707 or a 720—over New York or upstate Connecticut.

It appears from the investigation that one of the airplanes was off altitude by 1 ,000 feet.

If the printout information which is available now—whether or not it was then, I do not say—if it had been in operation the controller would have instantly noticed two targets converging which he assumed had altitude separation, both reporting the same altitude, advised one of the pilots or both of them, and that accident would not have occurred.

If he had not been as busy as he was at the moment and had had the time to constantly recheck the pilots, because when he sees two blips converging he has no way of knowing whether there is any separation there from what he can see.

He relies wholly on the pilot. If he had time to recheck that it was on collision course and doublecheck the altitude, that accident would not have occurred.

We do not know how many chalked up to pilot error could be avoided if the air traffic control system was adequate to meet its needs.

If it is adequate it is just barely adequate in some places. It will not be adequate tomorrow. The anticipated sophistication of equipment will not be accommodated by our present facilities.

We have a saying in flying that when it comes to checking out pilots "you are either ahead of an airplane when you fly it or you are behind it."

There is no such thing as being even with the airplane. I think the same thing is true of air traffic control. Unless they are able to stay ahead of what they are doing, to be constantly anticipating every move required of an aircraft or another, then they are behind the system because they can never be even with it.

Controllers now I might say, who are required to work overtime are unenthused about doing so because they are paid less for their overtime than they are paid for their normal working hours.

Many controllers are on tranquilizers because of the stress of the job. Some of them have reported in and have been temporarily relieved of duty until their nerves have been repaired.

Because of shortages, controllers sometimes sit 3, 4, and 6 hours without a break at a position continually handing off and receiving aircraft and maintaining overloaded scopes.

All of this, we think, is destined for some difficulty. There is a duty on the part of these gentlemen before that becomes imminent to bring it to the attention of those who can do something about it.

In my judgment, after evaluating the problem, after talking to the airlines, with general aviation, with probably more controllers than any other human being has visited in the last 3 months, with the FAA,

the Air Transport Association, I believe that the remedy for this situation is not within the Agency.

I believe that the remedy involves a much broader step, in essence, a scrapping of the present system and the creation of a new system insofar as the individual controller is concerned.

We anticipate presenting to the Congress I should say within a time—I have in mind the fact that this very rapidly growing organization is trying to accomplish in 6 months what would ordinarily and properly take 2 years—some kind of legislation to provide for a professional air traffic controller, perhaps analogous to the circumstances of those in the Federal Bureau of Investigation but probably attempting to reject the whole notion of GS ratings which we think inappropriate to this business.

He is as important as a pilot, he must be as highly skilled as a pilot, and in order to attract that type of man he should have something somewhere roughly comparable to what the pilot has and will continue to have.

We are very hopeful that this will receive the attention of the Congress and we do not intend to rest it simply on the fact that the air traffic controllers demand this.

We are hopeful the Members of Congress will visit the facilities.

Congressman Minshall was flying to Ohio and requested radar advice from the controller and the controller said, "No, I am too busy; you can't have an advisory."

He went down to the facility to see why he couldn't have advisories and I am satisfied, because he spoke at one of our meetings, that he, as I am certain many others do, realizes the gravity of these problems and their potential danger.

This in synopsis is pretty much what the professional air traffic controllers have in mind. I have a letter here with me that I sent to General McKee explaining basically what we are doing and why.

I might say the organization does not have the backing or involvement of any other organization, that it is entirely self-supporting, at the moment rests on the initiation dues of its members and will rest on their dues periodically taken.

We hope that by the time our legislation comes up for attention we will represent virtually all of the air traffic controllers in the United States.

We rather think that that is possible. Up until this time they have had no effective voice, at least in their own judgment, to bring these problems to the attention of the Congress in a proper, efficient, and sober way.

We rely wholly on the evidence. We do not think that any reasonable person knowledgeable in the business of aviation can spend any time listening to a radio frequency in any of our high-density areas—and to just tick off the worst of them, Chicago, Los Angeles, and New York—listen to the pace at which these people make decisions, and none can be wrong, and imagine the retention in the minds of an individual that much information when planes are constantly coming in and going out without realizing this is a critical pattern, that without much further delay we should make the effort to secure the use, judgment, and skill of everyone who can be found.

The business of the controller will get tougher as will the business of the pilot, but it is no longer possible just to recruit anybody who may come in off the street, and the present demand for qualifications I consider to be very low according to information promulgated by the FAA.

These people are not going to be able to do the job when the present front line controllers are gone unless someone comes in to replace them; the business of air traffic control could very well wind up and very quickly wind up in a very nasty mess.

I thank you very much.

Mr. FRIEDEL. I want to thank you, Mr. Bailey, and I wish to assure you and everyone here that the chairman of the full committee and the chairman of this subcommittee are very much aware of the matters that you mentioned and we are very much interested in the safety of aviation for the benefit of all.

We know there are areas where we need more controllers and we need more radar facilities. There is a need for a collision-avoidance system.

All of these are being worked on right now and I think the controllers are dedicated men, doing a good job, and I think in the appropriations bill we passed last year we provided for more controllers than we had the year before and we hope to have more.

Mr. STAGGERS. I have no questions. I would like to thank you for your very clear presentation of a problem which we all recognize is going to have to be worked on and I think you have done a real fine job in presenting it.

Mr. BAILEY. May I leave for the committee our letter to General McKee which is a formal presentation to the Agency of what this organization is (See p. 351.)

I must emphasize that this is just about as far from a union effort as you can get and nothing in the letter promotes the organization.

Since we expect to appear again and again before the Agency, not as a union looking for its own advancement but just speaking for controllers generally, whethey they do or do not belong, because they simply have the problems—we simply want the aims of the organization on record in case other suggested aims are brought forward.

Mr. DEVINE. I have no questions, Mr. Chairman, but I want to say that we do not want this subcommittee used for any organizational purposes.

Mr. BAILEY. Absolutely not. I hope my remarks are pertinent to every controller in the United States whether he belongs to any organization or otherwise.

Mr. KUYKENDALL. Your reputation as an attorney if not as an aviation expert has preceded you here, Mr. Bailey.

How large a radarscope would it take to put altitudes on in O'Hare or the New York area?

Mr. BAILEY. The ones I have seen operating at Atlanta in the alphanumeric system I should say are 24 inches in diameter.

Mr. KUYKENDALL. You are not implying they would be large enough for a highly congested area?

Mr. BAILEY. I don't think the question of the size of the scope is necessarily determinative because the areas are broken up into many areas and one scope covers a small area and they overlap.

I know there has been some talk of giant screens on the wall where all aircraft could be viewed and I think this is something worth investigating.

Most controllers feel that would not be a good system.

Mr. KUYKENDALL. In my visits to FAA centers and in standing behind and watching these terribly busy people operate, at the present time it is indicated that the state of the art is not ready for the alpha-numeric scope that we have.

I know in the context of trying to put myself in the shoes of a rated air traffic controller I would probably find it about as difficult as a lot of them would trying to put themselves in my shoes. They have their problems and we have ours.

I want to know if you know about the fact that the Civil Service Commission has just recognized the professional status for 17,000 aviation administration employees.

Mr. BAILEY. I read that in the paper this morning. It confuses me as to how the professional status was recognized. I read it as consisting of an increase in grade.

Mr. KUYKENDALL. It means an increase in pay.

Mr. BAILEY. I don't think it will come close to some having our problem. The job is still unattractive.

Mr. KUYKENDALL. Have you read the testimony before this committee from the two previous organizations who are representing the same group of people?

Mr. BAILEY. In summary form it has been reported to me.

Mr. KUYKENDALL. I would say you have about 99 percent duplication of their testimony. What do you mean when you say in the first person "I" will not give a commercial license?

Mr. BAILEY. As the operator of a flight school——

Mr. KUYKENDALL. I thought FAA gives licenses?

Mr. BAILEY. I understand that, but we cannot send anyone up for a recommendation until our own instructors——

Mr. KUYKENDALL. I thought you knew something I didn't know.

Mr. BAILEY. As a matter of fact, we do give licenses. Our own people—our employees—are authorized by the FAA to issue licenses.

Mr. KUYKENDALL. But the FAA issues the license?

Mr. BAILEY. They have authorized us to issue the license.

Mr. KUYKENDALL. The thing that bothers me here, and about the other two organizations also because the testimony is practically identical, is that you have a great many "shoulds" but you seem to come up with the same old dollar poultice for the cure.

Everybody who comes in appears for every disease known to man and has a dollar poultice. I would like to have some ideas from your organization and others about training, education, and some specifics about how to do a PR job.

For instance, we all know that one of the New York life insurance companies has done a terrific job in putting in national magazines full page advertisements which say as an example "would you like your son to be a doctor?"

This skilled manpower shortage is not only true in your field. We have tremendous areas where there are shortages of highly skilled people. We need not so many "shoulds" but a lot of "hows." This is what we are looking for.

We are concerned with this problem as you are. We sat and listened to the last words of the pilot on the tape in the New Orleans crash. It creates concern in anybody. We have done that here and in Oklahoma City and elsewhere; so please give us "hows" and not so many "shoulds."

Mr. BAILEY. I would be pleased to give you a few "hows." First of all——

Mr. KUYKENDALL. I have been called downstairs to another committee. In the "hows" I am talking about specific proposals.

Mr. BAILEY. You would like me to submit it in writing?

Mr. KUYKENDALL. Yes.

Mr. BAILEY. I would be happy to do so.

Mr. KUYKENDALL. They are the types of things we expect to use and I know you are a brilliant attorney and have great retention but I suspect you would like to study your proposals before you put them in writing.

Mr. BAILEY. I am prepared to give them right now, but I will be pleased to submit them in writing.

Mr. KUYKENDALL. I don't retain as well as you do, and I would like to have them in writing.

Mr. FRIEDEL. Your letter to General McKee will be included in the record.

(Letter referred to follows:)

PROFESSIONAL AIR TRAFFIC CONTROLLERS ORGANIZATION,
Boston, Mass., March 25, 1968.

Gen. WILLIAM F. MCKEE,
Administrator, Department of Transportation, Federal Aviation Administration, Washington, D.C.

DEAR GENERAL MCKEE: This letter results from a conversation held between Mr. D. D. Thomas of your office and myself some weeks ago, wherein he requested that a letter of description and a charter be furnished as soon as possible in order that the Agency might have some concrete evidence of the structure and objectives of this organization. I am in the process of drafting a temporary charter (since a detailed constitution and by-laws must await our first convention in July, 1968), and will forward a copy to you as soon as it is complete. Meanwhile, I ask that you accord us your recognition as an organization based upon the representations set forth herein.

PATCO was formed in January, 1968, at a meeting in New York of controllers in that area. Because of the critical traffic problems in that area, the New York Controllers felt that major steps would have to be taken in the immediate future if air safety was to be maintained in the face of steadily increasing loads. They explained to me that because of conditions that now exist they were operating inferior equipment for excessive periods of time, and that because of the low pay and lack of realistic retirement periods, many of those now being recruited to become controllers were incompetent to discharge the heavy responsibilities involved. As in any other line of work, where the working conditions are unattractive to the caliber of man needed, that caliber does not apply.

I was asked to assist in the formation of this organization, and to act as its general counsel once it had been placed on its feet. It was decided that the tenor of the group would be professional, in every sense of the word, as distinguished from a unionistic approach, and that only active controllers current and proficient in the actual control of aircraft would be eligible for membership.

Since the orginal meeting in New York, we have visited a dozen major facilities across the country. According to our present figures, between 85 percent and 90 percent at each visited facility have joined. We will shortly publish our first Journal, partly to explain to all interested parties what PATCO is and where it intends to go, and partly to communicate with those controllers whom we are unable to reach by direct meeting.

We do not think that the remedy for the numerous grave problems which now exist is to be found within the Agency itself, although we do support the Agency in every way. We intend to ask Congress to enact a new law, which in essence will:

(1) Take Air Traffic Controllers outside the GS rating structure, and place them in a separate group similar to the Federal Bureau of Investigation.

(2) Provide much higher compensation for front-line controllers, and at the some time limit the number of hours which they may work during any one week (as pilots are limited) and permit early retirement.

(3) Increase future qualifications for controller-applicants to include formal education and flight education.

(4) Authorize by law the participation by controllers in flight programs of all kinds, including unlimited familiarization flights with consenting carriers. It is our thesis that the more a controller knows about flight the better controller he will be. In addition, he will then be suited for some useful occupation when he is no longer sufficiently resilient to take the pressures of air traffic control.

I should like to emphasize that this Organization involves only air traffic controllers, and is not backed or financed by any larger group. We have refused offers of outside help, and will continue to do so. It is our view that the controllers of vast changes in the duties and responsibilities of air traffic control during the past few years, and similar changes forecast for the years to come, must be sharply upgraded if they are to have any chance to keep pace with demands confronting them. I hope that we may have the support of the agency in accomplishing our aims.

Agency officials are welcome at our meetings and are invited to make any suggestions they may think appropriate.

Very truly yours,

F. LEE BAILEY,
Acting Executive Director.

Mr. PICKLE. Mr. Bailey, when was your organization formed?

Mr. BAILEY. January 1968.

Mr. PICKLE. Then you have only been in operation a couple of months or more?

Mr. BAILEY. Yes.

Mr. PICKLE. Why did you form this organization when there were two organizations in this field?

