

**TRANSACTIONS OF SOCIETY OF ACTUARIES
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**REPORT OF THE COMMITTEE ON AVIATION
AND HAZARDOUS SPORTS**

AVIATION STATISTICS

This report covers statistics obtained from United States and Canadian governmental sources, both civilian and military, supplemented by publications of the aviation industry. The emphasis in the report is primarily on the 1983 and 1984 data that have become available during the past two years. Data for earlier periods are included for comparison and for indication of trends.

UNITED STATES CIVIL AVIATION

United States Civil Aviation can be divided into two types: Commercial Air Carriers and General Aviation. Commercial Air Carriers can be divided into Certificated Route Air Carriers, Air Taxi, Commuter Air Carriers, Supplemental Air Carriers, Commercial Operators, Commercial Operators of Large Aircraft, and Air Travel Clubs. Definitions of what constitutes a particular aviation type or activity are formulated by the Civil Aeronautics Board or the Federal Aviation Administration. This report covers the mortality experience of Certificated Route Air Carriers and General Aviation.

Pilots engaged in air carrier flying may not, under government regulations, fly more than 100 hours per month or more than 1,000 hours per year in domestic operations. Pilots in international operations are generally limited to 100 hours per month or 300 hours every 90 days depending upon the size of the flight crew. Certificated Route Air Carrier pilots, in particular, under a union-negotiated contractual obligation, are allowed to fly a maximum of 700 to 800 hours per year. Some air carriers, whose numbers are increasing, have no such union obligation and generally require pilots to fly the maximum annual number of regulation hours.

Certificated Route Air Carriers (Passenger/Cargo)

Certificated Route Air Carriers hold certificates of public convenience and necessity (issued by the Civil Aeronautics Board) authorizing the performance service over specified routes and a limited amount of nonscheduled service. They are divided into two groups: passenger/cargo and all cargo.

As defined by the Civil Aeronautics Board, "domestic" operations are, in general, within the 50 states of the United States, including intra-Alaska

and intra-Hawaii operations. In general, "international" (technically, "international and territorial") operations are outside the territory of the United States including operations between the United States and foreign countries and between the United States and its territories and possessions.

Table 1 shows the recent aviation fatality rates of the United States Certificated Route Air Carriers for passengers, first pilots, all pilots and copilots, and other crew members in domestic and international flying. Lives exposed as "All Pilots and Copilots" and "Other Crew Members" include persons who may do the less-than-normal amounts of flying because of supervisory duties or other reasons. Helicopter airlines that are also Certificated Route Air Carriers are excluded from the experience in Table 1.

TABLE 1
UNITED STATES CERTIFICATED ROUTE AIR CARRIERS
(PASSENGER/CARGO) AVIATION DEATH RATES*

Years	Passenger Rate per 1,000 Scheduled Passenger-Hours†	First-Pilot Rate per 1,000 Scheduled Airplane-Hours†	All Pilot and Copilot Rate per 1,000 Life-Years‡	Other Crew Member Rate per 1,000 Life-Years‡
Domestic Operations				
1975-1979 ...	0.0002 (11)	0.0002 (6)	Not Available	
1980-1984 ...	0.0001 (8)	0.0002 (6)		
1983	0.0000 (3)	0.0003 (2)§		
1984	0.0000 (1)§	0.0001 (1)§		
International Operations				
1975-1979 ...	0.0002 (2)	0.0003 (1)§	Not Available	
1980-1984 ...	0.0000 (1)§	0.0000 (0)§		
1983	0.0000 (0)§	0.0000 (0)§		
1984	0.0000 (0)§	0.0000 (0)§		
Domestic and International Operations				
1975-1979 ...	0.0002 (13)	0.0002 (7)	0.1113 (9)	0.1746 (7)
1980-1984 ...	0.0001 (9)	0.0002 (6)	0.0825 (6)	0.0363 (5)
1983	0.0000 (3)	0.0003 (2)§	0.1422 (2)§	0.0332 (2)§
1984	0.0000 (1)§	0.0001 (1)§	0.0689 (1)§	0.0154 (1)§

*Number of fatal accidents shown in parentheses.

†Based on scheduled operations only; experience of helicopter carriers is excluded.

‡Based on all operations, scheduled and nonscheduled; experience of helicopter carriers is excluded.

§Based on five or fewer fatalities.

In some prior studies, mortality rates of crew members have been given separately for domestic and international operations. A review of the exposure information revealed that the split into domestic and international has not always been accurate. Therefore, the rates for this study are given for combined domestic and international operations.

