Preliminary Study Confirms That Pilots Die at Younger Age Than General Population

Evidence indicates that mortality is higher immediately after retirement and loss-of-license disability claims are linked to specific age-related causes.

by
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Editorial Note: After examination of pension fund data, Ibrahim E. Muhanna, the principal author of this study, suspected that the life expectancy of pilots after retirement was less than the general population. He said that if this were true, pilots might be entitled to increased benefits at no additional cost. Moreover, if the causes of early death could be identified, pilots might benefit from information that could contribute to a prolonged life. The author, whose organization is a member of Flight Safety Foundation, attended the 43rd International Air Safety Seminar in Rome in 1990 to discuss his ideas with Foundation staff. His request for assistance was published in an on-site seminar newsletter, and several seminar participants responded to his request. They later provided him with the data used in this study.•

This analysis is a preliminary study of airline pilot death rates before and after retirement. Its conclusions are an important first step in conducting a more comprehensive investigation. Such a study would monitor the pilot population prior to death and disability to derive reliable mortality and disability rates. From this information, measures of life expectancy can be derived.

Airline Pilot Associations Contributed Data

Two sources of data were used in the analysis. Source 1 was provided by seven airline pilot associations in the United Kingdom, Argentina, Colombia, Switzerland, Greece, Ireland and Spain. It included data on the number of pilot deaths in the 50-74 age group with an average retirement age of 56. Source 2 was provided by the U.S. Air Line Pilots Association (ALPA) and included information about pilot deaths only after the retirement age of 60.

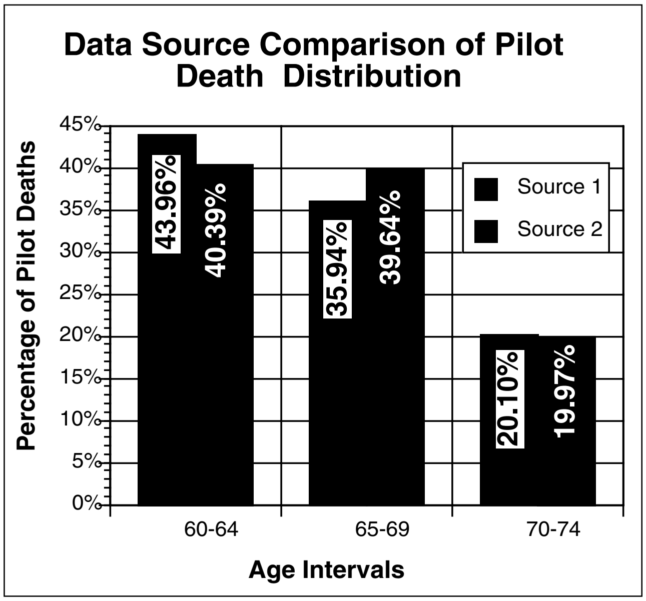

Figure 1

Data were grouped to produce a homogeneous point of reference. Grouping data is a difficult task because it requires using actuarial assumptions that must be chosen carefully to ensure that they support the full scope of the analysis. For example, the various data for pilot deaths from the eight associations had to be refined to make them comparable. The data were grouped satisfactorily by the appropriate use of specific actuarial assumptions. Each association provided data for different periods of time, but all of them included the period from 1980 to 1990. Recognizing that the pilot work force is not equally distributed throughout the years, the death statistics were converted into percentiles as a common reference throughout the investigation period.

The two independent sources of data were tested against each other and they demonstrated very similar distributions (see Figure 1). Both group analyses were then compared with general population rates. [The age intervals for the two sources are the same, but not the age group covered by the three intervals. In Figure 1, the age group is 60-74, while in Figure 2, the age group is 50-74. The 60-74 age group is common to Source 1 and Source 2 in the comparison of data in Figure 1. This accounts for the variation in percentages between Source 1 data in Figure 1 and Source 1 data in Figure 2.]

Pilot Deaths Compared to General Population Deaths

Examination of the number of pilot deaths occurring in the 50-74 age group provides a reasonable representation of the structure of death rates before and after the average retirement age of 56. Grouping data on pilot deaths from natural causes during the 50-74 age interval provides a distribution that is expressed in percentages of the total number of deaths in the age interval. Five equal five-year age intervals rather than single-year intervals further emphasize the changes in pilot death numbers (Figure 2).

An examination of these results and a discussion of possible death distribution irregularities is feasible only after the results are compared with an identically structured set from the general population.

The pilot population is a growing one. A growing population is characterized by the addition of new entrants spread throughout the age group under study. The opposite would be a static population from a given age group with no new entrants at any point. Therefore, general population data, based on a static population, had to be analogously adjusted for a valid comparison.

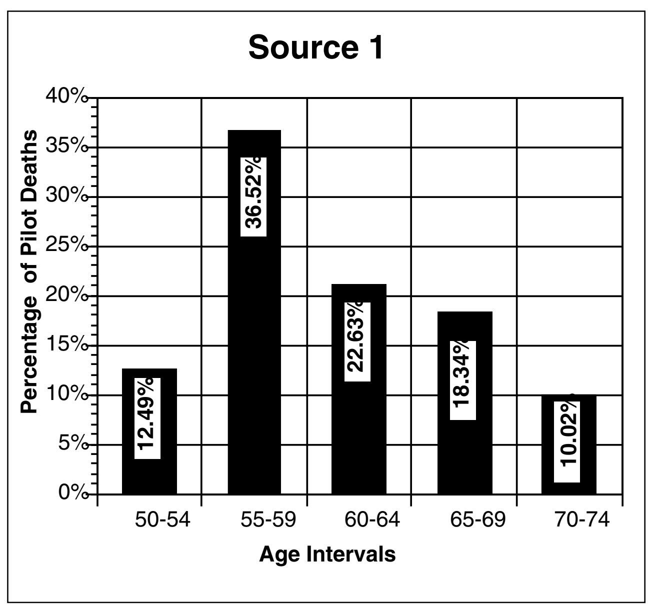

Figure 2

Although data for the total pilot population were not available, transforming the general population into a growing one by incorporating the pilot population growth rates yielded an acceptable basis for comparison. The pilot population growth rates included existing data from the years 1980-1990 with projections to the year 2000 (Figure 3).

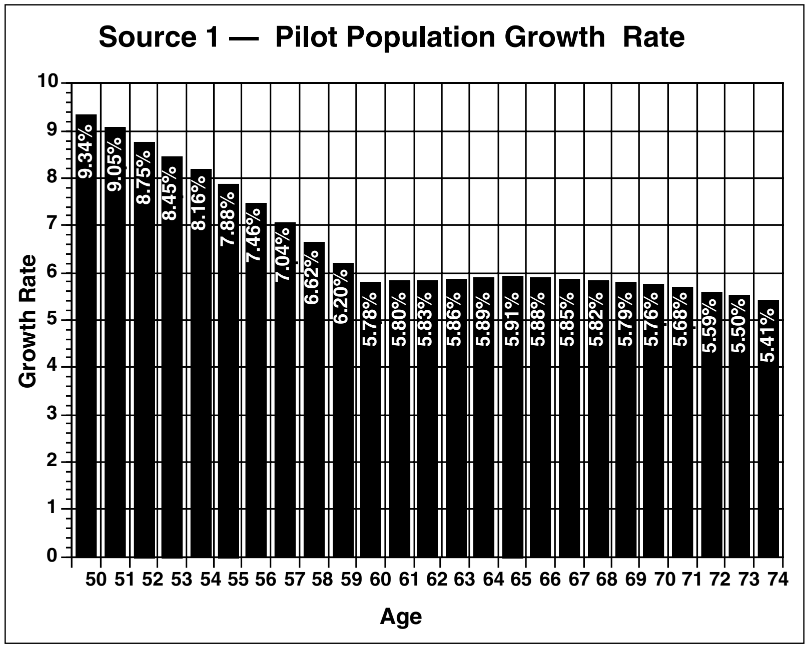

Figure 3

These growth rates were applied to general population data and, by using the life table's mortality values, the numbers of deaths in a growing population were obtained at each age. Several mortality tables were considered, but one published in 1990 on pensioners' experience (PML80Base), was selected as the most appropriate. Because the pilot population is overwhelmingly male, only male mortality values were used.