Mr. BAILEY. It was the controllers who formed the organization and they approached me and I am simply their general counsel until they can afford an active competent executive director; we are satisfied neither of those organizations could accomplish their objectives for two reasons:

First, one was a militant union type organization operating under the Executive order which they did not feel was appropriate to their professional status and their professional aims and responsibilities.

Another factor was that a professional organization which at one point had quite a large membership but which included in addition to controllers those who are clearly in the business of management and the controllers did not feel that it represented their interests.

Second, because of a failure to support individual controllers in trouble in times past, the organization's strength had dropped and a great deal of hostility had set in in certain areas. They felt rather than working back up to a beginning in an organization in which they lost faith, they felt it was better to start with a new concept.

Mr. PICKLE. Do you say these two organizations have lost faith and have not done their job?

Mr. BAILEY. I would say because of their sharp differences in strengths in different areas and the hostility that exists in a given area that does not have strength it has tended to divide the controllers and

at least prevent them from agreeing on the important things on which they do all agree.

Mr. PICKLE. You are the attorney for the PATCO?

Mr. BAILEY. Yes.

Mr. PICKLE. Your job then is to organize the association and solicit members as such? Is that what you are doing? Are you organizing and soliciting?

Mr. BAILEY. The organization is attempting to have as its membership all of the controllers because it feels that the problems are common to all of them and that the prior approaches have been demonstrably unsuccessful.

Mr. primary function is to guide the organization in attempting to obtain its objectives.

Mr. PICKLE. You are saying that the NAGE and the ATCA have been demonstrably effective?

Mr. BAILEY. Yes; and I think the record bears this out.

Mr. PICKLE. I think the answer is you have a strictly professional group.

Mr. BAILEY. Yes.

Mr. FRIEDEL. I want to thank you very much, Mr. Bailey.

We shall hear next from our colleague, the Honorable William Minshall, of Ohio. Please proceed Mr. Minshall.

STATEMENT OF HON. WILLIAM E. MINSHALL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OHIO

Mr. MINSHALL. Mr. Chairman, I wish to associate myself with the remarks of the distinguished witnesses who have preceded me to urge strengthening of the safety functions of the Federal Aviation Administration, particularly in the area of air traffic control.

As ranking minority member of the Subcommittee on Department of Transportation Appropriations, I took the House floor last October to urge an increase in air safety funds for the Federal Aviation Administration. I am mindful of the millions of air travelers dependent on the alertness, skill, and physiological and fitness of the air controller who quite literaly holds their lives in his hands.

Air traffic growth rates are expected to range between 11.3 percent and 19.7 percent by 1969, according to the Federal Aviation Administration, certainly an indication that comparable increases in skilled personnel are necessary. I concur with the comments of Mr. F. Lee Bailey of the need for a more adequate air traffic control system, and I know that this great subcommittee will continue to give strong emphasis to this facet of the program.

Air traffic activity growth rates are expected to range between 11.3 percent and 19.7 percent in the next year, according to the Federal Aviation Administration. This certainly points to comparable increases in trained personnel and particularly in the area of the air traffic control system.

There is no need to recapitulate the lives which have been lost in air tragedies which might have been saved had proper equipment been available or sufficient air traffic personnel on the job. I hope that this great subcommittee will give its thoughtful attention to the FAA re-

quest in this area, as I assure you the subcommittee on which I serve shall.

For the record, I wish to include articles from the Cincinnati Enquirer and Cincinnati Post, which emphasize the increasing need for air safety funds.

(The articles referred to follow:)

[From the Cincinnati Enquirer, Feb. 5, 1968]

PANELISTS AGREE $5 BILLION NEEDED FOR AIR SAFETY

(By Bob Brumfield, Enquirer Aviation Writer)

The 1968 Air Safety Conference held in Cincinnati Sunday proved that Ohio's congressmen and a blue ribbon panel of aviation experts are vitally interested in flight safety but don't know where to get $5 billion.

It also indicated that airline pilots disagree with general aviation pilots, both disagree with air traffic control, everybody is sore with the Federal Aviation Authority and airport managers are caught in the middle.

Fortunately for the cause of air safety, in airing their differences of opinion on just about every facet of flying, the spokesmen for the various associations and agencies represented at Sunday's meeting pointed up the many problems involved and the various options available for solving them.

And according to Reps. Robert Taft Jr. and Donald D. Clancy (R., Cincinnati), co-sponsors of the conference, that was the idea of having it in the first place—to inform the public and their elected officials.

Since the meeting featured four congressmen—Rep. Donald E. Lukens (R., Hamilton), Rep. William E. Minshall (R., Cleveland) and Representatives Taft and Clancy, it could have developed into a political show. It didn't.

The legislators spoke briefly at the beginning of the conference sticking strictly to aviation and flight safety, then turned the meeting over to Cincinnati attorney Carl B. Rubin, who served as chairman for panels on air traffic control, uniform standards for airport certification, airport construction and moderization, flight crew training and all-weather flying and noise abatement procedures.

Panelists included representatives from the Federal Aviation Administration, Air Line Pilots Association, City of Cincinnati, Greater Cincinnati Airport, Flight Safety Foundation, Aircraft Owners and Pilots Association and Air Traffic Control Association.

The basic needs, as revealed by the panelists, are familiar ones—more people to operate more and better equipment at better airports, all paid for by more money.

Maj. Gen. Joseph D. Caldera, USAF (Ret.), president of Flight Safety Foundation, termed the present air traffic control system, which is under the jurisdiction of the FAA, totally inadequate to handle the present and future needs of aviation.

Byron Hood, chairman of the Ohio Area Chapter, Air Traffic Control Association, and control tower operator at Greater Cincinnati Airport, said the big problem in air traffic control is the small number of trained people available. He said the FAA simply hasn't done much hiring in past years, and that now control towers must operate with "no bench."

Hood also said a computer assistance system for airport control radar is needed, and that the FAA has been very remiss in providing such equipment.

Thomas Basnight, director of regulatory matters for the Air Line Pilots Association, disagreed with Hood, arguing that the need is not for more manpower on the ground, but for utiliation of space-age technology and placing the decision-making function for collision avoidance "in the cockpit" with the pilot.

"Yeah, but we still get blamed for crashes," countered Hood.

Robert Monroe, representing Aircraft Owners and Pilots Association, said a new method for controlling air traffic must be found, but added: "When there is such a good economic justification, why use the safety argument?"

He said more people die from therapeutic accidents in doctors' offices than in airplane accidents.

On the subject of airport modernization and construction, Capt. John McDonald called for certification of airports and airport managers by the FAA. He said that some airports do not even require fire fighting equipment, and stated that many

airport managers are qualified for the job only in that they are the brothers of the wives of mayors.

Byron Dickey, manager of Greater Cincinnati Airport, replied, that he was not the brother of the wife of any mayor, but that he knows that most airports can't modernize properly within the current budget for Congress.

McDonald said air safety does not cost money. "Lack of air safety costs money," he stated.

He cited the cost that one airplane crash imposes on insurance companies and the owners of the aircraft involved, saying that this cost would more than pay for air safety equipment at an airport.

And so the meeting went, through all the various panel topics, always arriving at the same question: Where does the estimated $5 billion needed for air safety during the next 12 years come from?

If the aviation industry is to have adequate airports, satisfactory noise abatement, improved simulators for training, closer scrutinization and certification by the FAA, sophisticated new control equipment, improved instrumentation for aircraft—in short, air safety—who's going to pay for it?

Nobody at the conference volunteered to pick up the check.

[From the Cincinnati Post and Times-Star, Feb. 5, 1968]

Air Safety Is Going To Be Costly

(By Dick Rawe)

Plane crashes at the Greater Cincinnati Airport weren't supposed to be discussed at the Cincinnati Air Safety Conference, but they came up for discussion anyway, if only indirectly.

Experts from all fields of aviation agreed that billions of dollars must be spent in the future in aviation and much of it for air safety. They didn't agree on who should foot the bill.

Financing of larger, better equipped airports, new instrumentation in planes and better trained personnel in aviation came into each of the 45-minute panel discussions held yesterday during the safety conference at the U.S. Postoffice and Courthouse.

During a discussion on "Airport Construction and Modernization," Capt. John McDonald, a United Air Lines pilot who flies out of Detroit, said, "I cannot disagree, safety does cost money. But the lack of taking safety precautions cost more."

He then explained a standard which suggests compaction of soil on paved runway shoulders to a distance one-third the width of the runway. This would mean soil compaction 50 feet wide on either side of a 150-foot wide paved runway.

The cost of "one accident you may have had already because of the lack of this feature would pay for this (compaction) at every airport in the state of Ohio. You spend it in destruction of the airplane, in loss of income from that airplane, in litigation. Why not spend that money for something to prevent accidents?" he said.

He was referring to the Nov. 8 crash in which a TVA Boeing 707 slid off the west end of the east-west runway at the airport. A Delta Airliner was mired in the mud off the same runway. The co-pilot flying the TWA plane has said he heard a thud as he passed the mired plane and aborted the flight which resulted in the crash.

Capt. McDonald is chairman of the Air Line Pilots Assn.'s enforcement procedures study committee and has been active in accident investigations. He said sliding off runways is one of the worst things facing pilots today. "One major carrier had 11 planes go off runways last year," he said.

George Gary, eastern regional director of the Federal Aviation Agency, was asked if the FAA certified airports. He said the FAA did not, that it was left up to local governments.

McDonald said that because it does not certify airports the FAA does not require them to have fire fighting equipment. Noting that the Greater Cincinnati Airport has a fire department, he said, "A lot of airports do not even have a bucket of sand and yet air traffic is authorized into those airports." He said most everyone associated with aviation is certified and airports should be, too.

Carl B. Rubin, Cincinnati attorney who moderated the panel, asked Capt. McDonald whether most fatal crashes occur near airports. McDonald said the largest number of fatalities are near airports. "The most hazardous part of the trip is the takeoff and the landing," he said.

Wallace Power, Cincinnati utilities director, said after years of discussion Cincinnati now has a small amount of money for planning a firehouse at Lunken Airport. "All it takes is money," Power said.

Robert Monroe, who represented the Aircraft Owners and Pilots Assn., said incidents of fires are fewer than 150 per year.

Monroe said his organization is opposed to a use charge to help finance improvements at airports. He said people in general aviation, which excludes the military and major airlines, pay their fair share through purchase of goods and services at airports.

Gary said the total investment in airports today is $5.5 billion, according to FAA records. He said in order to bring airports up to expected FAA standards in the next seven years it would cost another $5 billion. "The question then is, how would this be paid," he said.

He said there are 10,000 civilian airports, of which 7000 are unpaved and unlighted and only 1,200 of the 10,000 have runaways 5,000 feet long or longer. He said 6,300 are privately owned and added, "Unless something is done we are going to lose some fine airports."

The safety conference was sponsored by Reps. Robert Taft Jr. and Donald D. Clancy of Cincinnati, who participated in the first panel, "Public Responsibility," with Rep. Donald E. Lukens (R., Hamilton), and Rep. William E. Minshall (R., Cleveland).

Minshall, who has a private pilot's license, said: "The sky literally used to be the limit, vast and uncluttered." He said we are heading toward a crisis in the air and likened it to highway traffic today if no expressways had been built. Minshall, who is on the House Appropriations Committee, said a move must be made in the future to spend billions on aviation and aviation safety.

During the panel on Air Traffic Control, Byron Hood, chairman of the Ohio Chapter, Air Traffic Control Assn., said the FAA in the past three or four years has been "trying to run the ball team without a bench." He said more air controllers had been hired recently but they need training before they become effective. He also said more equipment is needed.

Capt. Joseph H. Bartling, of the Air Line Pilots Assn., said pilots want an electronic collision avoidance system installed in planes, leaving this phase of air safety up to the pilots. It was explained the electronic system gives pilots on a collision course with another plane positive instructions, such as telling one to turn right, the other left.

Capt. Edward J. Burke, chairman of the Air Line Pilots Assn.'s all-weather flying committee, was asked if all-weather flying was here yet. "Yes," he said. "It's still in the experimental stage the same as it was in Gen. Doolittle's time in 1929."

Burke discussed proposed new lower flying minimums. He said some airports had surface detection equipment (radar) which would show the entire surface of the airport, including a man on a bicycle in a fog. "They've just decommissioned it and now is when we need it," he said, and said.

"We've had cases where people drive out on runways in autos, strangers visiting airports. You ask me to take 150 people down that runway?"

A former FAA official said the decision was based on economic factors.

Burke, asked if huge, complex new planes have put too great a stress on pilots, he said yes. Burke, stressing the need for new safety equipment in planes for landings and takeoffs said, "Less money is spent on instruments than on the entertainment factor on aircraft."

In a discussion on noise abatement, it was suggested airports buy more acreage to remove homes from the vicinity of airports where landing and takeoff noise is greatest.

Byron Dickey, general manager of the Greater Cincinnati Airport said the airport used to talk about a total of 3,000 acres but now is aiming for 8,000 acres by 1970. He said it's a question of whether it is financially feasible.

Mr. FRIEDEL. Our next witness will be Mr. John P. Woods, executive assistant, National Business Aircraft Association.