Certificated Route Air Carriers (All-Cargo)

Carriers in this class hold temporary certificates of public convenience and necessity issued by the Civil Aeronautics Board authorizing the operation of scheduled air freight express and mail transportation over specified routes as well as nonscheduled flights that may include passengers.

Prior studies showed that there had been no pilot fatalities in the period 1973–1982. There was one fatal accident in 1983 and one in 1984. The 1983 accident involved three fatalities, the entire crew of the airplane. The 1984 accident involved the deaths of four people, the entire crew and one passenger.

Unfortunately, all-cargo exposure data were not available at the time of this report. Therefore, it is not possible to calculate fatality rates.

AIR CARRIERS OF COUNTRIES OTHER THAN THE UNITED STATES

The general conditions in aviation technology unique to any country influence the hazards of flying in that country. Each country has its own aviation regulations and methods of enforcement. These regulations can differ for domestic and international operations, the latter being affected by international agreements on the crossing of international boundaries.

World Air Transport Statistics, a publication of the International Air Transport Association (IATA), reports on the operation of association members. IATA member airlines numbered 134 on December 31, 1984. Of the 134 members, 117 reported data to the IATA. The reporting IATA members carried 63% of the world's passenger air traffic in 1984 and 60% in 1983. United States membership, which has fluctuated in recent years, stood at twelve passenger/cargo air carrier members in 1984 and seven in 1983. Of the 1984 members, however, three did not report statistics to IATA.

Table 2 gives passenger fatality rates per 1,000 scheduled passenger-hours. Comparing the periods 1975–1979 and 1980–1984, the safety record of airlines in countries other than the United States has shown improvement but continues to be less favorable than that of the United States scheduled airlines.

TABLE 2
 SCHEDULED AIR CARRIERS (PASSENGER/CARGO)
 OF UNITED STATES AND OTHER COUNTRIES
 PASSENGER DEATH RATES PER 1,000 SCHEDULED PASSENGER-HOURS*

Years	Members Reporting to IATA		All United States Air Carriers
	Countries Other Than the United States	United States	
1975-1979.....	0.0007 (1,828)	0.0002 (470)	0.0002 (540)
1980-1984.....	0.0004 (1,360)	0.0001 (138)	0.0001 (230)
1983.....	0.0006 (493)	0.0000 (0)	0.0000 (8)
1984.....	0.0000 (40)	0.0000 (0)	0.0000 (1)

*Number of fatalities shown in parentheses.

In 1984, 35% of the scheduled passenger-hours reported to IATA were flown by the United States members. This is an increase from 28% in 1982 and 34% in 1980. United States IATA members also accounted for 66% of the scheduled airline passenger-hours flown by all United States Certificated Route Air Carriers in 1984. This is an increase from 49% in 1982 and 57% in 1980. The combined international and domestic scheduled experience of all United States Certificated Route Air Carriers (passenger/cargo) is included in Table 2 for comparison.

UNITED STATES GENERAL AVIATION

General Aviation is divided into 11 use categories: Aerial Application, Aerial Observation, Commuter Air Carrier, Demand Air Taxi, Business Transportation, Executive Corporate Transportation, Instructional Flying, Personal Flying, Rental Aircraft, Other Work Use, and Other. The flying time in General Aviation during 1984 was 5.24 times that of the Certificated Route Air Carriers (passenger/cargo) domestic flights. This is a decline from the figures of 6.56 in 1980 and 6.14 in 1982.

Prior to 1977, the FAA collected statistics on General Aviation by sending a registration to all General Aviation aircraft owners each January requesting such information as the number of hours flown and the primary use of each aircraft. The data were compiled and adjusted for nonreporting aircraft. Beginning in 1977, a sample of approximately 14% of all registered General Aviation aircraft was selected as a basis for determining how many hours were flown by all aircraft according to primary use.

Death rates for General Aviation in Table 3 are expressed per 1,000 aircraft-hours. Although it might be helpful to relate deaths to average hours flown in a year by pilots in each category of General Aviation, such data cannot be estimated reliably from information supplied by the National

Transportation Safety Board and the FAA. Some distortion in death rates by type of flying can occur because the methods used for assigning deaths are not entirely consistent with those used for assigning aircraft hours. Both rotary- and fixed-wing aircraft are included.