After establishing data showing the number of deaths for a growing population during the selected age intervals, the general population could be compared with the pilot population, which yielded the distribution shown in Figure 4.

This comparison suggests some significant conclusions:

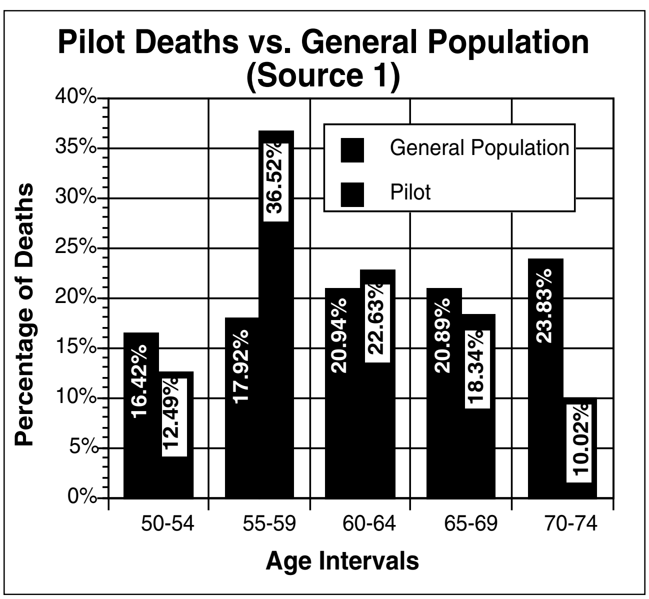

Figure 4

It is evident that there are substantial differences between the two distributions (note the far greater percentage of pilot deaths in the 55-59 age interval). In this interval, the pilot data show an 18.6 percent deviation from the general rate. From these data, we can conclude that the average age at death of pilots is about 61. The average age at death of the general male population in the 50-74 age group is approximately 63. Average age at death is a crude measure that relates to the characteristics of a particular population's death distribution but it gives a reliable indication of the mortality trends within the population.

Death Rates Peak Around Retirement

It also is evident that death occurrences among the general population present a fairly smooth distribution, with a slight increasing trend as age advances. Among pilots, however, there is a sudden and high peak in the 55-59 age interval (the years around retirement in Source 1 data), with deaths then falling sharply.

With Source 2 data, a larger sample was available for pilot deaths after retirement during the years 1972-1990 and a more accurate death rate analysis was possible. Data were homo-

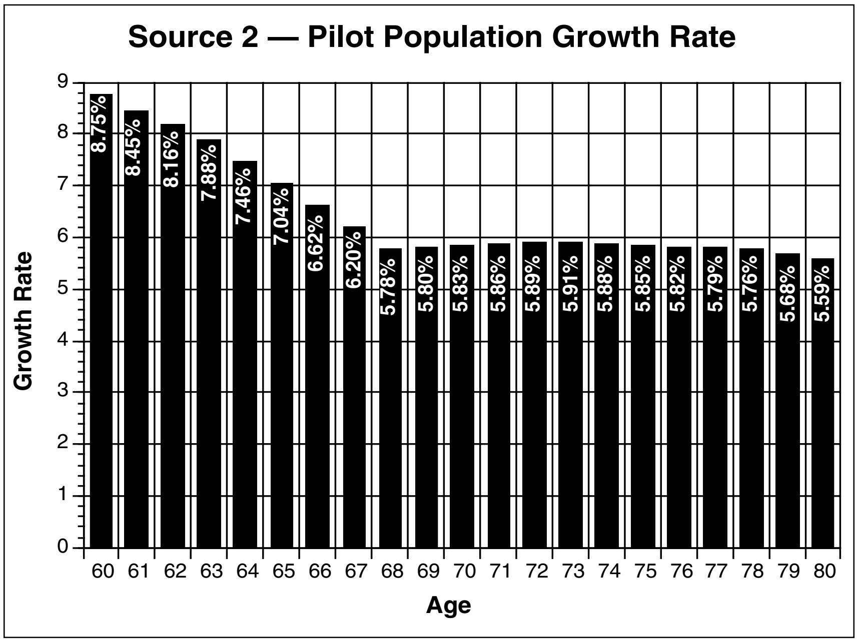

Figure 5

geneously grouped and only required investigation and expression of the number of deaths at each age between 60 and 80 as a percentage of total. The retirement age in this sample is 60 and the analysis concentrates on pilot mortality after retirement.

The PML80Base table for the general population was again transformed into a growing one using the calculated growth rates for ages 60-80 (Figure 5).

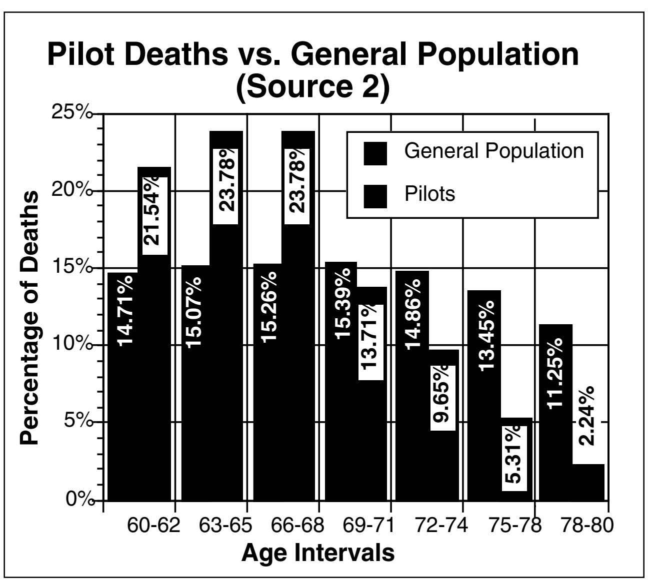

Figure 6

Each age bracket in the data (Figure 6) includes three years, and an analogous structure is provided for the general population to yield a valid comparison.

The measures of death among the two populations are similarly distributed. The age interval with the greatest deviance from the general population rates is 78-80, at 9.01 percent. Source 2 data are presumed to be more accurate, because they include a larger sample of pilots. When compared to the results from Source 1, further correlation between pilot and general population data is evident.

The data in Figure 6 indicate a trend toward increased pilot deaths in the younger age intervals (60-62, 63-65 and 66-68) compared with the general population, and that there is a sharp decrease in the number of pilot deaths from age 69 on. This is because 69 percent of pilot deaths in the 60-80 age group occur in the first nine years of the interval, thus leaving the remaining population significantly reduced. On the other hand, the death distribution of the general population is smoother with only 45 percent of deaths in the 60-80 age group occurring in the first nine years.