STATEMENT OF JOHN P. WOODS, EXECUTIVE ASSISTANT, NATIONAL BUSINESS AIRCRAFT ASSOCIATION

Mr. Woods. The NBAA represents business aviation. All of our 750 members are U.S. corporations. Specifically, our membership accomplishes about 80 percent of the corporate flying employing full-time professional pilots, and a much smaller percentage of business flying accomplished by professionally qualified, but less than full-time pilots.

This business aviation industry is inordinately safety conscious—almost to the point of fetish. The vast majority of our command pilots hold airline transport ratings, despite the absence of any legal requirement. The aircraft uniformly carry equipment designed to improve safety that is vastly more comprehensive than imposed by any legal requirement.

By membership demand, NBAA has conducted a safety awards program for many years. Any injury to a person or dmage to an aircraft is disqualifying. A small dent in a wing tip causes a pilot applicant to revert back to zero accident free miles. It is probably the strictest safety award program in existence in aviation.

Yet, in October 1967, NBAA issued safety awards to qualifying pilots working for NBAA member companies whose aggregate was 749,848,100 nautical miles without even the most minor accident.

If the proof of the pudding is in the eating, let me report that NBAA members flew approximately 1 million hours last year. We had one fatal accident.

Let me put it another way. The latest available FAA and CAB figures show that, in 1965, corporate aviation with professional pilots had an accident rate of 1.75 per 100,000 hours flown. The scheduled airline rate was 1.59. Yet our operations are far more varied and often into marginally equipped airports thereby offering higher potential for accidents.

Our results are deliberate. Our cliche may amuse you: "Safety Is No Accident."

From the vantage point of our record, I must report to you that safety is not the primary objective of the national air transportation system. We are alarmed that many highly placed officials have viewed the national air transportation requirement solely in terms of safety. This has happened so repetitively that safety has become a platitude used with such abandon it is obscuring and even replacing the only genuine reason why we have and need an air transportation system.

Throughout recorded history, the sites of civilization have grown and waned because they were or were not conveniently located with respect to the most efficient means of transportation. In the United States in 1968, air transportation carries a vital portion of the lifeblood that keeps our national economy moving.

Air transportation must do its job as safely as it possibly can, but, primarily, the national interest requires that it must do its job. The airline or the NBAA corporation did not replace its DC–3 with a jet because it was safer. The airline passenger did not forsake the Greyhound bus because the airline was safer.

Our record shows our concern for safety and our plea today is only that the platitude be forsaken and that the order of priority be dictated by reality.

Reality dictates that the capacity of the air transportation system be increased. We are all aware of the existing volume of air traffic and of predictions as to the volume that the public requirement will generate in the short-term future.

Yet, no recent Federal proposal offers any hope or promise of significant system capacity increase. Several major Federal programs, such as the semiautomated air traffic control system, offers probable benefit in terms of safety. We would not wish to belittle such programs, but rather to place them in proper perspective.

A series of four consecutive recent Federal actions have all been highly restrictive to the capacity of the system. Briefly, they are:

1. The 250-knot speed limit;
2. The special VFR rule;
3. The mandatory IFR proposal; and
4. The terminal airspace proposal.

Each of these proposals has at least some partial justification on the basis that it would offer a probable improvement in safety. Some, but not all, of this claim of improved safety must rely on the obvious fact that less traffic means greater safety on a direct ratio to the ultimate point where total safety may be equated with zero air traffic.

We would even agree that certain portions of these four consecutive, most recent Federal proposals are necessary. But we would only so agree following our reluctant observation that there has been no Federal proposal that would offer significant capacity increase, nor, despite our aggressive efforts, have we been able to learn of any such planned or impending program.

In a climate where there will be no significant capacity increase, artificial restrictions to fulfillment of the public demand for air transportation are probably inevitable.

This absence of program to increase capacity exists despite specific recommendations from NBAA and from other aviation organizations and interests. Some major portions of these recommendations have been repeated over a 10-year period. Nearly all of the equipment and the technology have been available for a similar period. The problem is that, as the Federal has preempted in the area of air traffic control, further progress by the industry cannot be made without cooperative Federal action.

By this we mean that aircraft operators will not install costly improvement in the airborne display of navigational data unless there are procedures enabling the ATC controller to utilize such airborne capability and precision. Similarly, airports cannot build runways to separate slow and fast traffic unless Federal criteria are developed to show how the runways must be placed before ATC controllers may clear aircraft to them on an independent and nonconflicting basis.

It is our belief that the central theme of the means to increase system capacity can be simply defined if we strip away the maze of supporting technical detail.

In the early days of air traffic control, the pilot had an elementary display of navigational data that would permit him to fly only directly

to or directly from a ground-based navigational facility. As the controller had no navigational display, he relied on position reports from pilots to issue clearances, monitor progress, and resolve potential conflict. This was known as a cooperative system as the factor which held it together was cooperation between the pilot and the controller.

It was readily agreed that the controller could do a better job of issuing clearances, monitoring progress, and resolving potential conflict if he had an independent means of observing the traffic flow and did not have to place complete reliance on position reports.

Ground-based radar did this job beautifully and still does. Automated radar will do it even better.

The problem is that the pilot's display was not improved even though the technology to do so was concurrently developed. As a result, the pilot had to go from point to point, but the controller could take him over an infinite number of routes due to the area navigational capability of radar.

As this area navigational capability of radar enabled an increase in system capacity, it was so used as it is now and as it will continue to be according to Federal plan. One result is that, particularly in the complexities of terminal area routings, the pilot is always slightly lost until the controller vectors him onto a route that his navigational display can identify and enable him to follow. We do not call this a cooperative system. We call it a ground-dominated system.

The ground-based portion of the ATC system is controlled by the Federal Government and operated by Federal employees. That this portion should dominate is the apparent preference of the Federal Government despite the colossal inefficiency of such an arrangement.

There are two reasons why this arrangement is inefficient:

First, to provide navigational guidance by radar vectors, the controller must concentrate intensely on each aircraft and should handle only about four at one time, whereas he can monitor the progress of a large number of aircraft.

Second, radar, a magnificent tool for monitoring traffic flow, is too inaccurate and too unrealiable for precise navigational guidance. A reason for this is that the controller's display miniaturizes miles of airspace into a 36-inch circle so that aircraft a mile apart often appear to touch.

The safe resolution of these inefficiencies is to provide huge blocks of airspace around each aircraft enabling a relatively small number of aircraft to create a crowded sky.

Existing precise airborne navigational displays are so much more accurate than ground-based radar that the same terminal airspace would theoretically accommodate at least twice as many aircraft in greater safety. We will not know the exact number unless the Federal Government permits a broad scale operational evaluation.

Another advantage of the cooperative system is its lower total cost and the fact that most of the cost is placed directly on the user.

Another portion of the total problem is the airport. The cooperative system described previously would free reliever or satellite airports from their existing restrictions which is caused by the fact that the airspace over them is now used and dominated by operations to and from the primary, or major hub airport. At the present time, for

example, it would be imppossible to fit the airspace requirement for independent operation of any new airport anywhere within reasonable distance of New York City.

As long as the existing huge amount of airspace is required for major hub airports it is not realistic to place too much reliance on the relief that may be obtained from the construction of reliever airports. Of utmost importance, therefore, is the improvement of capacity at existing airports. The cheapest, fastest, and most effective way to do this is to create a separate small runway and conduct a totally independent, separate operation of the slower aircraft to it.

Due to the technical difficulty and slowdown caused by mixing fast and slow aircraft, the acceptance rate of each runway would increase. The problem is that the airports will not build these runways unless the Federal Government specifies where to put them so controllers will be authorized to use them. The Federal Government presently has no evaluation underway that would result in such criteria.

We believe that saturated ATC system—a system with inadequate capacity—is a system under pressure. Regardless of slowdown regulations and procedures, regardless of restrictions, the undercapacity system will be under pressure. Regardless of platitudes about safety, the human beings operating the undercapacity system will be under pressure to do the primary job and move the traffic. As the pressure increases, the potential for error increases by geometric progression.

Restrictive regulation is like sweeping dust under the rug. The only way to improve safety is to create a system that will meet the public demand.

Mr. FRIEDEL. Thank you, Mr. Woods.

Mr. PICKLE. Mr. Woods, we have before us the measure that would establish certain standards with respect to air safety management. I notice you don't mention that bill at all. What is your approach to the legislation before us?

Mr. WOODS. Sir, I will have to admit ignorance on this point. I checked into this, as to specific legislation, and I was given information that these hearings were exploratory and not directed to specific legislation.

Mr. PICKLE. I understand this is just a general statement with respect to safety and not with respect to specific legislation.

Mr. WOODS. Possibly it was our misunderstanding that that is what you sought.

Mr. PICKLE. Perhaps that will be a matter that will be presented to us later. I thought you might have some specific recommendation on the bill which is before us with respect to certain standards, with respect to noise abatement and the noise problem but yours is entirely in the area of safety.

Mr. WOODS. Sir, we testified previously due to the kindness of the chairman on H.R. 3400. We are on record with your committee on that subject.

We are in support of H.R. 3400.

Mr. PICKLE. Thank you, Mr. Chairman.

Mr. DEVINE. No questions, Mr. Chairman.

Mr. FRIEDEL. Thank you very much.

Our next witness will be Mr. John B. Galipault, president of Galipault & Associates, Worthington, Ohio.

Mr. DEVINE. Mr. Chairman, Mr. Galipault is known to me. He is a constituent from my district. He has contacted me over the past year on air safety and I am happy that he has an opportunity to present his testimony this morning.

Mr. FRIEDEL. Anyone who is a friend of Congressman Devine is a friend of mine.

STATEMENT OF JOHN B. GALIPAULT, PRESIDENT, GALIPAULT & ASSOCIATES, WORTHINGTON, OHIO

Mr. GALIPAULT. Thank you, Mr. Chairman.

I guess the best characteristic of a last witness is to be able to adapt and meet the change in situation.

I wrote my testimony quite independently of Mr. Bailey last Monday and I showed it to him this morning. He said, "John, it looks like we are thinking the same way."

Therefore, I think I will deviate somewhat from my original presentation and talk a little more off-the-cuff than the other gentleman.

Mr. DEVINE. May I suggest the testimony may be made a part of the record.

Mr. FRIEDEL. Your full statement will be included in the record as if it were read.

(Mr. Galipault's prepared statement follows:)

STATEMENT OF JOHN B. GALIPAULT, PRESIDENT, GALIPAULT & ASSOCIATES, WORTHINGTON, OHIO

I am delighted to have the opportunity to present my views on the problems of aviation safety. Although much of which you will hear in my testimony may be redundant, it does represent a growing feeling within the aviation community that careful, considered planning be undertaken in the "Care and Feeding" of our National Air-Space System.

I am not here today representing any special interest group or carrying any specific bias regarding the status of air transportation safety. I am, rather, presenting some thoughts that might serve as focal points in further evaluations of air safety.

Let us begin by considering what the accident phenomenon is. An accident has been defined in many ways, but there is general agreement that two essential ingredients must be present for an accident to occur; namely, the presence of unsafe conditions and the initiation of unsafe acts. Both unsafe acts and unsafe conditions may be obvious and clear to the investigator or they may be subtle, hidden, interacting covertly and building up to a catastrophe in short or long periods of time. It is rather difficult for the accident researcher or investigator to predict the proper combination and magnitude of factors that produce an accident. The term "Accident Phenomenon" to aviation safety experts is in fact a mysterious, bewitching, and regrettable event that frustrates even the most astute and educated professionals in aviation. Yet, post-accident investigations have, in many cases, revealed aircraft structural failures, design deficiencies, and inadequate operational procedures which are corrected usually at great cost in time, money, and personnel.

My concern today is with the human aspects of aviation safety that may or may not be alluded to, cared about, or even interesting. My comments are directed, in a sense, as criticisms to all members in the aviation community. I freely criticize the Federal Aviation Administration, the aircarriers, general aviation, and the various special interests groups representing each of the above.

Today's air traffic control system is somewhat analogous to Aunt Minnie's corset. The old garment does a fair job of keeping things from busting out as long as Aunt Minnie is not too active. Should Aunt Minnie put on weight or should one of the stays break, a catastrophe could result and injure innocent bystanders. The air traffic control system is bursting at the seams, and there is little prospect of containing the tremendous growth in air traffic. We do not suggest that

airspace should be restricted, we only say it should accommodate all parties in a safe, efficient, and equitable manner.

Until someone can provide valid arguments to the contrary, it is our view that the nation's airspace should be available to all members of the aviation community on a first come first serve basis. For the past five months, considerable dialogue has been presented by two special interest groups in aviation. The Air Transportation Association, on one side, is advocating limited use of airspace by other than larger, revenue producing aircraft, and general aviation groups on the other are opposing this position. Both sides would like to "go to heaven without dying"—each would like absolute freedom in airspace utilization without having to pay a price for it.

I feel we must encourage careful and sensible specification of operating limitations in our airspace. However, we should first be concerned with those changes in procedures and regulations which enhance safety and not the economic gain for any specific interest group. Unfortunately, there is mounting evidence that new regulations and procedures have, and will continue to be, initiated that have economic bases. I will discuss two such rule changes later in my testimony.