TABLE 3
GENERAL AVIATION FLYING BY KIND
PILOT AVIATION DEATH RATES PER 1,000 AIRCRAFT-HOURS*

Years	Pleasure	Instruction	Business	Corporate	Aerial Application	Air Taxi
1975-1979 ..	0.030 (1,904)	0.008 (222)	0.008 (276)	0.004 (75)	0.010 (108)	0.011 (214)
1980-1984 ..	0.032 (1,850)	0.006 (153)	0.009 (317)	0.002 (62)	0.010 (100)	0.010 (152)
1983	0.038 (416)	0.006 (29)	0.009 (53)	0.001 (6)	0.009 (15)	0.011 (28)
1984	0.033 (374)	0.006 (29)	0.010 (67)	0.001 (4)	0.010 (20)	0.008 (23)

*Number of fatalities shown in parentheses.

The six categories of Pleasure, Instruction, Business, Corporate, Aerial Application, and Air Taxi made up 91% of the total General Aviation flying hours during the period 1980-1984.

In the five-year period 1980-1984, Pleasure flying accounted for about 31% of pilots' flying time in General Aviation. Death rates in this category are probably overstated because there is a tendency for pilots to understate the amount of time they spend Pleasure flying and overreport the amount of time they spend on other flying. In Table 3, Rental hours are included in Pleasure hours on the assumption that most pilots renting planes do so for pleasure purposes.

Instruction flying in the 1980-84 period represents about 14% of the total hours flown in General Aviation. The experience under flight training of civilians includes the death of either the instructor or the student, depending on who was acting as pilot when the accident occurred. Practice flying not under the supervision of an instructor, either in the air or on the ground, is not included in the Instruction category.

The combined Business and Corporate categories account for approximately 33% of the total General Aviation hours in the 1980-84 period. Business flying is done by nonprofessional pilots flying for business reasons. Corporate flying is done by professional pilots receiving a direct salary or compensation for piloting an aircraft (not for public hire) operated by a corporation or business firm for the transportation of personnel and/or cargo and furtherance of the company's business.

Air Taxi flying accounted for approximately 8% of the total General Aviation hours in 1980–1984. This type of flying includes scheduled and non-scheduled passenger and cargo flying by professional pilots other than Corporate and not done by Certificated Route Air Carriers, Charter Air Carriers, or Commercial Operators. Table 3 includes both scheduled and nonscheduled Air Taxi flying.

Aerial Application, which accounted for approximately 5% of General Aviation flying during 1980–1984, includes firefighting operations and the distribution of chemicals or seeds in agricultural, reforestation, and insect control. Pilot fatality rates in this category have traditionally been higher than those in other commercial activities, but in the years after 1975 have shown improvement. For example, the pilot death rate for 1971–1974 was 0.018.

CANADIAN CIVIL FLYING

Canadian airlines aviation fatality rates are not available for the publication of this report. Statistics Canada has discontinued the publication that was used in the past to complete this table, and the committee has not been able to locate an appropriate source of data for passenger-hours and airplane-hours.

The fatality rates among Canadian civil pilots, by class of license, are shown in Table 4 for 1975–79, 1980–84, 1983 and 1984, based on figures furnished by Transport Canada. Note that many pilots holding licenses may be inactive and that pilots holding airline transport licenses are not necessarily flying for scheduled airlines, because they may engage in other types of flying.

TABLE 4
CANADIAN CIVIL PILOTS BY CLASS OF LICENSE
1980-84 AVIATION FATALITY RATES

Class of License	Period	Life-Years of Exposure	Aviation Fatalities	Rate per 1000 Life-Years of Exposure
Glider.....	1975-79	13,117	6	0.46
	1980-84	21,020	0	0.00
	1983	4,487	0	0.00
	1984	4,600	0	0.00
Private (excluding students)....	1975-79	176,237	182	1.03
	1980-84	201,612	136	0.67
	1983	40,014	22	0.55
	1984	39,041	19	0.49
Commercial.....	1975-79	37,122	124	3.34
	1980-84	41,563	73	1.76
	1983	7,936	12	1.51
	1984	7,907	12	1.52
Senior commercial.....	1975-79	4,779	17	3.56
	1980-84	6,443	10	1.55
	1983	1,307	3	2.29
	1984	1,239	1	0.81
Airline transport.....	1975-79	20,621	39	1.89
	1980-84	29,897	32	1.07
	1983	6,260	3	0.48
	1984	6,316	18	2.85

UNITED STATES MILITARY

General

As in previous reports, deaths due to hostile action are omitted. Where available, the experience has been grouped in five-year intervals. The statistics furnished are shown on a calendar-year basis.