Data Confirm Trend of Early Deaths for Pilots

Comparing the average age at death of pilots in the 60-80 group with the equivalent measure for the general population, the ages 67 and 70 are obtained, respectively. Thus, the Source 2 data also confirm that there is a tendency among pilots to die younger than the general population.

There is evidence from other studies that mortality is higher immediately after retirement, although this analysis could not conclude that directly; it suggested only that the number of deaths is greater. The mortality measure arrived at in this analysis shows the same irregularities as those observed in other mortality studies concerning different professional groups. The preliminary findings clearly warrant more comprehensive investigation.

Disability Causes Identified

An amalgam of data from insurance companies was also used to identify causes of disability among pilots. Because this provided information about loss of license (LOL) insurance claims from a large sample of pilots in the last decade, it was possible to identify the causes of disabilities and the average age at which pilots' claims were made.

According to the sample, there were 13 causes of disability that resulted in LOL over the 10-year period 1980-1989 (alimentary [nutrition-related], alcoholism, bodily injury, cancer, cardiovascular disease, diabetes, hearing, kidney, musculo-skeletal, neurological, psychiatric, respiratory and visual). Given the very high levels of responsibility and skills required in the pilot profession, health matters that affect absolute fitness are of paramount importance. Consequently, causes of pilot disability include such syndromes as diabetes or nutrition-related problems that, in other professions, may not result in job loss.

In each year from 1980 to 1989, the average age fluctuated between 43 and 48 for claims relating to the above causes. There is no evidence of any pattern that suggests an increase or decrease in the average age throughout the years. The average age with respect to the total number of claims for the 10-year period is estimated to be 45 (45.25). This does not mean that most of the claims arose at this age, only that it is the approximate age to expect some pilots to become disabled resulting in LOL.

Cardiovascular Ailments Lead Early LOL Causes

Most frequent causes of disability (Figure 7) were cardiovascular disease (34 percent), neurological impairments (18.2 percent) and cancer (9.1 percent). These figures represent the percentage of total claims incurred during the 10 years. The least frequent causes of disability were kidney (0.6 percent), alimentary (1.2 percent), hearing and musculo-skeletal (3 percent).

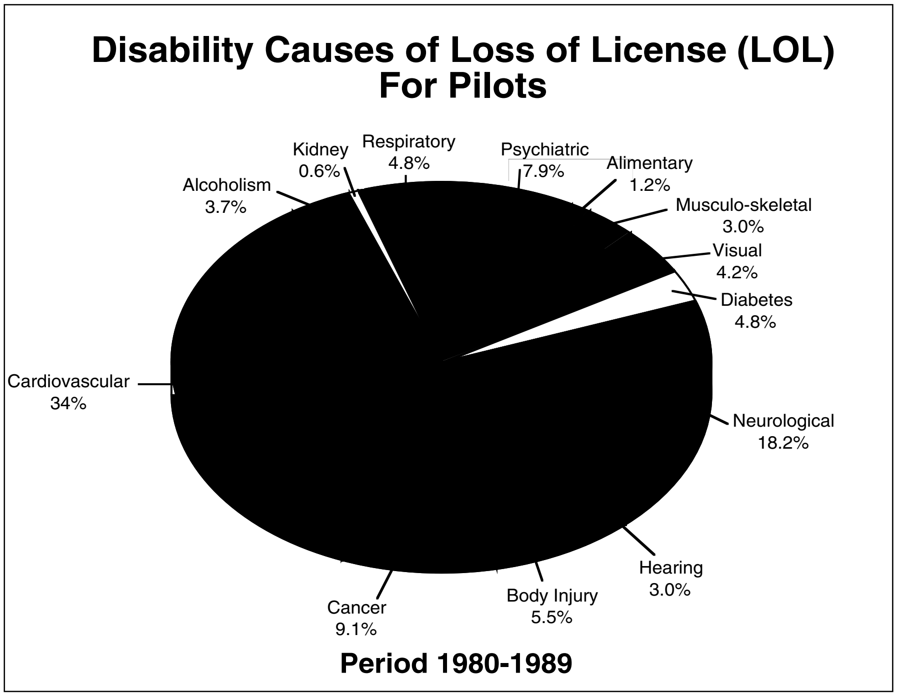

Figure 7

The overall picture shows a fairly steady distribution for most of the disability causes throughout the 10-year period. This is quite clear in the case of cancer, alcoholism, respiratory and visual disorders. In the later years of the period under study, there is a significant drop in cardiovascular claims — from 40 percent in the earlier years to 17 percent in the more recent years. There is also evidence of improvement in conditions such as diabetes and kidney disorders during the latter years of the investigation period. Perhaps, the improvements are the result of advancements in medical technology. Although there was a slight decrease in the number of claims during the last four years of the decade, it is not suffi-

LOL Disabilities Correlated with Age

Strong		Moderate		Weak	
Psychiatric	(7.9%)	Diabetes	(4.8%)	Body Injury	(5.5%)
Alimentary	(1.2%)	Neurological	(18.2%)	Cancer	(9.1%)
Musculo-skeletal	(3.0%)	Hearing	(3.0%)	Cardiovascular	(34.0%)
Visual	(4.2%)			Alcoholism	(3.7%)
				Kidney	(0.6%)
				Respiratory	(4.8%)

Figure 8

cient to conclude that pilots have become more physically fit. There is an increase in other problems — from 7 percent to 16 percent for psychiatric problems and from 12 percent to 23 percent for neurological disorders.

Examining the relationship between pilot age and number of claims for each cause of disability allowed us to determine whether there was evidence that claims increase with advancing age. Although that is the common expectation, a proper correlation study revealed the strength of the relationships between different causes of disability and age.

Figure 8 presents a classification of the 13 claim-related disabilities as being strongly, moderately or weakly correlated with age. The percentages represent the share of each cause of LOL in the period 1980-1989.

Data suggest that the greater the age the more likely that a pilot would suffer from disabilities and a loss of license. There was a high correlation between causes of disability, such as visual and musculo-skeletal impairments and age. Another cause of disability exhibiting a high degree of correlation with age was the alimentary category; however, as it was not a very frequent occurrence, the evidence for the correlation is mostly circumstantial.

The strongest correlation between disability and age appeared in the psychiatric category. This suggests that stress and other psychological factors significantly affect pilot health with advancing age.

The remaining causes of disability showed no such significant relationship to age, not even cardiovascular disease or cancer, which may appear surprising. But we are examining a tiny fraction of the general population and even within that we are not including the entire pilot population.

The nature of the sample data prevents a complete picture of a correlation study. However, a high correlation between the number of claims for disability from any cause and advancing age is expected in accordance with trends in the general population.♦

About the Authors

Ibrahim E. Muhanna is chief executive officer and actuary of OmniLife Overseas Insurance Co. and director of i.e. Muhanna & Co. He earned undergraduate university degrees in mathematics and electrical engineering, and a master of science degree in actuarial mathematics. He also taught mathematics in the United States as a college instructor, and lectured on financial mathematics, operational research and probability and statistics at a university in Lebanon. He has been an actuary for companies located in the United States, Lebanon, Cyprus and the United Kingdom.

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Aviation Statistics

Worldwide Jet Transport Statistics Updated And Aircraft Operations and Safety Trends Examined for 1991

The annual update of worldwide jet transport aircraft operation and safety performance is prepared from data provided by aircraft manufacturers and airlines, as well as other published information. Some data require reasonable adjustments and estimates. For example, the number of aircraft reported in service is based on the month of December. Generally, the number of aircraft in use during July, August and September is greater than in December.