Today's air traffic control system is basically a good one for traffic loads of ten years ago. It has evolved over the past thirty years into a reasonably safe and effective system for moving limited numbers of aircraft. However, the nonlinear growth of aviation negates the validity of this system. The time has arrived for *all* of us to become actively concerned with system changes. While the events at Hendersonville, Urbana, Grand Canyon, and New York bring to mind the mutual interference of aircraft, there are other equally critical problems. ATC is like the proverbial iceberg, i.e., there are hundreds of problems below the surface of which the general public is not aware. There are short-term solutions to some of these problems. I would like to direct my attention to the short-term problems, because of the effect they can have on the existing situation and allow for orderly system growth and development.

The controller-pilot air traffic system is much like the pilot-aircraft system in the following manner. The aircraft has known physical and flight operating characteristics. The air traffic system has several known characteristics among a large number of variables. The pilot, with skill and experience, can make his aircraft into a far better vehicle by his expertise. If the aircraft is capable of performing short-field take off and landings, the pilot usually can exceed the published performance capabilities through expert flying. In the same manner, the air traffic controller is able to do a better job of controlling air traffic, with existing radar and other hardware devices, than the original requirements set forth by the system designers. This is true only if the controller has some freedom in operational decision-making. Given a good working environment, adequate visual aids and communication channels, the controller can greatly improve upon the existing system. However, in today's ATC system, the controller is greatly constrained, inhibited, and demoralized because of inappropriate, restrictive procedures and policies and conditions of overwork without prospects of tangible rewards.

At this point, I would like to separate the problems of air traffic control into two categories and talk briefly about each. They are system oriented problems and the human oriented problems. These problems are not independent of each other; they interact vigorously, and do, in general, have a debilitating effect on ATC.

The key system oriented problem stems from traffic density. A salient characteristic of ATC which promotes congestion is the necessary convergence and divergence of aircraft on single points. This is true in the enroute airway navigation structure and, of course, in airport terminal areas. Because of this point, convergence characteristic, controllers have only a few techniques for maintaining proper aircraft separation. These include altitude, airspeed, and heading differences. Unfortunately, the controller can only manipulate aircraft that communicate with him and follow his commands. He does have aids in providing aircraft separation such as radar, instrument landing systems, and voice communications.

By and large, the limitations placed on the controller are those of communication, numbers of aircraft being handled, and knowledge of the aircraft's positions in space.

From a system operation viewpoint, the simplest controlling task is in real instrument flying weather. During IFR (Instrument Flight Rules) operations, the controller is able to effectively move aircraft to and from airports and on

airways because the rules and operating procedures are explicit and pilots and aircraft are generally qualified for IFR. The next in order of simplicity is the strictly VFR (Visual Flight Rules) situation where all aircraft are operating by the "see and be seen" rules. The third and most difficult controlling situation is where some aircraft are operating under visual flight rules and others under instrument flight rules. This is compounded by the aircraft having a wide range of performance characteristics, i.e., minimum and maximum flying speeds, approach speeds, turning radii, rates of climb, and maximum cruising altitudes. Throw in a mixture of pilot skills and capabilities, and we find the controller in a situation that is almost untenable.

The controller lacks the added tools to preserve system integrity at all times. He desperately needs better means for speed control, bright display radar scopes in busy towers, non-jammable radio systems, altitude information, and many others. He needs more concrete for landing and departing aircraft. He needs better, more timely, and accurate weather and flight information. The controller needs the sympathetic understanding of the pilot, the FAA, Mr. John Q. Public, and his Congress. *Most people do not understand his problems.*

The present ATC system is predicated upon implicit cooperation and trust between pilot and controller. The pilot remains the tactician and the controller the pathfinder. Unfortunately, a vast majority of pilots lack appreciation and understanding of the problems and limitations of ATC. I see a crying need for greatly increased pilot education, better dissemination of information pertinent to use of the airway system, better and more comprehensive pilot training programs in which standards of performance are significantly above the minimum standards established in the Federal Air Regulations. Above all there must be a better rapport between the pilot and controller.

In my opinion, the FAA has done a rather inadequate job of familiarizing pilots with ATC problems. Current pilot training programs do not stress understanding of ATC. The majority of controllers have no time to extend effort in sharing their problems, their limitations, or their expertise with pilots. In some respects, I blame the controllers for this immobility. Yet, I can see why they are not acting as true professionals. They are overworked, underpaid, and, thus, demoralized. This brings us to the second point—human oriented problems—which greatly constrains ATC.

Staffing levels at terminal facilities, in particular, are based upon the amount of IFR traffic generated. Likewise, the salary structure is based upon the amount of IFR traffic. There are numerous airports in the United States that have approximately three times as many VFR operations as instrument operations. For example, Columbus, Ohio, had, during CY 1967, slightly more than 300,000 VFR operations and 121,000 instrument operations. The personnel at Port Columbus International Airport are professional in every sense of the word, but severely overworked. There has been some effort to provide more qualified controller personnel, but the magnitude of the increase is small and does not have a very desirable effect on system operation. Surely the basis for staffing strengths are unrealistic.

Controllers need professional standing within the aviation community to include recognition as a professional body, favorable promotion and salary schedules, and earlier retirement benefits. The Federal Aviation Administration has, in general, failed to adequately meet the needs of controllers and elimination of their pressing problems. The controllers need better lines of communications for making recommendations for updating regulations, procedures, and specific controlling techniques. They are better qualified, more knowledgeable as a group, and in touch with reality than most of the rule makers in Washington.

An example of this failure of the line of communications is the recent elimination of special VFR operations at 33 hub airports under Part 93.113 of the FAR's. This new regulation was instituted without proper public hearing and without consideration of the overwhelming support for continuance of the existing VFR. The FAA last summer distributed questionnaires to all major terminal control groups concerning their interpretations of the problems of special VFR. I know of two major hub airports where 80 percent of the controllers were in favor of continuing special VFR. The majority of controllers feel that, when properly supervised, special VFR is many times less dangerous than flying in basic VFR conditions in airport control zones. There was vigorous opposition to the present regulation voiced by the Aircraft Owners and Pilots Association, National Business Aircraft Association, National Aviation Trades Association, the National Air-Taxi Conference, and numerous individual air carrier pilots. They were not allowed to speak out.

For those who are familiar with the objectives of certain special interest groups in Washington, it appears that the regulation was modified to improve the economic position of the air carriers.

It is my sincere hope that the testimony you have heard in the past seven months on aviation safety has revealed at least some of the basic problems. We need money to do the job of evolving a sound ATC system. More important, we need to *understand* the *real* germane questions. These questions can only be answered by those people intimately familiar with the system.

We must guard against the inaction or bureaucratic inertia. We must move not like C. P. Snow's analogy of the mating of elephants where: ". . . things are conceived at a very high level; there is lots of smoke and dust; and nothing creative comes out for a very long time. . . ."

Thank you.

Mr. GALIPAULT. I am not here representing any particular interest group. I am here acting as a pilot, speaking as a pilot, and as a researcher who has looked at many problems in aviation safety and who has done research germane to the things that we are talking about. I would like to allude to some of these problems that exist today and let them be focal points for you to consider in your evaluation of aviation safety.

I might start by talking just a little bit about the accident phenomenon. Accidents have been defined in many ways by many different people. But there are two things which must be present for an accident to occur. There must be an unsafe situation and someone has to commit an unsafe act.

The accident researcher and the accident investigator usually do not have real understanding of the magnitude of the unsafe conditions or the magnitude of the unsafe acts. Accident investigators can only look at the results of accidents. They can see some preliminary information such as flight data recordings, voice recordings, and other pertinent information. But when it comes down to the final analysis, it is extremely difficult to reconstruct the unsafe conditions and the unsafe acts that have occurred to produce a catastrophe.

We have numerous unsafe conditions in our airspace today, gentlemen—we have many.

Two weeks ago I was flying over a radio navigation facility at an assigned instrument altitude and I reported a near miss. The controller working my flight plan asked me how close the aircraft was. I think I satisfied him pretty adequately. I said, "I heard him go by." This is an unsafe situation.

A salient characteristic of our air traffic system is the converging of aircraft on discrete points. You talk to the British and they are petrified to fly in our airspace because of the way we manage to congregate all at one single point. This is an example of an unsafe condition. We live with this unsafe condition; we accept it, because we feel that the odds of our meeting another aircraft in the air are pretty low, and yet there are many, many near misses each day.

It is not good and we all know it.

Unsafe acts are committed all the time. I can cite many and the record books reveal many more. I think we, as pilots, have a reputation much like fishermen. We tend to exaggerate sometimes the things that occur in the air but we all know we make mistakes—we are human.

It is the proper combination of these two situations that produce accidents. Until we take a very serious look at aviation safety we are

not going to reduce these numbers to an acceptable level with the ever-increasing growth in aviation.

I go back to Mr. Bailey's testimony and that of Mr. Woods. Unfortunately, I was not here yesterday to hear other testimony, but these gentlemen seem to understand the problem. As a researcher one of the very basic things I have to do is to state the proper research question or my investigation will be irrelevant. This implies that I understand the problem. The routine of solving or answering the research question is pretty straightforward but we must understand the problem.

This is what I am trying to point out today. I implore you gentlemen to seriously—and I know you are serious about it—look at all aspects of this safety problem.

I had an opportunity last fall to escort one of your committee members, Mr. Clarence Brown, to the Columbus, Ohio, approach control facility unannounced. Mr. Brown came away from that 1-hour visit with a much more clear understanding of what the problems are in air traffic control.

He was amazed that you could have two aircraft on final approach in an instrument landing system and have them land safely despite the fact that the radar went out of service three times in 6 minutes. He was quite astonished because he was not aware that there are other alternatives available in the controlling of aircraft. You do not have to have radar in order to control aircraft.

We had an unsafe situation there—namely, no radar. The unsafe situation was not followed by an unsafe act on the part of the controller. He acted coolly, calmly, he knew what to do, he was well educated, and thus he kept that from being a catastrope.

I am particularly concerned with the human aspects of aviation safety. I don't pretend to know much about hardware.

I think, the human problems are probably the greatest ones we have to face in aviation safety. I think today's air traffic control system is very much like Aunt Minnie's corset—the old garment does a fair job in keeping things from busting out all over the place as long as she does not become too active or put on too much weight.

If she does become too active, the stays could break and a bystander could be injured. I think the air traffic control system today is bursting at the seams and there is little prospect of containing this tremendous growth in air traffic.

I don't say that we should restrict airspace to any one particular group. I think it should be made available on a first-come, first-served basis to everyone but it has to be allocated in a safe, efficient, equitable manner. This leads me to the dialog going on for several months between two special groups in Washington. This is a verbal battle between the Air Transport Association and the special interest groups in general aviation, including National Aviation Trades Association, AOPA, National Business Aircraft Association, and others.

Each party is protecting, or attempting to protect, its rights to the airspace. I have no quarrel with this desire to protect the rights. I am a user of the airspace. I can understand the problems of a large revenue carrier. They have to make money. They have very good revenues at the present time but are in a profit squeeze, and I can see

why they would like to have unrestricted use of the airspace with no delays.

But, by the same token I am a user of the airspace myself and I like to have no delays. But, I guess it boils down to this: Both parties want to go to heaven without dying and we just cannot do this.

We all have to trade something off in order to use this airspace. Until we reach an impasse and start cooperating and understanding each other's problems, we are going to have much conflict and further deterioration of safety.

I think we have to be careful in the specification of the operation limitations of our airspace. We should be concerned with first those procedures, those rules, those changes in the rules that are directed to safety and not economic gain by some special interest group.

There is mounting evidence that there are numerous regulations on the books which have economic bases on behalf of the air carriers.

I will cite you an example.

There is a modification of part 93.113 of the FAR's, which will terminate special VFR privileges at 33 "hub" airports in the United States. Questionnaires, I am told, were forwarded to all terminal facilities of the FAA seeking opinions from the controllers, supervisors, and management personnel about the value of special VFR. There was a docket announcement in October of last year concerning this proposed rule change.

As a result, a tremendous inflow of mail was made to NBAA, NATA, and AOPA concerning the modification of special VFR and yet there were no opportunities for these parties to express themselves.

Within the last month, there has been a change in the regulation without representation by all parties.

So now there is no special VFR permission at these hub airports. Yet, you talk to controllers who provide separations and clearances for aircraft in these situations and they say, "No, special VFR is not a bad thing. It does not hurt anyone as long as it is used properly." I feel that the general aviation public has not been properly heard or represented on this problem.

I think at this point I would like to talk about system concept as it applies to air traffic control. Any system is made up of components. These components are usually machine components and human components. Machines and humans are connected together by communication links. I think one of the most ridiculous situations we have in air traffic system today is the archaic method of information transfer, the communication link between the man, the machine, and other men.

Let me give you a very simple example of this.

This is a roll of paper. This is teletype paper. If I were to plan a flight from Columbus, Ohio, to Richmond, Va., I would have to look at 16 feet of this paper. It is in cryptographic or that I must decipher, that I have to integrate into a picture and that will tell me whether or not I can safely fly from Columbus to Richmond. In the process of looking at this information or calling to a flight service station—when the phone is not busy—or calling a flight service representative on the radio, I can consume anywhere from 10 to 30 minutes seeking that information.

Last week I was grounded in a northeast city. I won't tell you the city for a definite reason. I had my own aircraft there. I was trying

to return to Columbus, Ohio. If you recall, last Wednesday through Saturday we had some rather ugly weather. Cloud ceilings at this northeast city were down to 100 feet with anywhere from a mile to one-eighth of a mile visibility.