In the aggregate, Air Force experience for each of 1983 and 1984 is significantly more favorable than that reported for 1981 and 1982. The number of recent reported fatalities among Air Force pilots is approximately 50% lower than those of prior years. For nonpilot-rated officers, the reduction in fatalities is more than 50%.

For the Army, pilot experience for 1983 and 1984 appears more favorable than that of 1982 (1.5 per 1,000).

Experience of Navy and Marine Corp Pilots is not included in this report; mean strength data have not been available since 1981.

Age and Rank

Tables 5 and 6 show aviation fatality rates by age group and rank, respectively, for Air Force pilots and nonpilot-rated officers (that is, those with duties other than pilots, such as navigators and observers).

The information received should refer to all active-duty personnel with full-time flying duties. The category of proficiency flying was discontinued many years ago.

Based on data furnished in recent years, the fatality rates for Air Force pilots and nonpilot-rated officers are lower in almost every age group except those under 25. The pattern of fatality still bears out the highest rates among the youngest ages for Air Force personnel. However, most categories have few fatalities.

As for distribution by rank among Air Force personnel, the categories are generally based on a limited number of fatalities.

TABLE 5
 UNITED STATES AIR FORCE, NAVY, AND MARINE CORPS FLYERS, BY AGE
 AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE
 DEATHS DUE TO HOSTILE ACTION EXCLUDED

Age Group	1975-1979	1980-1984	1983	1984
Air Force Pilots				
Under 25	2.2	3.8	3.4	2.7
25-29	2.3	1.8	0.4*	0.8*
30-34	2.4	1.5	0.2*	0.5*
35-39	1.8	1.1	0.4*	0.0*
40 and Over	1.5	0.5*	0.0*	1.1*
All	2.2	1.9	1.1	1.3
Air Force Nonpilot-Rated Officers				
Under 25	2.1	3.8	2.7	1.1*
25-29	2.0	1.0	0.4*	0.0*
30-34	1.3	1.5	0.0*	0.0*
35-39	1.3	1.5*	0.0*	2.5*
40 and Over	1.6*	1.4*	0.0*	0.0*
All	1.8	1.8	1.0	0.6*
Navy and Marine Corps Pilots				

Distribution of mean strengths (exposures) not available since 1981.

*Based on five or fewer deaths.

TABLE 6
 UNITED STATES AIR FORCE, NAVY, AND MARINE CORPS FLYERS, BY RANK
 AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE
 DEATHS DUE TO HOSTILE ACTION EXCLUDED

Rank (Pay Grade)	1975-1979	1980-1984	1983	1984
Air Force Pilots				
2nd Lieutenant (0-1)	2.5	1.4	1.2*	0.0*
1st Lieutenant (0-2)	2.3	2.1	1.6*	2.4
Captain (0-3)	2.3	1.8	1.3	1.1
Major (0-4)	1.9	2.4	0.3*	1.2*
Lieutenant Colonel (0-5)	1.3	1.6	0.6*	1.1*
Colonel and General (0-6 and up)	1.5*	0.9*	1.5*	1.4*
All	2.2	1.9	1.1	1.3
Air Force Nonpilot-Rated Officers				
2nd Lieutenant (0-1)	1.1*	1.9	0.0*	0.0*
1st Lieutenant (0-2)	2.8	1.6	2.2*	0.0*
Captain (0-3)	1.6	1.8	0.9*	1.0*
Major (0-4)	1.3	2.2	1.1*	1.0*
Lieutenant Colonel (0-5)	1.3*	2.2*	0.0*	0.0*
Colonel and General (0-6 and up)	0.0*	0.0*	0.0*	0.0*
All	1.8	1.8	1.0	0.6*
Navy and Marine Corps Pilots				

Distribution of mean strengths (exposures) not available since 1981.

*Based on five or fewer deaths.

Duty Assignment

Table 7 presents aviation fatality rates among Air Force pilots.

Many of the categories for 1983 and 1984 show fatality rates based on a limited number of deaths. For five-year experiences, Air Force pilots continue to show highest rates for helicopters and observation and fighter planes.