Aircraft used for military or general aviation flying are excluded from this update. The following jet transport aircraft are included in the annual update:

Four-engine:	Boeing 747, 707, 720; DC-8; BAe146; VC-10; Convair 880, 990; and HS Comet IV
Three-engine:	Boeing 727; DC-10; L1011; and HS Trident
Two-engine:	Boeing 757, 767, 737; DC-9; MD-80; F100, F28; A300, 310, 320; BAC-111; and SE 210 Caravelle

Table 1

Worldwide Jet Transport Aircraft Hours Flown (thousands) By Number of Jet Engines and Type Calendar Years 1990 and 1991

Aircraft Type	No. of Aircraft 1990	No. of Aircraft 1991	Change		Hours Flown 1990	Hours Flown 1991	Changes	
Two-engine	5,055	5,687	+632	(12%)	12,306	12,275	-31	(0.3%)
Three-engine	2,285	2,240	-45	(2%)	4,475	4,085	-390	(8.7%)
Four-engine	1,334	1,350	+16	(1%)	3,168	3,057	-111	(3.5%)
Total	8,674	9,277	+603	(7%)	19,949	19,417	-532	(2.7%)
Two-engine	58.3%	61.3%	+3.0%		61.7%	63.2%	+1.5%	
Three-engine	26.3%	24.1%	-2.2%		22.4%	21.1%	-1.1%	
Four-engine	15.4%	14.6%	-0.8%		15.9%	15.7%	-0.2%	
1st Generation	480	362	-118	(25%)	530	496	-34	(6.4%)
2nd Generation	4,732	4,810	-78	(2%)	9,652	9,068	-584	(6.1%)
Widebody	1,645	1,750	+105	(6%)	5,083	4,767	-316	(6.1%)
Newest Types	1,817	2,355	+538	(30%)	4,684	5,086	+402	(8.6%)
Total	8,674	9,277	+603	(7%)	19,949	19,417	-532	(2.7%)
1st Generation	5.5%	3.9%	-1.6%		2.6%	2.5%	-0.1%	
2nd Generation	54.6%	51.8%	-2.8%		48.4%	46.7%	-1.7%	
Widebody	19.0%	18.9%	-0.9%		25.5%	24.5%	-1.0%	
Newest Types	20.9%	25.3%	+4.4%		23.4%	26.1%	+2.7%	

Table 2

Worldwide Airline Jet Transport Aircraft Hours Flown U.S.-manufactured Compared with Western European-manufactured Aircraft Calendar Years 1990 and 1991

	Aircraft		Hours Flown (000)			
	1990	**1991**	**1990**	**1991**	**Hours**	**Changes**
U.S.-made	7,443	7,810	17,448	17,141	-307	(1.8%)
Non-U.S. made	1,231	1,467	2,501	2,274	-225	(9.0%)
Total	8,674	9,277	19,949	19,415	-532	(2.7%)

Aircraft in Service and Hours Flown

Worldwide airlines operating these jet transport aircraft recorded 19,427,000 flight hours compared with 19,949,000 in 1990, a decrease of a half million hours, or 2.7 percent. The decrease of daily utilization is across the fleet. Table 1 (page 7) shows a comparison of aircraft in service and annual flight time for 1990 and 1991. During the two-year period, the number of aircraft in service increased 7 percent from 8,674 to 9,277. The biggest increase in number of aircraft in service is in the category of the newest types of jet transports. That increased 30 percent from 1,817 to 2,355. In flight hours, the newest types of jet transports rose from 4.7 million to 5.1 million, an increase of 8.6 percent.

Table 2 (above) shows a breakdown of jet transport by aircraft were manufactured in the United States or in Western Europe. Of the 21 aircraft makes/models in use in 1991, 11 makes/models with a total of 7,810 aircraft were made in the United States and 10 makes/models with a total of 1,467 aircraft were made in Western Europe. The daily utilization in 1991 for a U.S. jet is about six hours. A non-U.S. jet logs about four hours. Of the total hours flown in 1991, U.S. jets account for 17.1 million hours, or 88 percent; the non-U.S. jets account for 2.2 million hours, or 12 percent.

Fatal Accidents and Hull Losses

In 1991, worldwide airlines operating large jet transport aircraft were involved in 10 fatal accidents and 13 hull losses, resulting in a

Table 3

Worldwide Airline Jet Transport Aircraft Fatal Accidents, Hull Losses and Rates Calendar Year 1991

Aircraft Type	Fatal Accidents	Hull Losses	Fatal Accident Rate per 100,000 Hours	Hull-loss Rate per 100,000 Hours
Two-engine	7	8	0.049	0.057
Three-engine	0	0	0	0
Four-engine	3	5	0.098	0.164
First Generation	1	3	0.202	0.605
Second Generation	6	6	0.066	0.066
Widebody	1	1	0.021	0.021
Newest Types	2	3	0.039	0.059
U.S.-made	8	11	0.047	0.064
Non-U.S.-made	2	2	0.088	0.088

Table 4

Worldwide Airline Jet Transport Aircraft Fatal Accident and Hull-loss Rate (Hours Flown per Fatal Accident/Hull Loss) By Aircraft Type Calendar Years 1959-1991

Aircraft Type	Average Hours per Fatal Accident	Average Hours per Hull Loss	Median Hours per Fatal Accident	Median Hours per Hull Loss
First Generation	647,177	439,566	481,501	332,263
Second Generation	1,514,277	1,065,036	1,255,571	977,555
Widebody	1,618,926	1,664,727	1,222,333	1,264,168
Newest Types	2,980,530	2,768,603	2,946,060	2,522,207

The years of observation vary according to aircraft type. The data for newest types are based on five years, while the data for the first generation jets are based on 33 years.

total of 685 fatalities, compared with 11 fatal accidents, 10 hull losses and 357 fatalities in 1990. For the period since 1959, worldwide airlines recorded a total of 356 million flight hours and were involved in 352 fatal accidents and 448 hull losses. About 10 of these events involved terrorists.

Table 3 and Table 4 (above) show the fatal accidents, hull losses and rates involving worldwide jet transport aircraft in 1991. Figures 1 and 2 (below) show the fatal accident and hull-loss trends during the past three decades. The figures show that fatal accident rates and hull loss rates have been stabilized in 0.05 accidents per 100,000 aircraft or 0.06 hull losses per 100,000 aircraft hours during the last decade. An analysis of fatal accidents and hull-loss rates in average number of aircraft hours flown since the beginning of the jet age reveals about one million hours per fatal accident and about 800,000 hours per hull loss.