I made phone calls at least six times in each of 3 days trying to find a "window" through which I could fly, trying to get back to Columbus; a window which would keep me from picking up ice; a window that would keep me away from severe storms and turbulence; a window which would allow me to reach my destination with adequate fuel; and a window which would allow me to find a sufficiently close airport that I could reach and still have the required fuel reserve. I never found that window because there was a lack of information.

The problem was basically at that point of departure. The atmosphere had an uncommon characteristic during that period; that is an inversion where temperatures went up instead of down as you increased in altitude. This was a desirable situation during that period because it would allow me to fly at a higher altitude without picking up ice which, in my aircraft, we had no means of removing.

The temperature on the ground at this airport was 33 degrees. I had the suspicion that the first 3,000 feet would put me in rather high icing conditions. I would have gladly paid $25 for that information; that is, who is picking up ice? Has anyone picked up ice? Nobody could tell me at the flight service station. I said, "Will you give me the telephone number of the approach control?" They said, "No, we cannot, it is an unlisted phone number."

I could have gone to the tower and asked permission to enter the tower and ask them to contact an aircraft coming in. Instead, I went to my airplane, started the engine and turned on the radio to a ground control frequency.

A Mohawk BAC–111 just landed and I called the pilot asking if he picked up any ice in his landing approach. He said, "No; very little."

At that point, I had my information. But it seems rather ridiculous that you have to go through this exercise to gather information in order to make a decision whether or not to fly.

I have done some very interesting research on risk acceptance in pilots. In this experiment we asked pilots to fly at a 2-foot altitude toward two bamboo poles and try to fit the aircraft between the two poles. We would vary the width of the poles in a random fashion so the pilot never knew the size of the opening with respect to the aircraft's wing span. We did not give him any information. We let him ask us for information. We said, "Try to go through. If you cannot, pull up and go over it."

As a result of this experiment, we were able to get a fingerprint on the pilot which described his willingness to accept risk. We found where he was willing to take risks and where he was not. We found out who was the Casper Milquetoast and who was the so-called tiger.

One interesting result of this research was that the so-called tiger, the one who took the big chance and didn't really understand what the consequences were, was the pilot who did not seek information.

This is significant, and it is borne out in many of the accident reports.

All you have to do is look at them. This is one of the major problems we have in our airway system.

It is quite incongruous to see a $1.5 million airplane with $200,000 of avionics equipment, operating at speeds close to mach 1, at altitudes up to 45,000 feet, having to be tied to a system that is 30 years old and dying fast. It is so far behind the times that it is virtually useless.

I am aware of proposed changes in flight service configurations. There will be a consolidation of facilities with increased efficiencies but without significant improvement in basic service offered. The cost of providing this same service is going to be slightly less but it is no better. I feel it is time we take a hard look, particularly from the FAA's point of view, at just what is the best way to present information.

I can give you another example right here at your own National Airport. I have navigated all across the ocean with a little bubble sextant. I have been able to hit the Azores right on the button after 7 hours of flight where errors can accumulate very rapidly. I have navigated all over the United States using the existing system without getting lost.

Last night I landed at National Airport and I was a blubbering idiot because I didn't know how to get off the runway to the parking area.

I couldn't see the correct taxiways, find the turnoffs. I didn't know where I was; I couldn't see other aircraft, and obstructions—it is ridiculous. It is absolutely ridiculous, that I should be completely lost on the ground.

This typifies the inconsistency of our system—we are able to operate very sophisticated aircraft systems in the air but cannot begin to handle the basic ground problems.

I do want to say one more thing. Although I would like to amplify the vital role of the air traffic controller, I think Mr. Bailey has done an adequate job. I think Mr. Bailey understands the controllers' problems. I don't have the eloquence that he has demonstrated and I don't think it is necessary for me to continue on that vein.

I do implore you, gentlemen, to take the opportunity to find out personally what the problems really are. Go out and talk to the people who are living with the problems—the pilots, the controllers, and the flight service specialists. Only in this way will you really understand the problems of air safety.

I would be delighted to see you organize some informal working group of operational people to assist in gathering information about safety for you. I know of many controllers, pilots, and accident researchers who would be delighted to present the facts as they see them to you without bias and without possible recriminations. I would be delighted to serve in any capacity in gathering information so that you can make better decisions or make more clear decisions based upon facts.

It is my sincere hope that the testimony I have given you will be germane to the hearings you have been holding for the past 7 months. It is true that we need more money to evolve a better air traffic system. We can spend the money to make the system better or we can pay the liability claims for accidents. I think we have a choice. I think we all —the Congress and the American public—would like to go to heaven without dying. We don't want to pay the money for a better system, yet we want a better system. I think we need to get down to the grassroots

level of the problem and really understand it before we jump off in any direction.

I might close with this: We must guard against inaction and bureaucratic inertia. We must move not like C. P. Snow's analogy of the mating of elephants where: things are conceived at a very high level; there is lots of smoke and dust; and nothing very creative comes out for a long time.

Thank you very much.

Mr. FRIEDEL. I want to thank you very much.

Mr. Devine?

Mr. DEVINE. You were here during the testimony of Mr. Bailey and you said you agreed with the theory and philosophy behind it.

Do you also agree with him that a ground controller's job is so dismal, so miserable as he pointed out, I don't know why they have any applicants at all for these jobs.

You know I have great admiration for the controllers across the country. Do you think this is such a miserable job?

Mr. GALIPAULT. If you are asking me if I would like the job, I would say no, I would not like the job because I would not be recognized as a professional. As a pilot flying a commercial aircraft or a corporate aircraft I have that professional reputation.

There are several ingredients in a profession and it just happens that one of these ingredients is money.

You have to have respect. The controllers have respect but they don't have recognition. They need a means of communication, of expressing themselves. They have no means of communication.

They must have a means for researching and finding new ways for doing things better.

Mr. DEVINE. They have no means of communication with whom?

Mr. GALIPAULT. With the people who direct their job functions—the FAA.

Mr. DEVINE. Do you mean the Federal communications——

Mr. GALIPAULT. I do not say they do not have any. I should say they do not have an effective channel of communication.

Mr. DEVINE. Do you share the views of Mr. Bailey? He said with the pilots all they have to do is take off and land and nothing in between, whereas the ground controller is busy all the time?

Mr. GALIPAULT. I am sorry Mr. Bailey is not here for me to say this to him but I do not quite agree with him. He may not have much to do at 41,000 feet on autopilot, but the pilot operating at lower altitudes in bad weather is very busy.

I think Mr. Bailey is making a point that the controller is a very vital part of this team.

Mr. DEVINE. I think like many lawyers he may have overstated or oversold his case in that instance.

From your own knowledge, do you know whether there is a shortage of personnel in the field of controllers?

Mr. GALIPAULT. I have a gentleman sitting behind me who is a tower operator at Port Columbus and he has informed me that the staffing at Columbus is adequate. I am not familiar with the conditions at the other facilities. I do know that places like O'Hare, JFK, and other large facilities are understaffed in many positions.

Mr. DEVINE. Do you know of your own knowledge whether any controllers within your scope of acquaintanceship are on tranquilizers,

are under psychiatric care, or are suffering from frustrations as a result of their occupations?

Mr. GALIPAULT. As to the first two things, definitely no. Several of them drink socially with me and that is the extent of it. Some do have ulcers that are not detected in their annual physical examinations. They do suffer from many frustrations and I think one of the major frustrations is the inability to have themselves heard on the problems of air traffic control operations.

Mr. DEVINE. By their parent agency?

Mr. GALIPAULT. By their parent agency.

Mr. DEVINE. I have a final comment which does not relate to you but again it relates back to the testimony of Mr. Bailey when he cited a singular example of a man in his thirties who had a heart attack which may or may not have been connected with his duties.

Mr. GALIPAULT. The gentleman sitting behind me is about 47 years old and he has been a controller at Columbus for 20 years and he is one of the finest pilots I have ever had occasion to fly with.

I am embarrassing him now but I think he is typical of the men at the facilities. I think perhaps he is no different than anyone else, you or I. Really, there are pressures on him and I am sure Mr. Bailey is emphasizing these pressures. They are there. I know if I had targets constantly converging on a radarscope I would be mighty concerned. Let me give you an example.

Sunday, February 4, 1968, at Columbus was a beautiful clear day. This gentleman advised me that there were 93 targets on a radarscope at Port Columbus within 25 miles of Port Columbus airport at a specific time of day. An American Airlines aircraft took off to the northwest. This gentleman advised me that he heard the taped conversation between the controller and the pilot. The controller called traffic to American 16 times before he passed through 5,000 feet. The pilot was able to identify 11 or 14 of these targets. Of the 93 targets, the controller had knowledge of the altitude of less than 10 percent of these because they were the only aircraft that either reported an altitude or were on instrument flight plans.

Now, this is a case in point. When you have 93 aircraft in such limited airspace crisscrossing at unknown altitudes, the controller is like a pilot flying without any flight controls—he is helpless. He just has to sit there and watch it happen and it is not easy for him.

Mr. DEVINE. I think our hearings over the years would demonstrate that the fellow who comes up with this, and maybe you will in your research, a radarscope that shows altitude will help solve these problems.

Mr. GALIPAULT. It will help.

We have this equipment available but try to get it—you can't and it is so desperately needed.

Let me make this point: I can take an airplane of known characteristics and I can make a better airplane out of it because I am a good pilot.

I have to say I am a good pilot because that is something I have to believe in order to be a pilot. I can make it better than the manufacturer thought it would be because I bring out things in it that are not really emphasized.

The same thing goes with the controller. He can make an archaic system into a workable system—he is doing it every day.

I tell you now that he is cutting corners—and he has to—but he is making the system better.

Now, add a few things, change a few procedures, and you might make it even better but don't let it come from the top down where special interest group pressure is applied for the sake of economics or profits.

That is not how we should improve the system. It has to come from the bottom up, from the people who know the problems. The only people who know the problems are the people there doing the job.

Mr. DEVINE. Thank you, Mr. Chairman.

Mr. FRIEDEL. I want to thank you very much, Mr. Galipault, for your very fine testimony.

Mr. DINGELL. Mr. Chairman, I notice that Mr. Stimpson from the FAA is present in the room and there is something I would like to have in the record before this matter is concluded.

It does not deal with the comments of our witness here but, Mr. Chairman, if you recall, the National Transportation Safety Board recently made some recommendations regarding part 135 of the Federal Air Regulations.

This dealt with air traffic operators and safety air taxi operators.

This is a matter of some concern to me and I would like to ask if the Chair would not request of the FAA comments as to what that agency proposed to do about the matters that were in the recommendation by the Air Safety Board.

I feel quite strongly on this.

I believe that a careful review of the record will show that the Post Office Department requires rather greater care on the part of operators of its equipment than does the FAA require of air taxi operators.

I have always felt very strongly that it was important that we should provide the highest possible safety for people even though we do want the mail to get through.

I would appreciate having Mr. Stimpson provide us, for the benefit of the record, first, the communication received by the FAA regarding the air taxi operators and, second, a statement of what the FAA proposes to do regarding those recommendations which I think are important to air safety.

Mr. FRIEDEL. The FAA, through Mr. Stimpson who is present, is requested to furnish the correspondence to which reference has been made.

(The following documents were subsequently submitted as requested:)

DEPARTMENT OF TRANSPORTATION,
NATIONAL TRANSPORTATION SAFETY BOARD,
Washington, D.C., March 14, 1968.

Hon. WILLIAM F. MCKEE,
Administrator, Federal Aviation Administration, Department of Transportation, Washington, D.C.

DEAR GENERAL MCKEE: The Safety Board has become increasingly aware in recent months of the very rapid expansion in the operations of the air-taxi operators, and within that group a similar burst of activity on the part of the scheduled air-taxi operators.

Also of interest to us, and in the same general area, is the rapidly expanding use of such operators by the Post Office Department in the contract carriage of mail.

A description of the nature and present scope of the operations of this group will serve as a background against which the safety of such operations, a matter of real concern to the Safety Board, can be appraised.

There are, as you know, more than 3800 air-taxi operators in the United States. As of October 1, 1967, *scheduled* air-taxi operators totalled 165, an increase of 42% over the 116 reported only eleven months before. Another indication of the rapid rate of growth of this segment of the industry can be gleaned from the fact that there were only 12 scheduled air-taxi operators four years ago, and that during the same period the number of aircraft utilized by them increased from 72 to 685.

Although this figure may not be entirely precise, it is our information that during the calendar year 1967 scheduled air-taxi operators carried over 3,000,000 passengers.

It is worthy of note that at least two certificated airlines have contracted with scheduled air-taxi operators to operate a segment of the certificated carriers' routes and that there are some 42 interline agreements between certificated airlines and scheduled air-taxi operators for the onward carriage of airline passengers.

In this connection, it is also worthy of note that in the contractual arrangements for the operation of route segments by air-taxi operators there are no affirmative references to the safety of such operations (other than requirements for insurance coverage imposed by the certificated carrier—and these could hardly be said to contribute to safety). Nor do the interline arrangements evidence concern as to safety by anything other than protection against airline liability through insurance.

The Post Office Department has, within the past year, become a very important contributor to the expansion of this segment of aviation through its contracts for the carriage of mail. Some indication of the rate of growth in this area can be gleaned from the fact that in 1966 the Post Office Department paid air-taxi operators about $180,000 for carrying mail; in 1967 the amount was in the neighborhood of $3,500,000; and in 1968 the Post Office expects the figure to go as high as $8,000,000.