TABLE 7
UNITED STATES AIR FORCE, NAVY, AND MARINE CORPS PILOTS,
BY DUTY ASSIGNMENT
AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE
DEATHS DUE TO HOSTILE ACTION EXCLUDED

Duty Assignment	1975-1979	1980-1984	1983	1984
<i>Air Force Pilots</i>				
Search Rescue	0.0*	0.0*	0.0*	0.0*
Helicopter	3.3	4.3	0.0*	3.9*
Tanker	1.4	0.0*	0.0*	0.0*
Bomber	1.3	2.0	13.0*	0.0*
Reconnaissance	2.2	1.7	0.0*	1.4*
Trainer	1.0	0.8	0.8*	0.5*
Cargo	1.0	2.1	1.0*	1.5*
Observation	4.3	5.7	0.0*	5.3*
Fighter	4.7	3.3	1.6*	1.7*
Utility	4.7	0.8*	0.0*	0.0*
Liaison	0.0*	0.0*	0.0*	0.0*
Fighter Bomber†	—	1.7	1.4	1.7
All	2.2	1.9	1.1	1.3

Navy and Marine Corps Pilots

Distribution of mean strengths (exposures) not available since 1981.

*Based on five or fewer deaths.

†Fighter Bomber not shown separately prior to 1981.

Military Air Command (MAC)

Aviation fatality rates among pilots and crew members of MAC, a branch of the Air Force, are shown in Table 8. The last year for which complete information was available was 1980. No information was available for 1981, 1982, and 1983. For 1984, the only available information is for all units combined. Reported fatalities are relatively few.

TABLE 8
MILITARY AIR COMMAND (MAC)
AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE
DEATHS DUE TO HOSTILE ACTION EXCLUDED

	1975-1979	1980*	1984*
Pilots			
Transport units.....	1.2	0.0†	N/A
Other units.....	0.2†	1.0†	N/A
All.....	0.8	0.5†	1.1†
Crew members			
Transport units.....	2.0	0.0†	N/A
Other units.....	0.4†	1.9†	N/A
All.....	1.6	0.8†	0.0†

*Information on fatalities is not available for 1981, 1982, 1983; it is available only for all units for 1984.

†Based on five or fewer deaths.

United States Army

Table 9 includes data for all flying operations among nonstudent Army pilots and crew members. The experience for pilots as well as crew members was more favorable in 1984 than in 1983. Army flying is done primarily in rotary-wing aircraft, for which the 1984 fatality rate is lower than that of prior years.

TABLE 9
UNITED STATES ARMY—ALL FLYING OPERATIONS
DEATHS DUE TO HOSTILE ACTION EXCLUDED

	1975-1979	1980-1984	1983	1984
Aviation Fatality Rates per 1,000 Life-Years of Exposure				
Pilots.....	1.0	1.1	1.1	0.6
Crew members.....	1.7	1.4	2.1	1.1*
Pilot Fatality Rates per 1,000 Aircraft-Hours				
Fixed-wing aircraft.....	0.0220	0.0110	0.0000*	0.0164*
Rotary-wing aircraft.....	0.0152	0.0258	0.0506	0.0135
All types of aircraft.....	0.0163	0.0227	0.0345	0.0141

*Based on five or fewer deaths.

Student Pilots

Table 10 presents aviation fatality rates for student pilots in the Air Force and the Army, the latter representing rotary-wing aircraft only.

Rates are not shown for the Navy and Marine Corps because of the unavailability of appropriate information since 1981.

TABLE 10
STUDENT PILOTS
UNITED STATES AIR FORCE AND ARMY
AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE

	1975-1979	1980-1984	1983	1984
Air Force*	0.7†	1.4	1.6†	1.0†
Army	2.1	0.9	0.0†	2.3†

*Commissioned officers only.

†Based on five or fewer deaths.

Coast Guard

Table 11 displays the aviation fatality rates for Coast Guard personnel on flight orders. For 1983 and 1984, there were no reported fatalities. There have been no aviation fatalities among Coast Guard student pilots for the last 28 years.

TABLE 11
UNITED STATES COAST GUARD
AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE

	1975-1979	1980-1984	1983	1984
Aviators	2.0	1.5	0.0*	0.0*
Observers	9.7*	0.0*	0.0*	0.0*
Crew members	0.5*	0.6	0.0*	0.0*
Student pilots	0.0*	0.0*	0.0*	0.0*

*Based on five or fewer deaths.

Active Reserves and National Guard

Table 12 shows the aviation fatality rates for members of the active reserves and national guards. Such pilots generally fly on weekend and/or short-term (usually two weeks) training duty. Because of the unavailability of appropriate information since 1981, the rates for Navy and Marine Corps

Reserves are not included. As for Army Reserves, 1984 data are not available. The rate for 1983 is based on few deaths. Air National Guard experience has been quite favorable since 1981. Army National Guard experience has been favorable for the periods shown in the table.