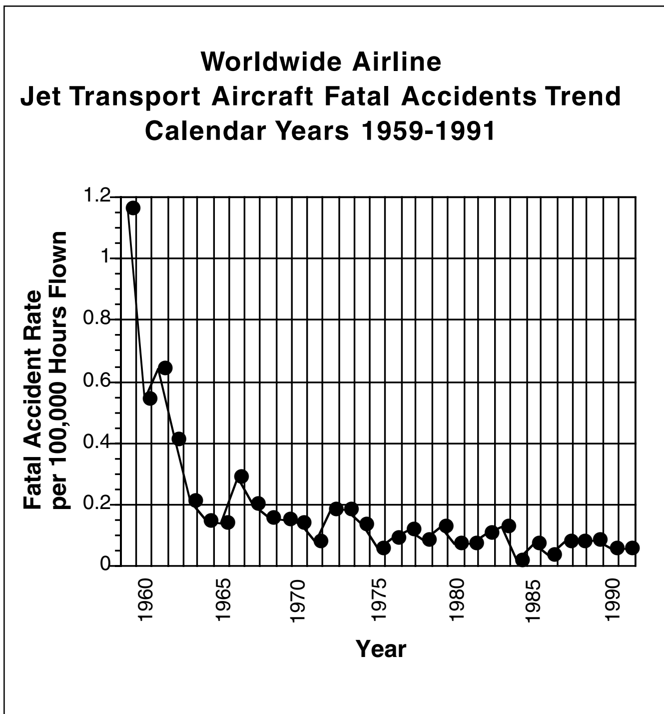

Figure 1

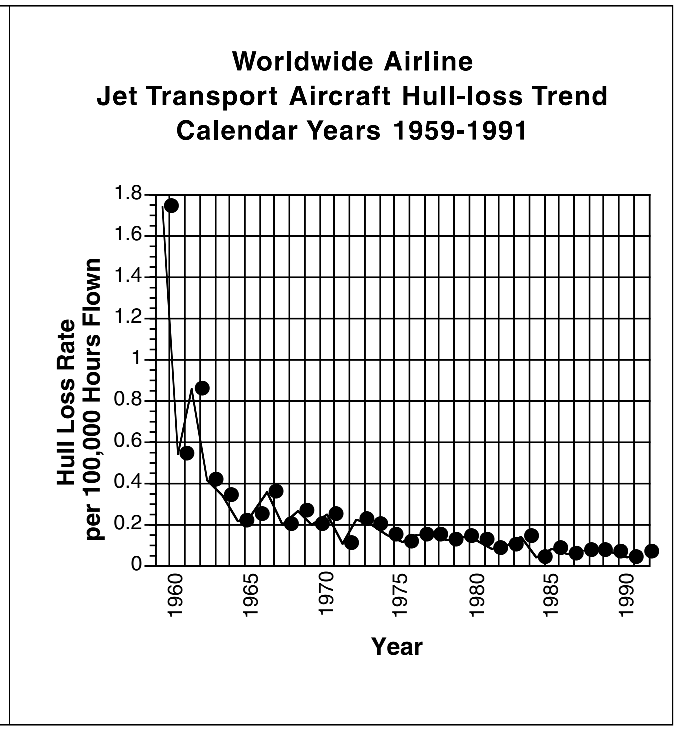

Figure 2

Worldwide Airline Jet Transport Aircraft Fatal Accidents per 100,000 Flight Hours Calendar Years 1961-1991

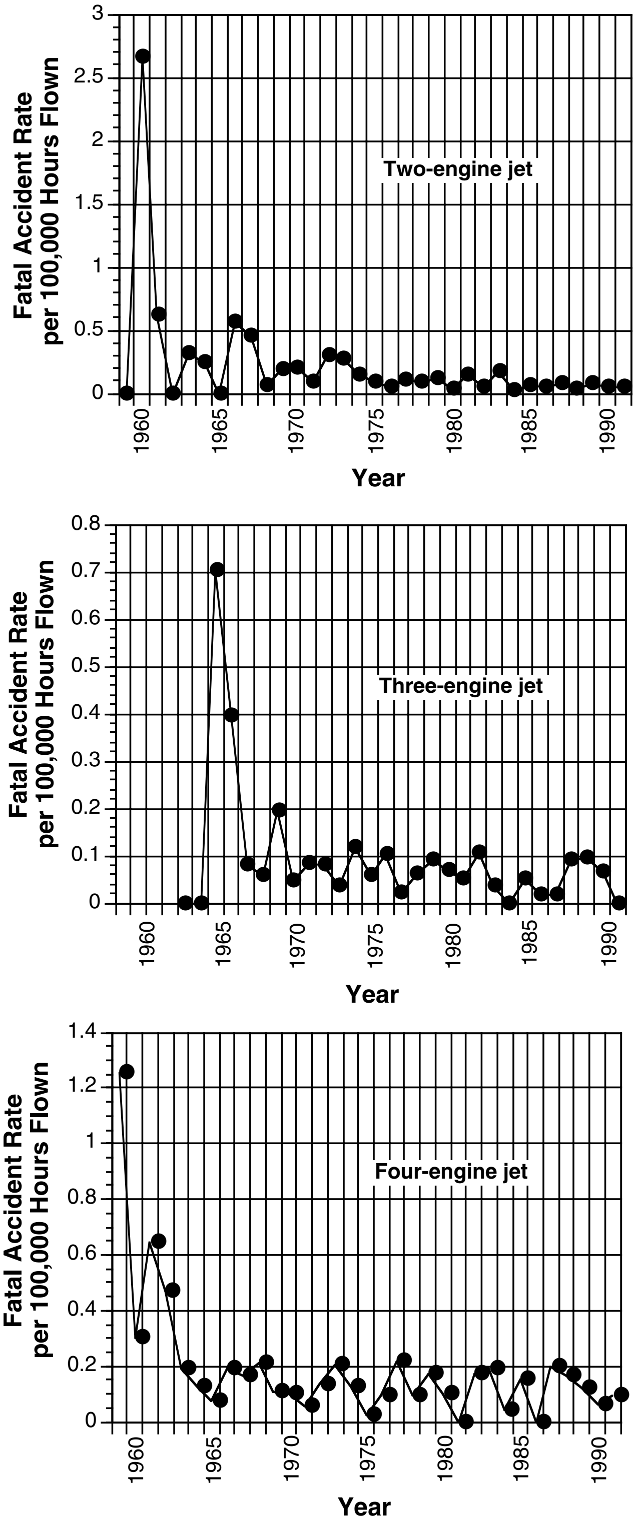

Figure 3

Worldwide Airline Jet Transport Aircraft Hull Losses per 100,000 Flight Hours Calendar Years 1961-1991