By the end of 1967 there were in the neighborhood of 80 mail routes being operated by some 35 air-taxi operators. The Post Office Department expects to have from 180 to 200 routes in operation by June 1968, presumably with a commensurate increase in the number of air-taxi operators involved.

In contrast to the contractual arrangements between air-taxi operators and air carriers, the Post Office Department has imposed safety requirements in its contracts which go substantially beyond those presently required by the Federal Aviation Administration under Part 135 of the Federal Air Regulations, and they are intending to make such requirements more stringent almost immediately, since they are far from satisfied with the safety record of their contractors in recent months. (Four aircraft losses between November 25, 1967, and January 28, 1968, with attendant loss of mail and lives.)

By and large, it is our understanding that the contractual safety requirements imposed and to be imposed by the Post Office Department are intended to reach a level of safety in operations at least equal to what may come out of the next proposed modification of Part 135.

Certainly, such contractual requirements are far more stringent than are required of air-taxi operators generally, or of scheduled air-taxi operators in particular, by the existing Federal Air Regulations, and any substantial amendment in the existing Part 135 cannot be overlooked for (because of Rule Making requirements) for at least six months, and more probably a year.

The Board is well aware that the FAA has been addressing itself to this emerging problem with a high sense of its importance and urgency, and as we both know the Post Office Department has quite recently expressed concern about the safety of their contract operations in a series of meetings with both the FAA and the NTSB.

It is our understanding that the FAA is disposed to cooperate with the Post Office Department not only in advising with them as to the type of contractual safety provisions they might wisely impose, but also to assist in the implementation of the Post Office Department's program by some type of surveillance over the operators to see to it that the contractual obligations imposed upon them in the interest of safety are in fact being complied with. This we applaud.

But this brings us to the proposition that at this point the Post Office Department, with the help of the FAA, is imposing a higher level of safety regulation on air-taxi operators carrying *mail* than the Government imposes on the same, or other, air-taxi operators who are carrying *passengers* for hire.

Three million passengers carried for hire by *scheduled* air-taxi operators in 1967 is not only a respectable number, involving a dollar volume many times that of the $3,500,000 Post Office expenditure during the same year, but of much more significance from the standpoint of our present discussion, has involved a death and injury toll which cannot be viewed with anything approaching equanimity.

Preliminary figures indicate that there were some 84 deaths in air-taxi operations in 1967, of which 61 were passengers and 23 were crew. Figures for 1966 indicate a passenger fatality in air-taxi operations of 32, about one-half the level of 1967.

The area we are talking about is so new and so rapidly changing that comparative statistics are not worth much. However, the 1967 toll in absolute numbers is of sufficient magnitude to justify concern and affirmative action.

This rapid growth is being encouraged by the Federal Government, both by expanded authority through the Civil Aeronautics Board and the expanding contract operations of the Post Office Department. Then, too, the contracts between certificated carriers and air-taxi operators, as well as interline agreements between the two, would indicate a growing belief by at least some certificated airlines that the air-taxi operator fulfills a need. All in all, it can safely be assumed that the expansion is desirable and should be both encouraged and helped.

It is of concern to us that this record rate of growth, however desirable it may be, is being accompanied by a preoccupation with economic growth and very little, if any, attention is being paid to the safety obligation imposed by the equally rapid change in the role of this class of carrier. It seems clear that we cannot wait six months to a year for the evolution of a more modern regulatory scheme through the upgrading of Part 135.

In recent months, as the FAA has observed appreciable laxity in operating techniques of certificated carriers, it has acted promptly and sent teams in to review practices and to force an upgrading of them. We are of the view that the technique could be used in the area under discussion, although admittedly the *assignment* would be radically different, as will be developed later.

In this connection, it might be observed that air-taxi operators, including scheduled air-taxi operators, are conceived of organizationally within the FAA as being essentially a part of general aviation. This was once true and may still be true for the bulk of air-taxi operators, but it is by no means true for scheduled air-taxi operators or those under contract with the Post Office Department. This would suggest that not only should these carriers be classified as air carriers, but should be treated as such both within the structure of FAA and, in the longer pull, from the standpoint of safety requirements.

Another analogy of possible use in FAA consideration of this problem is its Project 85 which, as recently as in September, 1967, was set up on a test basis to encourage accident prevention in general aviation. The essence of this proposal, as we read it, is to upgrade the operations involved not by surveillance but by helping and by teaching. It is suggested that if Project 85 were narrowed down so as initially to make its principles specifically (and solely) applicable to scheduled air-taxi operators and air-taxi operators under contract to the Post Office Department, the possibility for success of the venture would be substantially enhanced. Experience with this more limited group could provide valuable information as a prelude to expansion to other general aviation areas later, as resources permit.

It is also suggested that personnel presently assigned as air carrier inspectors (whose job it is, basically, to monitor highly sophisticated and, it can be assumed, highly effective operations related to safety) could effectively be utilized in implementing such a program. Certainly, 165 scheduled air-taxi operators and 35 or more air-taxi operators under contract with the Post Office Department (most of whom are within the 165) would be a manageable number for intensive effort, where 90,000 members of the general aviation fraternity might not be.

Summing all this up, the Board is of the view that concerted and speedy action by both industry and government is required to adequately cope with the situation described. A suggested program follows:

I. BY THE INDUSTRY

A. Organized groups of scheduled air-taxi operators are urged to devote their energies to the safety of their operations to an extent more reasonably related to the amount presently being expended for the enhancement of their economic opportunities. For example, it would not seem either beyond the capabilities of these organizations or adverse to the intelligent self-interest of their members were they to institute programs devised to give expert guidance to operators in setting up operating rules and establishing desirable operating practices in areas involving safety (a large portion of accidents in this field are attributable to deficiencies in operations, i.e., inadequate maintenance, inadequate training etc.).

B. Scheduled airlines are urged to take affirmative action commensurate with their responsibility for the safety of passengers being carried by scheduled air-taxi operators pursuant to interline agreements or specific contracts for the operation of route segments. Here, if the carriers are unwilling, for whatever reason, to assume affirmative responsibility for safe operations of air-taxi operators with whom they have either interline agreements or specific contracts to operate route segments, serious consideration should be given to having the CAB condition its approval of any such contractual arrangements on the existence of contractual undertakings by each air-taxi operator to comply with a set of safety rules comparable or at least equal to the then contractual arrangements between the Post Office and its air mail carriers.

II. BY THE GOVERNMENT

A. The Federal Aviation Administration should launch immediately a program addressed to the scheduled air-taxi operators and the operators under contract with the Post Office Department ,which would involve not only surveillance of the conventional type, but also the teaching of this group how better to perform a basically common carriage operation, with emphasis on associated safety aspects. This program should include sending in FAA teams to review and accomplish the necessary upgrading of their safety practices; and

B. That the FAA place the safety supervision of scheduled air-taxi operators and Post Office contract operators organizationally under FAA staff associated with the handling of air carrier safety operations, and proceed promptly to establish safety programs and standards for them commensurate with their current and long-range status, activities, and importance in aviation.

Admittedly, the programs recommended herein for action by the Federal Aviation Administration, the air carriers, and the air-taxi operators, are beyond the scope of what the Administration and the industry have been either equipped or expected to do, and might not even be favorably received by the group of air-taxi operators such programs would be intended to help.

However, the need is real and immediate and it is our view that the situation will not wait either for "as usual" industry practices or for the ordinary regulatory process to catch up to it.

Sincerely,

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

FEDERAL AVIATION ADMINISTRATION,
April 3, 1968.

To: Hon. Joseph J. O'Connell, Jr., Chairman, National Transportation Safety Board.

From: Administrator.

Subject: Air taxi operations.

The agency has been increasingly concerned with the problems associated with the rapid growth of air taxi operation and I can appreciate and understand the concern expressed in your letter to me of March 14, 1968.

Publication of the agency's statistics on scheduled air taxi operations as of October 1967, together with the advent of air taxi airmail operations, have served to focus attention on the growth of the air taxi industry in recent months.

While it is quite true that we have provided assistance and guidance to Post Office officials at their request, the safety standards we suggested to them were generally derived from requirements already imposed on many of the larger and

more active air taxi operators through operations specifications. Similar, and more stringent operations specifications, which include appropriate sections of Federal Aviation Regulations, Part 121, have been applied to air taxi operators who operate segments of certificated air carriers' routes. It is our opinion that these air taxi operators have affirmative references to safety practices through their operations specifications despite the lack of specific references in their contractual agreements with carriers.

In recent years, we have sent special teams to review operating practices of air taxi operators when there was reason to believe that their operations were substandard. The procedures followed by these teams closely parallel those used when conducting special inspections on certificated air carriers holding Civil Aeronautics Board authority. Additionally, at least one region is applying the Systems Worthiness Analysis Program (SWAP) to some of the larger air taxi operators on a test basis. If this proves practical, we will institute it on a national basis.

I have noted your suggestion that we consider the use of personnel assigned to our Project 85. This is a test program implemented in two regions with a limited number of personnel. We do not feel it would be wise to divert the personnel in this program.

Your suggestion that we use air carrier inspectors to conduct surveillance of scheduled air taxi operators is one that we have considered in the past. As a matter of fact, our field air carrier people have participated in developing standards and requirements for the operations specifications of air taxi operators. Additionally, we have considered transferring the responsibility for policy guidance of air taxi operations from our General Aviation Operations Branch in Flight Standards Service to the Air Carrier Operations Branch. The reason we have not done this is primarily because of personnel shortages and ceiling limitations under which we currently are operating. This is not to say that our Air Carrier Operations Branch does not involve itself with problems relating to air taxi operations. It does, as the need arises.

With regard to your suggested industry programs, I believe we may be considerably further down the road than many people realize. For example, the National Air Taxi Conference (NATC), with the encouragement and participation of FAA, held an Air Taxi Seminar last November in West Palm Beach. Approximately one hundred persons, some from as far away as Massachusetts and California attended the one-day session which covered management practices, operating methods, regulations and related subjects. Three more seminars, sponsored by NATC are scheduled for this spring and early summer.

Also, it's worth noting that individual air carriers have made space available in their own training and management programs for air taxi operators. A number of major air carriers have participated in the programs presented at the NATC annual conventions. Recently we discussed with the Air Transport Association the possibility of participating in an industry program similar to that which you suggest. Their initial response was favorable and, in light of your suggestion, we will be pursuing it further.

Insofar as government action is concerned, we are well along with a program addressed to the scheduled air taxi operators, including not only those who carry mail, but also those who hold interline agreements or conduct regular or frequent "on demand" operations. In February of this year we asked our regions to place special emphasis on the surveillance of air taxi operators falling in any of these categories. As I mentioned earlier, many of our field offices already have issued operations specifications based on the local or regional operating conditions and environments. These operations specifications include such items as prescribed training programs, pilot-in-command requirements, proficiency checks and flight time limitations equal to or more restrictive than those imposed by the Post Office.

We agree that effort should be made to advise and counsel these operators in how better to perform common carriage operations, with emphasis on safety. Regrettably, our manpower situation does not permit us to devote as much effort to such a program as we would like. However, we shall continue working with ACA, NATC and other groups at seminars, annual conventions and wherever else we believe we can help them to help themselves make their operations safer.

We agree that the safety supervision of air taxi operators who engage primarily in air transportation (as opposed to those who hold an air taxi certificate as an adjunct to another primary aviation interest such as a flying school or fixed-base operation) should be air carrier oriented. Unfortunately, most air taxi operations are not located in the immediate vicinity of our air carrier offices. As a matter of

fact, many of them are located a considerable distance from the nearest general aviation district office. However, for our own field people, we intend to provide policy guidance and inspector training which is air carrier oriented.

As recognized in your comments and recommendations, we are proceeding with regulatory action to upgrade the air taxi rules, Part 135. Our analysis of the industry comments on our Advance Notice of Proposed Rule Making of March 17, 1967, has been completed and a Notice of Proposed Rule Making is in final stages of development. We shall take every possible action to accelerate this rulemaking process.

Let me say again that I can understand your concern and I share the sense of urgency which you expressed. However, I am hopeful that the summary of actions already taken, as well as those underway by both industry and government, will serve to reassure you that positive and responsive steps are being taken. I can assure you that we are not overlooking the problems you have described.

Should you wish further information on any or all of our programs concerning air taxi operations, members of my staff will be pleased to meet with you or your people at any time convenient to you.

WILLIAM F. MCKEE,
Administrator.

Mr. DEVINE. In the Washington Post, March 24, there was a rather meaningful article which appeared under the title "'Tortured' Jets Safer Than Cars." It cited a number of cases and I think it would be well to make this a part of our hearing record and I would suggest this be inserted in our record.

Mr. FRIEDEL. Without objection, it will be included in the record.

(Article referred to follows:)

[From the Washington Post, Mar. 24, 1968]

'TORTURED' JETS SAFER THAN CARS

(By David Hoffman, Washington Post Staff Writer)

In the evolution of automobile travel, more drivers and more passengers have meant more accidents and more fatalities, the toll now standing at 145 deaths a day.

Air safety experts have long predicted a similar fate for air transportation—that disasters will inevitably multiply as air travel booms. But a decade of hard statistical evidence is proving the experts wrong.