TABLE 12
 PILOTS IN THE ACTIVE RESERVES AND NATIONAL GUARD
 AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE

	1975-1979	1980-1984	1983	1984
Army Reserves	0.5*	0.8*†	2.2*	†
Air National Guard	2.4‡	0.9	0.8*	0.8*
Army National Guard	0.5	0.4	0.2*	0.8*

*Based on five or fewer deaths.
 †Based on data excluding 1984, for which year data are not available.
 ‡Based on data excluding 1979, for which year data are not available.

Air Force Flight Surgeons and Nurses

During the five-year period 1980-1984, there were no fatalities reported among Air Force Flight Surgeons. During this same period, the aviation fatality rate per 1,000 life-years of exposure for flight nurses was 1.0; this rate is based on five or fewer deaths.

CANADIAN MILITARY

Aviation fatality rates among Canadian regular military forces, excluding reserves, are shown in Table 13 by age, rank, and functional classification.

The average number of flying hours for all pilots combined has remained steady over the five-year period at approximately 280 hours per year and shows little variation by age group. Crew members average about 325 hours per year. There is some variation by functional classification, but this cannot be determined accurately because of duplicate counting in different functions. Pilots and crew members flying more than one type of aircraft are counted in each function in which flying is done.

The extent of overstatement by type of aircraft is unknown. The adjusted average annual flying time for pilots and crew in the transport and maritime categories is considerably higher than for that in the categories of fighter, training, and helicopter. The former group averages 325 hours per year and the latter approximately 140 hours per year.

TABLE 13
CANADIAN REGULAR FORCES
1980-1984 AVIATION FATALITY RATES PER 1,000 LIFE-YEARS OF EXPOSURE[†]

	1974-1978		1980-1984 [†]		1983		1984	
	Pilots	Crew	Pilots	Crew	Pilots	Crew	Pilots	Crew
Age group:								
Under 25	2.9 (3)	0.0 (0)	0.4 (7)	0.6 (4)	0.3 (1)	0.0 (0)	0.3 (1)	0.0 (0)
25-29	5.8 (10)	0.6 (1)	0.4 (9)	0.2 (3)	0.2 (1)	0.0 (0)	0.2 (1)	0.0 (0)
30-34	5.5 (12)	2.0 (4)	0.3 (4)	0.3 (4)	0.4 (1)	0.0 (0)	0.0 (0)	0.4 (1)
35-39	2.4 (4)	0.0 (0)	0.2 (3)	0.3 (6)	0.0 (0)	0.0 (0)	0.0 (0)	0.3 (1)
40 and over	1.5 (3)	1.5 (3)	0.1 (1)	0.1 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
All	3.7 (32)	1.0 (8)	0.3 (24)	0.3 (19)	0.2 (3)	0.0 (0)	0.1 (2)	0.1 (2)
Rank:								
Lieutenant and lower rank	2.9 (4)	1.6 (8)	0.3 (7)	0.3 (15)	0.2 (1)	0.0 (0)	0.2 (1)	0.2 (2)
Captain	5.5 (26)	0.0 (0)	0.4 (16)	0.1 (2)	0.2 (2)	0.0 (0)	0.1 (1)	0.0 (0)
Major	1.1 (2)	0.0 (0)	0.0 (0)	0.2 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Lieutenant Colonel and higher rank	0.0 (0)	0.0 (0)	0.2 (1)	0.7 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
All	3.7 (32)	1.0 (8)	0.3 (24)	0.3 (19)	0.2 (3)	0.0 (0)	0.1 (2)	0.1 (2)
Functional classification:‡								
Fighter	6.2 (13)	0.0 (0)	0.5 (10)	0.2 (1)	0.8 (3)	0.0 (0)	0.3 (1)	0.0 (0)
Training	1.6 (7)	0.0 (0)	0.1 (5)	0.3 (2)	0.0 (0)	0.0 (0)	0.0 (0)	1.1 (1)
Transport	0.0 (0)	0.0 (0)	0.3 (7)	0.4 (13)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Maritime	3.1 (3)	0.8 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Helicopter	3.1 (7)	3.3 (6)	0.0 (1)	0.0 (1)	0.0 (0)	0.0 (0)	0.2 (1)	0.2 (1)
Others	4.7 (2)	0.0 (0)	0.2 (1)	0.7 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
All	2.6 (32)	0.0 (8)	0.2 (24)	0.2 (19)	0.0 (3)	0.0 (0)	0.1 (2)	0.1 (2)

*The number of fatalities is shown in parentheses.

†1980-1984 data are compared with 1974-1978 instead of 1975-1979 because of the unavailability of 1979 data.

‡The fatality rates by functional classification are understated because some pilots and crew members fly more than one type of aircraft. The extent of understatements in total can be determined by comparing the fatality rates of the "All" categories.