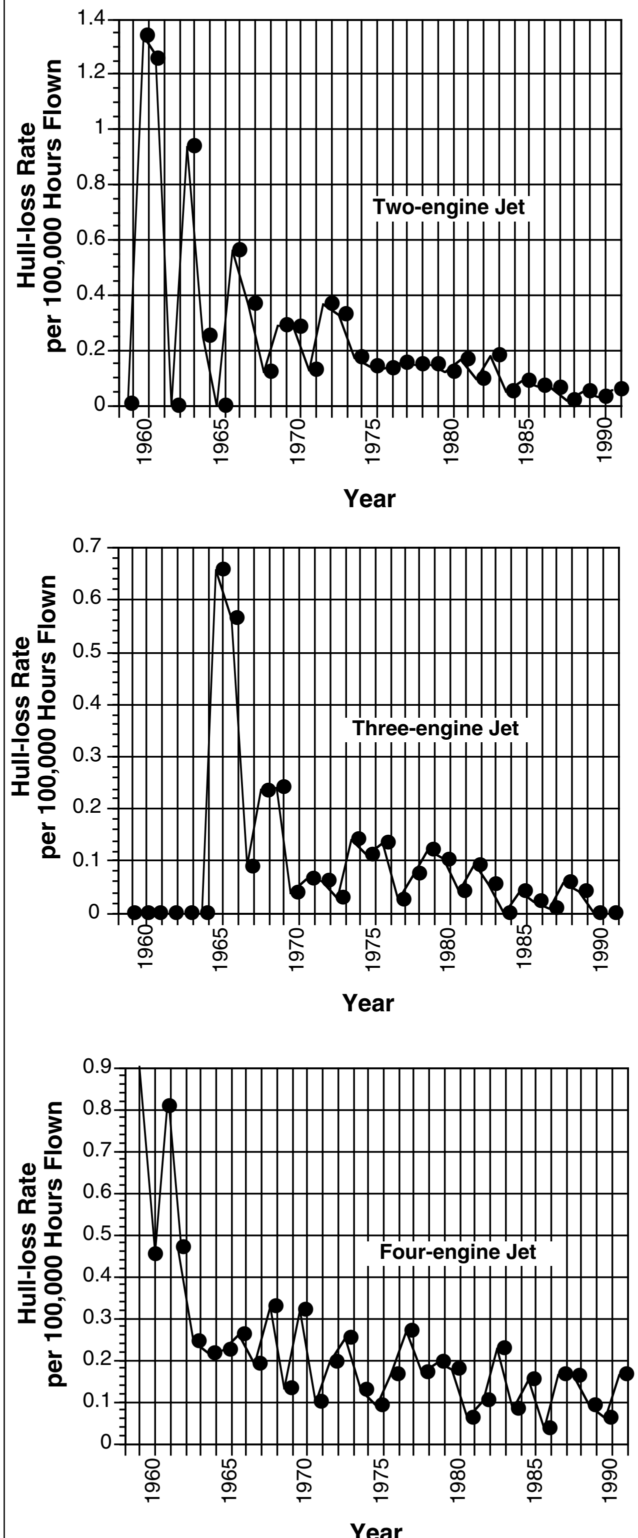

Figure 4

Figures 3 and 4 (page 10) show fatal accident and hull-loss trends by number of aircraft engines. For three-engine jets, the safety performance began to level after five years in operation. However, the fatal accident and hull-loss trends for two-engine and four-engine jets are more varied than the three-engine jet, which has the best safety record.

Figures 5 and 6 (right) show fatal accident and hull-loss trends for jet transport aircraft made in the United States and in Western Europe. In the first 10 years of the jet transport era, the safety record for non-U.S.-made jet transports was poorer than the record for U.S.-made jets. However, the gap between U.S.-made and non-U.S.-made jets has closed since the 1980s, especially after the newest types of jet transports entered into service.♦

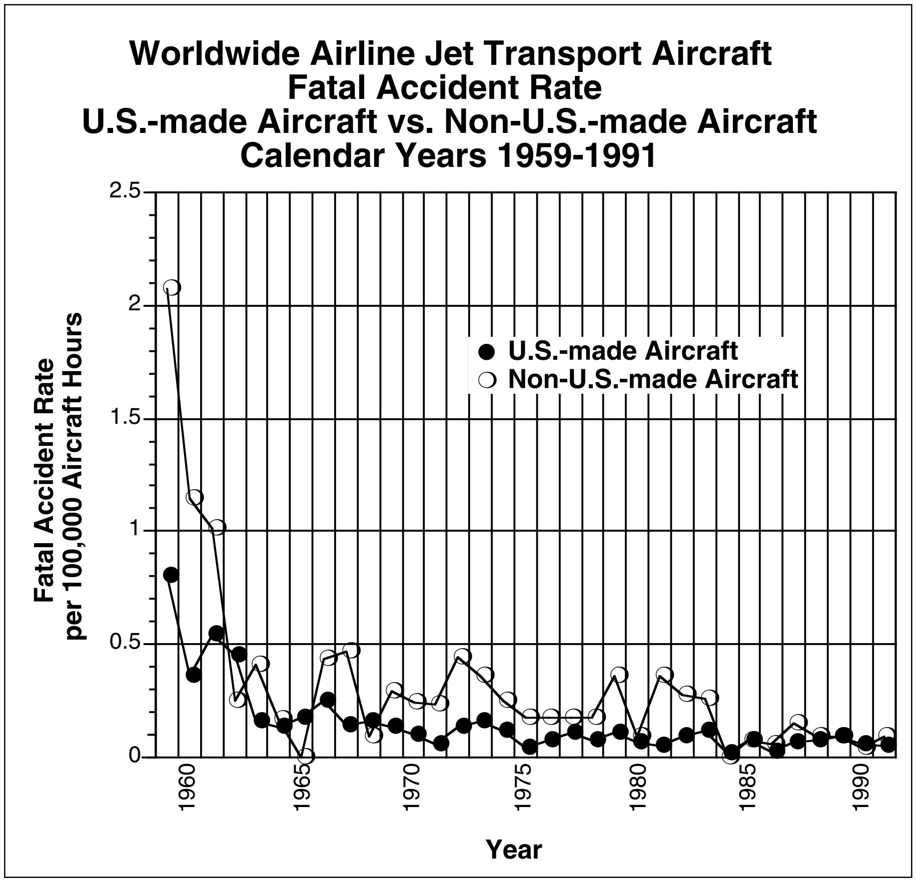

Figure 5

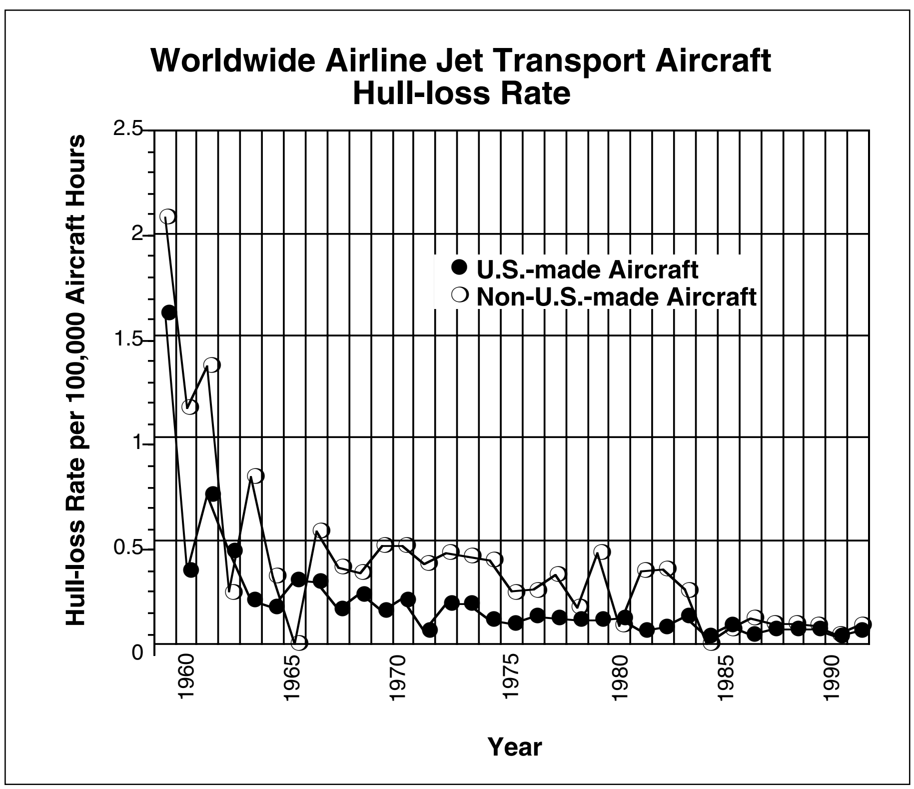

Figure 6

Reports Received at FSF Jerry Lederer Aviation Safety Library

Reference

Updated Reference Materials (Advisory Circulars, U.S. FAA)

Numbers	Mo/Yr	Subject
AC 120-40B	January 1992	Airplane Simulator Qualification (Cancels AC 120-40A dated July 31, 1986)
AC 39-6P	February 1992	Announcement of Availability — Summary of Airworthiness Directives (Cancels AC 39-6N5 dated June 4, 1990)

Reference Materials

Advisory Circular 91-68, 2/25/92, *Pilot Qualification and Operation of All Surplus Military Turbine-Powered Airplanes*. Washington, D.C. U.S. Federal Aviation Administration, 1992. 10 p.; ill. with flowcharts.