Last year was the tenth consecutive one in which U.S. airlines flew turbojets. And there was no measurable increase in the number of fatal accidents, the number of fatalities or the fatality rate per passenger mile.

Judged by that most meaningful ratio, the accident rate per aircraft flight hour, the tenth year of jet travel was the safest. In 1967, the accident rate per 100,000 aircraft hours dipped to a record low of 1.2 for U.S. commercial operators.

Enjoying such odds, a passenger can expect to fly a U.S. airline nonstop for 80 years before an accident might cost him his life.

WORKING SINCE 20S

By automating air traffic control, enhancing the competence of pilots, expanding airport facilities, improving the turbine engine and perfecting the jetliner itself, the aviation establishment has engineered a system in which more users survive each year.

Just as the Federal Government moved last year to regulate roadworthiness and crashworthiness into U.S. built automobiles, it moved in the 1920s to regulate safety into U.S.-built aircraft.

Now, almost 80 percent of the world's jetliners are manufactured in Western American states and the craft share one thing in common: their construction was supervised by the Federal Government, by the Federal Aviation Administration's Western Regional Office.

In trade jargon, this Federal supervision is called "certification." It entails dozens of semiformal bargaining sessions in which engineers and pilots from the company and the Government argue the cost of extra safety and try to anticipate—and eliminate— the causes of future accidents.

It is also a continuing process. As new transports build time in airline service, flaws appear inside them. Accidents investigations unearth other flaws, which manufacturers usually correct voluntarily. If industry fails to correct the flaws. FAA orders their correction with an "Airworthiness Directive" to the airlines or the manufacturer.

THE 'PICKLE SWITCH'

When engineers fail to anticipate causes of accidents during certification, aircraft crash. When the crash is fatal and its cause apparent, industry and Government move fast and forcefully to prevent a recurrence. For example:

On Feb. 12, 1963, a Northwest Airlines 720B climbed westward from Miami International Airport, over the Everglades, toward a gray forest of thunderstorms. While maneuvering to evade the squall line, the plane's pilots encountered massive updrafts. The jet's airspeed dropped rapidly as air currents thrust it upward through 17,000 feet, its nose cocked crazily skyward.

Embedded in the control column under the left thumb of the late Capt. Roy W. Almquist was a small black switch, called a "pickle switch" by pilots. It controlled an electric motor in the plane's tail section some 135 feet behind the cockpit.

The motor drove the jet's great slab-like stabilizer up or down to trim away bothersome control pressures. (A child adjusts, or "trims," the angle of his fingertips to porpoise his palm in the windstream outside a moving car.)

As the 173,000-pound plane rose, its air speed indicator warned that a stall was imminent. To avoid that lethal phenomenon, Almquist pushed his thumb against the pickle switch and held it forward for a total of eight seconds.

The stabilizer moved up in response—as far up as it could go.

At the same time, Almquist pushed forward on the control yoke, thus ordering his aircraft to dive away from the stall, to accelerate quickly. The jet responded in an instant. Its nose sliced through the horizon as the plane followed the roller coaster flight path used by the space agency to familiarize fledging astronauts with the oddities of weightlessness.

Dust rose up in the cockpit. Almquist rose also, until the safety belt restrained him.

In about eight seconds, the jet's nose was pointed at the swamp below. But when Almquist hauled back on the controls, struggling to brake his descent, nothing happened. Aerodynamic loads on the jet's tail section made the movable stabilizer, and the elevator behind it, useless. The falling jet accelerated through its "never exceed" speed and disintegrated in flight.

All 43 aboard died.

A $2 MILLION VERDICT

About two years after the accident, a five-week trial ensued in the Cook County (Chicago) Circuit Court. The jury, after deliberating five hours, awarded $2 million to the widow of a passenger killed in the crash. The Boeing Co., builder of the aircraft, was ordered to pay $1.6 million; Northwest Airlines the balance.

Attorneys for the plaintiff convinced the jury that the jet's stabilizer concealed a defect. They proved that the company knew of the defect from previous accidents. They showed that Boeing waited until after the Everglades accident to warn pilots against moving the huge metal slab while flying through turbulence, and that the manufacturer therefore was partly responsible for the tragedy.

In other words, the certification process had broken down, and in breaking down, had killed. Neither Boeing nor the FAA had spotted the potential hazard during the design, construction, testing and delivery of the 720B.

During the 1960–3 time span, the Civil Aeronautics Board reported 34 incidents in which turbulance damaged U.S. airliners or caused injury to their passengers. But only the Northwest accident proved fatal. Spurred by it, Government and industry put cost considerations aside and joined to tackle the turbulence problem.

A $100,000 RESTORATION

As soon as the downed jet's flight recorder was recovered and analyzed, Boeing sent other 720Bs aloft to fly approximations of the fatal maneuver at higher altitudes and less critical speeds. Together with the CAB, company experts ran the results through a computer.

Meanwhile, space agency aerodynamicists borrowed the aft half of a 720B fuselage from Boeing and mounted it in a hangar-sized wind tunnel. Simulta-

neously, CAB and Government agents were collecting debris from the accident site, hauling it 40 miles to Miami and rebuilding the jet's carcass in a $100,000 search for clues or causes.

Northwest Airlines, in conjunction with the Battelle Institute, set out to assess all the evidence.

Northwest Capt. Paul Soderlind toured the country warning fellow pilots not to actuate the pickle switch in turbulence, warning them not to chase their airspeed indicators in violent up- and downdrafts. Airspeed indicators, he reminded them, are notorious for flipping back and forth across a 200-knot speed band even while the airplane proceeds at a constant speed.

How should they penetrate thunderstorms? Slow the jetliner, keep it straight and level and ignore pressure-sensing instruments, Soderlind said.

In November, 1963, Boeing distributed to all airlines a handbook entitled "Flying in Severe Turbulence," which elaborated on earlier company telegrams. Recommendations in both had already been incorporated into all pilot training programs.

An urgent advisory from Boeing's Renton, Wash., headquarters instructed airlines to limit maximum possible stabilizer movement by about 25 per cent.

A BASIS FOR ACTION

In the case of Northwest Airlines, tragedy triggered a massive response. But must the aviation establishment await the impetus of tragedy before ridding air transportation of hazards long identified by engineers and pilots? The question was put to Lee Warren, deputy director of FAA's Western Regional Office.

"You can't junk the whole (air transportation) system just because you've developed a mathematical model that predicts the likelihood of an accident," he said. In promulgating safety rules, Warren added, "FAA holds its ground best when it has precise facts in hand."

To justify a safety regulation that *costs* big money, FAA must demonstrate that the regulation will *save* big money, as did the mandatory installation of airborne radar during the 1950s. Or FAA must show that the regulation will save lives. If no lives have been lost in the regulation's absence, the agency often must backtrack. For example:

Many within FAA believe that today's heavy jets are being flown from runways too short for safety. Airline pilots agree overwhelmingly. But neither the agency nor the pilots have mustered enough statistical evidence to convince U.S. airlines or the operators of U.S. airports that a hazard exists. Unfortunately, that evidence is beginning to collect.

A UNIQUE SPEED

On Nov. 6, at 6:41 p.m., a controller in Cincinnati's traffic tower cleared a Trans World Airlines 707 for takeoff. Unknown to the TWA pilot, another jetliner was mired in the mud alongside the takeoff runway, hidden in the darkness.

Like a car accelerating in high, the TWA jet rumbled down the runway, slowly gaining speed. Again and again, the eyes of its pilot, Capt. V. D. Matheny, returned to the airspeed indicator before him. At this point in the takeoff sequence, he was concerned with one speed and one speed only—the speed pilots call V1.

V1 is a unique speed, one that varies with the weight of an airplane, the length of its runway and the temperature of the day. It's the precise speed to which a pilot can accelerate, suffer failure of an engine and still do one of two things:

He can stop on the runway remaining, or he can continue the takeoff with only three engines operating. If engine failure occurs before V1, he must stamp on the brakes and stop on the runway. Should it occur after V1—even one knot after—the pilot continues aloft with three good engines, circles the field and lands.

As Matheny approached V1 for Cincinnati, 132 knots, he saw the other jetliner "loom up in my landing lights." Its silhouette appeared dangerously close to the runway. The TWA 707 sped by the stationary DC–9 and at that precise moment the TWA pilots heard what sounded like a cannon shot, or the sound of metal ripping into metal.

THE CONVERSATION

What occurred in the cockpit is told best by an edited and annotated transcript from the pilots' voice recorder. It begins at the point Matheny wheeled onto the runway for takeoff.

Matheny: "Close as I can get to the end, Ron, without backing it up." (Only one nose gear steering wheel is installed in the 707, alongside the pilot's left knee. Sitting in the left seat, Matheny has positioned the jet at the farthest end of Cincinnati's runway so that none of its length goes wasted behind him. Now he turns the aircraft over to First Officer Ronald G. Reichardt, who will perform the takeoff.)

Cincinnati Tower: "TWA 159, cleared for takeoff."

Reichardt: "O.K."

Cincinnati Tower: "Delta 379, you're clear of the runway, aren't you?" (Delta Flight 379, the DC–9 jet, has just landed and is rolling to a stop near the runway's end. Here, the controller wants to be certain the runway is clear for TWA's takeoff. Clearance should have been ascertained *before* the controller gave Matheny and Reichardt the go signal.)

Delta 379: "Yeah, we're in the dirt, though." (The DC–9's tail section is just seven feet from the edge of the runway.)

Cincinnati Tower: "O.K., TWA 159, he's clear of the runway, cleared for takeoff, company jet on final behind you." (The controller, in effect, tells Matheny to hurry up because another TWA jet is descending to land on the same runway.)

Reichardt: "O.K., we're rollin'." (Engine roar reaches its highest pitch here.)

Matheny: "Eighty knots, you got 'er." (The jet's rudder becomes effective at 80 knots. Matheny takes his hand from the nose gear steering wheel and passes control of the plane to Reichardt in the right seat.)

Matheny: "Not very damn far off the runway." (He sees the Delta jetliner appear in the darkness.)

Reichardt: "Sure as hell isn't."

Matheny: "See that fire in the end?" (He spots the orange torch of fire belching from the DC–9's tail-mounted engines as the Delta pilots attempt to pry their craft from the mud. A loud boom is superimposed on this transmission. Engine noise decreases dramatically as Reichardt elects to abort the takeoff.)

Reichardt: "Good God, I hit him!"

THE RIGHT PROCEDURE

Both pilots stomped down on the brake pedals. Matheny raised the spoilers—large metal flaps that kill lift atop a jet's wings. Now the plane was supposed to stop before it ran out of concrete.

But it didn't stop. Instead, the 707 rolled off the far end of the 7800-foot runway, plowing into a ridge of earth. After its landing gear sheared, the plane belly-skidded to a halt on the grass. All 36 aboard leaped from its cabin just before the outbreak of a fuel-fed fire. There were no fatalities.

Reichardt had been wrong, however. His jet had not collided with another; it had instead produced a rare kind of backfire. Not knowing this, Reichardt elected to abort the takeoff, doing precisely the right things, quickly, in precisely the right sequence.

Because the accident killed no one, there was little fanfare on Dec. 5 when the National Transportation Safety Board convened a public hearing to investigate its cause. But at that hearing, a young attorney built a case that the FAA, the airlines and the manufacturers are finding difficult to ignore.

Using the Cincinnati accident as evidence, he argued that on hundreds of U.S. runways, when a jet engine fails at the all-important speed V1, a crash becomes inevitable.

Donald W. Madole's credentials are unique in a highly specialized profession—aviation law. For several years, he was chief of the Civil Aeronautics Board's Hearings and Reports Division and, as such, presided over many an accident hearing. He is also a Navy plane commander with some 5000 hours of pilot time.

NO SAFETY MARGIN

Madole's job, as he saw it, was to expose a weakness in the certification process. This is how he proceeded:

Using the TWA jet's cockpit voice recorder, Madole showed that exactly 19 seconds elapsed between the time Matheny called "80 knots, you got 'er" and the

time Reichardt cut off all engine power. Using the jet's flight recorder, Madole showed that in 19 seconds, the 707 accelerated from 80 knots to 132 knots.

Therefore, he argued, Reichardt's decision to abort must have been reached prior to V1—the refusal speed. Since the TWA crew performed a perfect aborted takeoff procedure, the jet should not have skidded off the runway, endangering 29 passengers and a crew of seven. But it did, raising the question of why?

No one in FAA accused the TWA pilots of miscalculating their refusal speed, yet their calculation left no margin for safety. Similar calculations, Madole said, "are used every day to compute the proper performance of every airline jet that takes off on every passenger-carrying flight in scheduled air transportation. It is impossible, therefore, to overemphasize the seriousness of this accident."

It was during the certification process that Boeing and the FAA had decided that a 212,231-pound 707 could accelerate to 132 knots, sustain the loss of an engine and still stop safely within a 7800-foot runway. Behind that decision was a series of test flights that bore little resemblance to the last abortive flight of TWA 707 N742TW the night of Nov. 6 at Cincinnati.

NO SURPRISE ELEMENT

To determine the 707's runway length requirements, Boeing used a team of crack test pilots. It gave them a brand new 707 with brand new brakes. The 707's tires, fresh from the factory, were perfectly round and had deep, finely grooved treads. Installed on the 707's instrument panel was an oversized airspeed indicator that registered velocity in fractions of knots.