The functional classification "Others" largely comprises pilots who ferry planes to air bases and test new planes, both accepted and experimental models. It also includes a small number of pilots whose primary assignment is on the ground but who occasionally fly to maintain proficiency.

INTERCOMPANY EXPERIENCE

This year's report and the data contained in Tables 14-16 are based on the 1983-84 calendar year experience for issues of 1967 and subsequent calendar years. In addition, each of the tables shows the experience between 1971-74, 1975-78, 1979-80, and 1981-82 for issues of 1967 and subsequent years for comparison purposes over the five periods.

All experience is by number of policies, and the insured is classified according to status at the time of application of insurance. Policies with an aviation exclusion clause are not included. Exposure for policies with aviation extra premium is terminated when the extra premium is discontinued. For those policies with civilian flying hazards and for which there is still an aviation hazard after discontinuance of the extra premium, companies were encouraged to transfer the exposure to the "Without Aviation Extra Premium" category. Not all companies were able to do this, and consequently, the experience for that category includes only a portion of such cases.

In analyzing the data, keep in mind that the criteria by which the lives are classified are determined largely by the facts at time of issue. The older the issue, the greater the chance that the classification does not properly reflect current flying activity. The data used were submitted by five companies, as compared with eight companies contributing to the study two years ago. This has caused a substantial decrease in the exposure.

Civilian Aviation

Table 14 covers the experience for various classifications of pilots for policies issued with and without aviation extra premiums. The "Scheduled Airline" classification includes United States certificated route air carriers and corresponding major Canadian airlines. The "Corporate" classification covers hired pilots flying company-owned planes. The "Charter and Other Airlines" classification comprises the supplemental air carriers and intrastate and foreign airlines as well as air taxi and charter operations. The "Others" classification includes corporate and charter pilots insured by companies unable to subdivide their data, as well as specialty pilots in such occupations as aerial application, pipeline survey, advertising, and photography. Pilots

TABLE 14

INTERCOMPANY EXPERIENCE ON PILOTS
IN CIVILIAN AVIATION—BY POLICIES*
(1971-74, 1975-78, 1979-80, 1981-82, and 1983-84 Experience
on 1967 and Subsequent Issues)

Status at Issue	Years	With Aviation Extra Premium			Without Aviation Extra Premium		
		Years of Exposure	Aviation Fatalities	Rate per 1,000	Years of Exposure	Aviation Fatalities	Rate per 1,000
Scheduled airline pilots	1971-74	625	1	1.6	1,842	6	3.3
	1975-78	570	2	3.5	7,790	6	0.8
	1979-80	204	1	4.9	3,423	1	0.3
	1981-82	127	0	0.0	2,394	0	0.0
	1983-84	77	0	0.0	1,485	0	0.0
Other commercial pilots flying for hire:							
Instructing (at least half-time)	1971-74	3,664	10	2.7	231	1	4.3
	1975-78	4,312	16	3.7	506	0	0.0
	1979-80	1,977	0	0.0	307	0	0.0
	1981-82	1,085	1	0.9	433	1	2.3
	1983-84	612	3	4.9	322	0	0.0
Corporate	1971-74	1,881	2	1.1	3,064	1	0.3
	1975-78	2,470	7	2.8	4,447	5	1.1
	1979-80	1,136	4	3.5	2,108	2	0.9
	1981-82	729	0	0.0	2,107	3	1.4
	1983-84	238	0	0.0	1,080	0	0.0
Charter and other airlines	1971-74	2,765	10	3.6	521	1	1.9
	1975-78	3,021	12	4.0	854	1	1.2
	1979-80	1,402	6	4.3	468	1	2.1
	1981-82	572	2	3.5	598	1	1.7
	1983-84	399	1	2.5	459	0	0.0
Others†	1971-74	2,446	6	2.6	623	1	1.6
	1975-78	3,174	12	3.8	838	0	0.0
	1979-80	3,020	13	4.3	1,542	3	1.9
	1981-82	3,170	2	0.6	3,335	4	1.2
	1983-84	403	2	5.0	274	2	7.3
Private pilots	1971-74	22,275	24	1.1	85,101	87	1.0
	1975-78	26,757	25	0.9	106,122	98	0.9
	1979-80	11,899	7	0.5	54,148	47	0.9
	1981-82	6,929	2	0.3	47,219	30	0.6
	1983-84	2,850	3	1.1	21,533	11	0.5
Student pilots	1971-74	35,129	21	0.6	4,717	9	1.9
	1975-78	39,055	14	0.4	8,450	0	0.0
	1979-80	18,100	6	0.3	5,531	3	0.5
	1981-82	7,976	3	0.4	9,684	1	0.1
	1983-84	3,807	2	0.5	7,801	4	0.5
Total	1971-74	68,786	74	1.1	96,099	106	1.1
	1975-78	79,359	88	1.1	129,007	110	0.9
	1979-80	36,369	31	0.9	67,527	57	0.8
	1981-82	20,588	10	0.5	65,770	40	0.6
	1983-84	8,386	11	1.3	32,954	17	0.5