Summary: This advisory circular (AC) provides information and guidance to pilots who wish to become qualified to operate surplus military turbine-powered airplanes under a letter of authorization (LOA), as required by operating limitations issued for this type of aircraft.

Reports

Airline Competition: Industry Competitive and Financial Problems/statement by John H. Anderson Jr., associate director, Transportation Issues, Resources, Community, and Economic Development Division, before the Subcommittee on Consumer and Environmental Affairs, Committee on Governmental Affairs, U.S. Senate/ U.S. General Accounting Office. Washington, D.C. U.S. General Accounting Office**, [1991]. Report GAO/T-RCED-92-28. 19 p.; 28 cm.

Key Words
1. Airlines — United States — Finance.
2. Airlines — United States — Management.
3. Competition — United States.
4. Market share.

Summary: Anderson's testimony was based on work concerning issues related to airline competition, including reports on barriers to entry, the impact of industry consolidation on fares and the financial health of the industry. His testimony summarizes findings on the airline industry's competitive problems and discusses how the industry's financial problems are likely to affect competition. Anderson says that although deregulation has benefited many customers by providing reduced fares and more frequent service on many routes, consumers pay higher fares on other routes. Moreover, an analysis of 1988 fares from 15 concentrated airports shows that when one or two airlines dominated an airport, fares were higher than on routes from less concentrated airports. According to Anderson, the loss of another competitor airline on these routes could further erode competition and lead to higher fares. Barriers to entry further limit competition in the airline industry. An airline must also be financially sound to compete effectively. Although strengthened competition will help ensure the continued success of deregulation, Anderson says that proposals for reregulation of fares are not the best solution for the industry's problems. Rather, competitive access to airport facilities, a level playing field for marketing airline services and better access to domestic and international capital markets would provide an atmosphere to enhance competition. [Summary extracted from testimony]

Analysis of Helicopter Accident Risk Exposure Near Heliports, Airports and Unimproved Sites./R.J. Adams ... [et al.] Washington, D.C. U.S. Federal Aviation Administration, Research and Development Service; Springfield, Va. National Technical Information Service*, [1992]. Report No. DOT/FAA/RD-90/9, Contract No. DTFA01-87-C-00014. 61 p.; ill.

Key Words
1. Aeronautics — Accidents — Forecasting.
2. Heliports.
3. Airports — Traffic Control.
4. Helicopters.
5. Accident.
6. Risk Exposure.

Summary: Report discusses the development of relevant safety indicators used in the assessment of risk exposure due to heliport design and operational standards. The approach is to develop the total helicopter risk exposure due to all causes and then estimate what proportion of that risk should be allocated to various circumstances associated with specific heliport design and helicopter operational characteristics. Data on the number of helicopter accidents per year, accidents per 100,000 hours of flight time, accidents per 100,000 mission segments, accident rates for selected mission types, occupant risk of serious injury and neighborhood risk are presented as parameters for the analysis and quantification of risk factors. Civil helicopter accidents are categorized by the facilities near which they occur and by the operating facility design parameters that affect operational risk. [Summary from modified author abstract]

Rotorcraft Terminal ATC Route Standards/ Raymond H. Matthews, Brian M. Sawyer. Washington, D.C. U.S. Federal Aviation Administration, Research and Development Service; Springfield, Va. National Technical Information Service*, [1991]. Report No. DOT/FAA/RD-90/18, Contract No. DTFA01-87-C-00014. 73 p.: maps.

Key Words
1. Air Traffic Control — Helicopters.
2. Heliports.
3. Rotorcraft.
4. Visual Flight Rules.
5. Handbook 7110.65F.
6. Flight Rules.

Summary: This report incorporates the review, analysis and development of rotorcraft air traffic control (ATC) route structures and the analysis of current procedures and standards with the objective of recommending modifications to existing FAA documents, standards and procedures, which will enhance rotorcraft operations and National Airspace System (NAS) capacity in a terminal environment. The report focuses on major terminal areas and addresses both visual and instrument meteorological conditions under visual flight rules (VFR), special visual flight rules (SVFR) and instrument flight rules (IFR). The report is intended to assess the effect of visual and instrument meteorological conditions on the NAS, users and air traffic control. [Summary from modified author abstract]

Rotorcraft En Route ATC Route Standards/ Raymond H. Matthews, Brian M. Sawyer. Washington, D.C. U.S. Federal Aviation Administration, Research and Development Service; Springfield, Va. National Technical Information Service*, [1991]. Report No. DOT/FAA/RD-90/19, Contract No. DTFA01-87-C-00014. 46 p.; maps.

Key Words
1. Air Traffic Control.
2. Helicopters.
3. Heliports.
4. LORAN.
5. LOFF.
6. Flight Rules.

Summary: Report identifies constraints on helicopter operations in the en route environ-

ment as they relate to visual flight rules (VFR), special visual flight rules (SVFR) and instrument flight rules (IFR). This report concentrates on IFR operations and recommends modifications to route development standards using existing and planned navigation capabilities that will ultimately maximize the use of National Airspace System (NAS) en route air space. Recommendations are also made to enhance NAS capacity and accommodate the unique operational capabilities and requirements of helicopters. [Summary from modified author abstract] ♦

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Accident/Incident Briefs

This information is intended to provide an awareness of problem areas through which such occurrences may be prevented in the future. Accident/incident briefs are based upon preliminary information from government agencies, aviation organizations, press information and other sources. This information may not be entirely accurate.

Autopilot Disconnect Leads to Undershoot

Boeing 727-223. Substantial damage.
No injuries.

The captain of the Boeing 727-223 reported that the Category II approach was coupled until he recognized the approach lights through the fog. He uncoupled the autopilot and manually flew the aircraft about 150 feet to 200 feet above ground level (AGL).

A below-glidepath deviation quickly developed, progressing to approach light impact and ground contact on an asphalt surface about 400 feet short of the runway threshold. The airplane continued straight ahead through the approach lights, throwing up debris that damaged trailing edge flaps , the aft fuselage and engine cowls. A right main gear tire was also cut. The airplane then rolled out normally and taxied to the gate without injury to the 132 passengers and six crew aboard.

The runway was equipped with ALSF-1 approach lights, touchdown zone lights, high intensity runway lights and centerline lights. Weather during the daylight approach was RVR 1200. After descending on the final approach segment, the tower reported RVR 700. Winds were near calm.

It was recommended that CAT II approaches be coupled down to 80 feet AGL, the air carrier's minimum certified disconnect altitude for nonautoland 727s. The captain reportedly had flown the 727 since 1988, but had made very few CAT II approaches.

Wrong Numbers Cause Tail Scrape

Boeing 757-200. Substantial damage.
No injuries.