Instead of staging the tests on a runway slickened by engine oil and jet exhaust particles, the pilots used a long stretch on dry, clean concrete. But, more important, the men knew what lay in store as they sped down the runway.

Actual emergencies shock and surprise. It takes the average pilot four seconds to recognize the hazard, select proper countermeasures and employ them. During those four seconds, his plane can roll 1000 feet and accelerate 20 knots or more, easily exceeding the speed V1.

Yet the element of surprise is ignored in determining runway length requirements—a fact that the Air Line Pilots Association has long found infuriating.

Four and a half years before the Cincinnati accident, the FAA recognized that the average airline pilot might have difficulty duplicating the sudden stops achieved by the manufacturer's best test pilots. In a Notice of Proposed Rule Making published July 15, 1963, the agency declared that allowable accelerate-stop distance (an acceleration to V1, then a stop on the remaining runway) afford the "absolute minimum level of safety."

In unusually tough tones, FAA then proposed lengthening such distances by a constant 800 feet at all U.S. airports. It simultaneously proposed that an extra 1200 feet be tacked onto predicted landing distances whenever rain or snow made a runway slippery.

"FEELINGS" NO CRITERION

Industry's reaction was swift and angry and illustrative of the intimate relationship between safety and profit in air transportation. Representing the larger manufacturers, the Aerospace Industries Association commented:

"The statement that some airline pilots doubt that they could reproduce the certificated accelerate-stop distances during air carrier operations is not a legitimate reason for rule changing. Feelings should not be substituted for test data when making an important decision, such as that under consideration."

Representing scheduled U.S. trunklines, the Air Transport Association warned that the regulation would inflict huge economic penalties on its membership. For example, Eastern Air Lines would have to cut back jet payloads by up to 15,000 pounds at 27 cities, Pan American at 13 and so on.

Behind the AIA and ATA protests is a harsh fact of the marketplace: Compact jetliners require fewer feet of concrete to land and take off. The "little" jets, therefore, are alighting at smaller cities where runways generally are shorter—in the 5000- to 7000-foot category. When FAA adds 1000 feet to takeoff roll requirements on such runways, airlines must subtract up to 8 percent from their planes' maximum takeoff weight.

That 8 percent must come out of the fuel tank or the passengers' cabin, and either way it would cost the industry millions. Consider that the 15,000-pound weight reduction cited by Eastern could equal 75 paying passengers or 2500 gallons of kerosene which airlines burn to keep passengers paying.

The airlines' alternative is to persuade community authorities across the country to build longer runways. But such construction often is financed by bond flotations, and airport bonds are usually secured by income furnished by the airlines under landing fee or airport-use contracts.

Such contracts often call for higher landing fees when the local airport operator needs additional income to pay off new bondholders. To completely close the circle, the longer the runway, the higher the V1 speed allowable under FAA's certification regulation. The margin for safety is canceled.

A SUBSEQUENT EXAMPLE

Succumbing to industry pressure, FAA quietly withdrew its proposal to increase jet takeoff distances on July 7, 1965. In justifying this reversal of position, the agency said, as the ATA did earlier, that "there have been no overrun aborted takeoffs experienced in air carrier operations with a turbojet-powered airplane on a dry runway."

But last Nov. 6 in Cincinnati, rain or snow did not fall yet a passenger-carrying jet careened off the runway. Fortunately, the situation encountered by TWA in Cincinnati was not encountered by Pan American in Honolulu during the same month of November.

On Nov. 14, FAA fined Pan Am $10,000 for allowing 135 overloaded jet takeoffs from Honolulu International Airport. Company charts had shown Honolulu's usable runway length to be 8030 feet whereas in fact it was 7381 feet, an error that canceled the margin for safety supposedly provided by refusal speed theory.

FAA's reversal had still left hanging its proposal to increase wet runway landing distances by about 1200 feet. But the airlines found fault with even this precautionary measure.

"In view of the economic penalties involved," ATA commented, "it is imperative that an aceptable alternative means of demonstrating compliance with this regulation become available. If it is not, jet service to a number of cities may be reduced or, in some cases, curtailed altogether."

The trade association found it unnecesary to remind FAA that few things annoy Congressmen more than the curtailment of airline service back home.

ONE UNPULLED TOOTH

On Nov. 19, 1965, FAA responded to the airlines' plea. In an "advisory circular" to all companies, the agency again reversed itself, allowing airlines to demonstrate their ability to land jets on wet runways in the same old distances—distances that FAA had earlier called "inadequate."

The demonstration requirement is the last unpulled tooth in FAA's original proposal. It consists of five landings per airline, not necessarily in the rain but on "well-soaked" runways.

Despite its shortcomings, the certification process has served for more than 30 years as a catalyst to keep air transportation tolerably safe. But there is evidence that it might fail in the future.

Recent FAA budgets have pryoided about $7000 annually for every civil aircraft that flies; the agency's payroll includes approximately one employe for every three aircraft. Even so, FAA's Lee Warren predicts, current budget levels may soon force curtailment of the agency's role in aircraft certification.

Why? Because FAA lacks the technical manpower to inspect and test the forbiddingly complicated systems inside aircraft now being assembled—Boeing's supersonic transport and giant 747 jet, for example. A dilemma thus takes shape:

Either Congress must provide more money so that FAA can hire more engineers and test pilots for such inspections. Or the FAA must abdicate, at least patially, its statutory responsibility to ensure "the highest degree of safety" in airline operations.

The agency would then—as it does to a degree now—delegate responsibility to trusted employes of the manufacturer. Such in-plant inspectors, of course, would divide their loyalty between two masters—the public and their company.

LESSONS FROM ACCIDENT

The most recent U.S. jetliner to undergo FAA certification was Boeing's 737, a short-range twin-engine transport that the agency declared ready for airline service on Dec. 15. How might it have profited from Northwest Airlines' accident in the Florida Everglades?

On May 4 and 5, 1965, 25 men from the FAA met at the Boeing plant with 32 company employes. All were expert in some aeronautical specialty; together they made up the Preliminary Type Certification Board for the 737.

Rocco L. Lippis, assistant chief of the Aircraft Engineering Division in FAA's Western Regional Office, was one of the participants, and in a recent Los Angeles interview he explained the why of such sessions:

Prior to the preliminary board, all that FAA knows about the airplane is what it may look like and that the manufacturer has applied to build it. At this point, Boeing familiarizes the agency with the whole jet, what it will be made of and how it is supposed to fly. If Boeing comes up with some new system that hasn't been tested yet, or if there's a system that's causing trouble, then FAA attaches a "special condition" to it—meaning that the agency intends to look it over verey carefully, Lippis said.

Minutes of that preliminary board disclose that among many special conditions attached to the 737, at least two resulted directly from the Northwest Airlines accident.

Under the first, FAA asked Boeing to instrument the pilot's seat in a flight test 737, then fly the craft through severe thunderstorms. Instruments would record how the jolts and vibrations might impair the pilot's ability to see his instruments and manipulate flight controls. They would also reveal the effectiveness of ailerons, rudders and elevators in counteracting the impact of up and down drafts.

Under the second special condition, FAA asked Boeing to put the 737 through its paces fully untrimmed (with its movable stabilizer full up or down). In that unstable condition, Boeing and FAA test pilots wrung out the airplane, rolling it into tight turns, forcing it into steep dives and punishing pullouts, and after each, the plane obediently righted itself.

Not until after the Northwest Airlines accident was Boeing's earlier 720B put through comparably demanding tests. But the 737 was, and it pased with flying colors during its eight-month, $14.3 million flight test program.

A CONTEST FOR TIME

Many within FAA view the initial stages of certification as a kind of technological debate between the Government and the manufacturer. With all its expertise, the manufacturer presses for speedy certification of its product so as not to lose in the marketplace, where competitors are busy selling.

Before the certification process even begins, the builder is convinced that his product is airworthy—safe for passengers. And, unlike auto manufacturers, he has already sold it, promising purchasers a profitable range, speed and payload.

The FAA, meanwhile, fights a holding action, trying with relatively few technicians (there are 110 in the Western region) to inspect and test as much of the whole airplane as time and manpower permit.

By way of comparison, several acres of engineers and draftsmen sit side by side in one of Boeing's Washington State factories. Up through the engineers ranks rose J. E. Steiner, becoming chief project engineer for the incredibly successful 727 tri-jet, then Boeing vice president in charge of product development.

Steiner emphasizes another facet of the certification process—the one Boeing pursues independently, as if FAA didn't exist.

"We set criteria for every system in every airplane, and almost always ours are tougher than those required by the FAA," he said in an interview. "A group within our Service Department (which has worldwide representation) investigates every accident involving a Boeing product, feeding back analyses into the Design Department."

TESTING TO DESTRUCTION

Usually, Steiner says, Boeing telegraphs precautionary instructions to its customers before FAA can issue an Airworthiness Directive, and the customers comply.

"Although FAA doesn't require it," he said, "we're testing to destruction one 737 (sale price $3 million), two 727s (sale price $11 million) and two 747s (sale price $44 million)."

For such tests, Boeing mounts a 737 fuselage in a hangar, wiring it with hundreds of stress gauges. Then the company applies pressure. Huge hydraulic jacks bear down on the wings or the tail or the landing gear, simulating the loads to be imposed by turbulence, G forces or hard touchdowns.

Hidden computers balance the forces: a downward force on one wing is offset by an upward force on the other. Gradually, the pressure is stepped up as the jet absorbs energy like a woundup clock spring. Then comes the explosion as some primary structure gives way, releasing the stored power. Now Boeing knows precisely the toughness and resilience of its product.

Consider two other 737 tests that stopped short of outright destruction:

The 737's tall vertical tail fin is most sensitive to side loads—the kind that might be imposed on landing in a vicious, gusty crosswind. FAA requires that the fin withstand a 50-foot per second gust imposed at normal cruising speed. In FAA's opinion, if the 737 can endure such a blast, its passengers will be adequately protected.

But Boeing upped the force level 50 per cent. The 737's skin aged instantly under the impact, wrinkling and cracking. Its fuselage twisted and bent. Significantly, however, nothing failed or yielded in a way that would have endangered passengers.

THE BURSTING POINT

As with all pressurized transports, the higher the 737 flies, the greater the difference in air density between its interior and the air outside. The question naturally arises: How great can that difference get before the fuselage bursts like an overfilled balloon?

To find out, Boeing mounted huge fans in the 737's doorways and began pumping air into its cabin. Not until the pressure reached 17.3 pounds per square inch did the company turn off the fans. That pressure was 225 per cent greater than the differential the plane would ever encounter at maximum flight altitude.

As 737s begin amassing flight time in airline service, bugs inside the jet doubtless will be discovered, as they have in every U.S. transport. But the odds are extremely high that the problems will be identified and corrected, either by the manufacturer or the FAA, before they down an airplane.

It is for this reason that airliners generally grow safer even as they age.

Mr. FRIEDEL. This concludes this series of safety hearings.

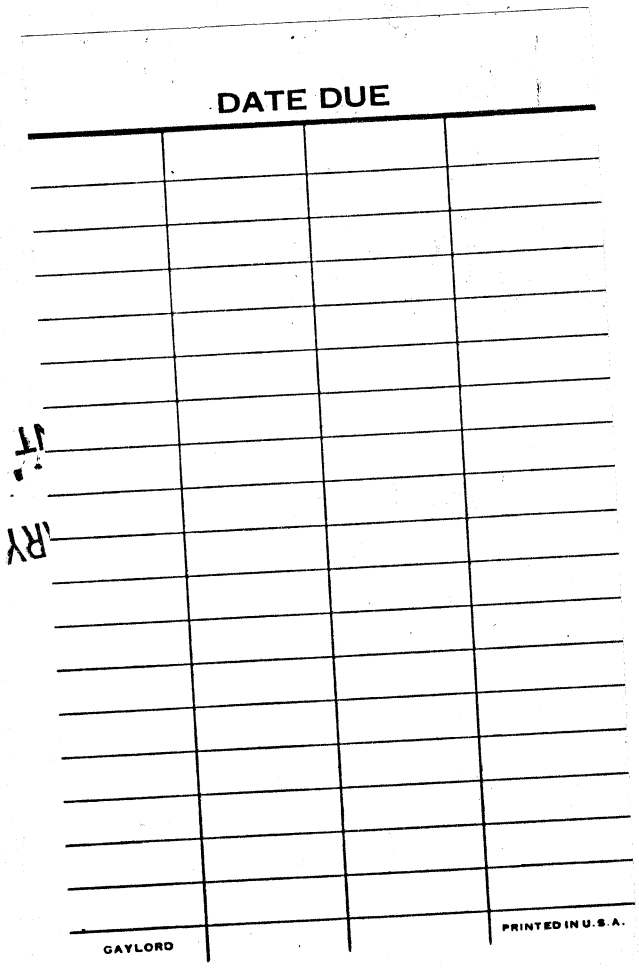
We are all concerned with maintaining and improving safety. In the very near future, I believe that the announced date is April 1, 1968, the Secretary of Transportation is to send up a broad legislative proposal concerning airports and airways.

I feel that these hearings and the studies and in-plant visits which many of us have made will serve as a useful and current background for any new legislative recommendations.

The meeting stands adjourned.

(Whereupon, at 11:45 a.m., the hearing was adjourned.)

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