When computing takeoff data, the copilot inadvertently used Boeing 767 data. V_1, VR and V_2 were calculated as 115, 118 and 129 knots instead of the correct 145, 148 and 152 knots. The pilot did not confirm the calculations and both pilots set their airspeed bugs incorrectly. During liftoff, the aircraft over-rotated and the aft fuselage contacted the runway. The crew noted a jolt but continued flight after talking with maintenance personnel. A subsequent investigation revealed that the aft pressure bulkhead was damaged. The aircraft landed safely, and there were no injuries to the 169 passengers and seven crew.

Factors contributing to the daylight incident were inadequate pre-flight planning, excessive rotation, improper use of the flight manual and poor pilot supervision.

Inadequate Training Leads To Fatal Crash

DC-3 Dakota/C-47. Aircraft destroyed.
Fatal injuries to three.

During a training flight, the aircraft entered a spin after completing a turn at 3,000 feet MSL (2,200 feet AGL), recovered, entered a second spin and crashed. The aircraft was destroyed by impact and fire. The wreckage was found with the gear and flaps fully extended and the elevator trim set in the full nose-up position. The copilot had 30 hours in this aircraft type. No record was found that he had been trained in approaches to stalls. No pre-impact failure was discovered.

An investigation concluded that flight supervision was inadequate and that excessive trim operation hampered adequate spin recovery. The investigation also cited inadequate pilot and copilot experience and recency of experience as contributing factors in the accident.

Windshield Moisture Leads To Departure Surprise

Britten-Norman Islander. Substantial damage.
No injuries.

The aircraft was departing on a freight flight a few hours after midnight in the winter. Before starting the engines of the piston-powered twin-engine aircraft, the pilot had a layer of frost removed from the windshields.

During taxiing, the pilot noticed that moisture was forming both on the outside and inside of the windshield. The aircraft heater, which also defrosted the windshield, had been turned on but had not become effective. The pilot reported that he was having problems with the cockpit lighting and that runway and terminal building lights were being distorted by the moisture on the windshield. After holding for a short time, the aircraft was cleared for takeoff.

The pilot stated that during the takeoff roll a bump was experienced similar to that caused by driving an automobile over a reflector on a highway. During the climbout, the pilot realized that his takeoff may not have been on the runway centerline and that he may have confused the runway edge lights for the runway centerline lights. He continued the flight and landed without incident.

Inspection of the aircraft revealed damage to one of the propeller tips, the nose landing gear leg and a cut tire. Damage was also found to the bulkhead in the nosewheel area. The pilot reported that as he taxied onto the runway for the takeoff, he must have mistaken the taxiway edge lines for the centerline. At that airport, a broad white painted line designates the boundary between the main runway surface and wide, paved shoulders.

Corporate Executive

Hydroplaning Sends Lear Careening off Runway

Gates Learjet-35 Transcontinental. Substantial damage. No injuries.

During a second night landing attempt in a thunderstorm, the pilot could not stop or maintain directional control due to hydroplaning. The aircraft went off the right side, 7,000 feet down the runway, struck runway lights and caused substantial damage to the right gear and wing. Factors causing the accident included a water-covered runway, inadequate hazard notification, rain and a cross wind. The thrust reverser system was not used.

Tired Pilot Puts the Lights Out

Beech 60 Duke. Substantial damage. No injuries.

The business twin was approaching to land at approximately 2000 hours. Weather was not a factor.

The pilot conducted the approach at a higher-than-normal airspeed to accommodate faster traffic following behind his aircraft. However, he did not take note of an increased rate of descent that accompanied the faster airspeed and did not adjust his approach descent angle accordingly.

The aircraft struck 17 approach lights and five support structures, but the pilot managed to land safely. An investigation concluded that the pilot was experiencing fatigue and misjudged altitude and distance. Darkness was also considered a factor.

Other General Aviation

Runway Ridge Adds Bounce To Hot Approach

Piper Seneca. Substantial damage.
No injuries.

The light, twin-engine aircraft was approaching to land with a pilot and five passengers aboard. The pilot made a visual landing approach with 10 degrees of flaps at 90 mph (78 knots) into an 18-knot headwind.

The aircraft touched down smoothly just beyond the threshold, and the nosewheel lowered onto the runway after approximately three seconds. As the aircraft rolled through a runway intersection, the nosewheel struck a surface ridge that caused the nose to pitch up. When the nosewheel again contacted the ground, its supporting structure failed, and the right side windscreen split.

The aircraft continued to porpoise uncontrollably because of suspension recoil, and the second nosewheel impact caused further damage to the nosewheel structure and to the aircraft's starboard propeller tips. The pilot eventually regained control of the aircraft and was able to taxi clear of the runway. All of the occupants were able to vacate the aircraft without injury.

The approach had been observed by a tower controller and by a flight instructor who was in an aircraft that was holding near the runway threshold. Both observers reported that the aircraft had approached abnormally fast, and that it had porpoised after landing.

Set-up for Trouble Succeeds

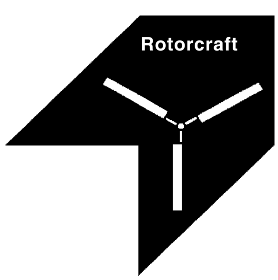
American Aircraft 1-B. Substantial damage. Serious injuries to one.

The aircraft's engine had been operating for approximately 10 minutes before takeoff. Prefight engine runup checks were normal and no problems were noted by the pilot during takeoff.

At a height of approximately 100 feet the engine lost nearly all power and the pilot attempted to return to the runway. He lost control during the turn, and the aircraft impacted the ground.

Investigation revealed that the pilot had been fueling the aircraft with a mixture of avgas and unleaded automotive fuel; the aircraft was not approved for automotive fuel. The weather conditions were suitable for the formation of carburetor ice at any power setting, and the use of automotive fuel increased the possibility of induction icing. Also, the mounting screws for the stall warning sensor on the wing were loose, and the system had not been adequately maintained. Investigators indicated that the stall warning system was inoperative at the time of the accident.

Significant factors included weather conditions favorable for carburetor ice, use of non-approved fuel, the pilot's decision to turn back at too low an altitude after the power failure, the poor condition of the stall warning system and the pilot's failure to maintain adequate flying airspeed.



Distractions and Turbulence End Ambulance Mission

Messerschmitt-Bölkow-Blohm BK117. Aircraft destroyed. Serious injuries to one.

The air ambulance helicopter was operating at night from a temporary landing zone in a parking lot. As the pilot was preparing to take off on a mission to pick up a patient from another location, he saw personnel in the landing zone and advised the dispatcher of the lack of security. After liftoff, the helicopter encountered turbulence and Venturi effect from wind blowing around the buildings. The pilot's attention was also directed to the people in the landing area. The helicopter drifted backward and the tail rotor struck the top of a garage. The aircraft entered an uncontrolled spin and crashed.

An investigation concluded that the pilot was distracted by the presence of people in the landing zone and that this occurred in conditions of unfavorable wind and turbulence.

Reduced Visibility Brings Sikorsky Down

Sikorsky S-76. Substantial damage. Serious injuries to two. Minor injuries to two.

The helicopter was en route operating below a cloud layer between two uncontrolled heliports. It encountered reduced visibility, and the pilot rotated the helicopter to the right, lowered the collective and tried to fly out. The helicopter struck trees with the main rotor and settled to the ground on the left side.

An investigation determined that VFR procedures were disregarded and that visibility was obscured by low ceilings and fog. ♦