*Exposure in "With Aviation Extra Premium" category is terminated upon discontinuance of extra premium. Exposure in "Without Aviation Extra Premium" category consists of pilots active at time of issue and rated standard or reduced to standard through liberalization of underwriting rules.

†Includes exposure of companies unable to subdivide data.

with either student or private certificates are defined as (1) private pilots (if they have 100 or more solo hours of pleasure or personal business flying) or (2) students pilots (if they have less than 100 solo hours of flying).

The 1983–84 experience in the “With Aviation Extra Premium” category was worse than that for earlier years in all but one classification, a change over the last study. However, caution should be used with the recent data because of the limited exposure and deaths.

The “Without Aviation Extra Premium” experience for 1983–84, in which there are significant exposures, was similar to the 1981–82 experience.

Table 15 covers the experience for various categories of private pilots (from Table 14) for policies issued with and without aviation extra premiums. Subdivisions by hours flown, type of flying certificate, and attained age are shown. The exposure for issues without aviation extra premium includes an unknown proportion of lives who have discontinued their flying activities. The total 1983–84 experience showed a slight decrease in fatality rates for “Without Aviation Extra Premium” and an increase in fatality rates for “With Aviation Extra Premium” compared to the earlier experience. With so few deaths in the 1983–84 experience, any analysis of trends must be viewed with caution.

TABLE 15
 INTERCOMPANY EXPERIENCE ON PILOTS FLYING
 FOR PLEASURE OR PERSONAL BUSINESS—BY POLICIES*
 (1971-74, 1975-78, 1979-80, 1981-82, and 1983-84 Experience
 on 1967 and Subsequent Issues)

Status at Issue	Years	With Aviation Extra Premium			Without Aviation Extra Premium		
		Years of Exposure	Aviation Fatalities	Rate per 1,000	Years of Exposure	Aviation Fatalities	Rate per 1,000
By hours flown:†							
Under 100	{ 1971-74	11,966	8	0.7	55,081	37	0.7
	{ 1975-78	14,706	7	0.5	68,685	38	0.6
	{ 1979-80	6,422	3	0.5	34,775	24	0.7
	{ 1981-82	3,602	1	0.3	29,372	9	0.3
	{ 1983-84	1,361	2	1.5	14,449	6	0.4
100-199	{ 1971-74	5,429	5	0.9	24,138	42	1.7
	{ 1975-78	6,149	5	0.8	28,802	54	1.9
	{ 1979-80	2,842	1	0.4	14,519	17	1.2
	{ 1981-82	1,534	0	0.0	12,691	13	1.0
	{ 1983-84	720	0	0.0	5,212	4	0.8
200-299	{ 1971-74	2,309	3	1.3	2,745	2	0.7
	{ 1975-78	2,521	6	2.4	3,597	4	1.1
	{ 1979-80	1,053	1	0.9	1,740	5	2.6
	{ 1981-82	613	0	0.0	1,958	5	2.6
	{ 1983-84	292	0	0.0	843	1	1.2
300 or more	{ 1971-74	2,187	6	2.7	1,350	2	1.5
	{ 1975-78	2,810	5	1.8	2,434	1	0.4
	{ 1979-80	1,268	2	1.6	1,541	0	0.0
	{ 1981-82	865	1	1.2	1,802	2	1.1
	{ 1983-84	451	1	2.2	813	0	0.0
By type of flying certificate:							
Commercial or transport	{ 1971-74	5,982	6	1.0	17,239	20	1.2
	{ 1975-78	7,103	8	1.1	22,432	13	0.6
	{ 1979-80	3,221	2	0.6	11,789	11	0.9
	{ 1981-82	1,791	1	0.6	10,380	6	0.6
	{ 1983-84	951	0	0.0	4,419	1	0.2

TABLE 15—Continued

Status at Issue	Years	With Aviation Extra Premium			Without Aviation Extra Premium		
		Years of Exposure	Aviation Fatalities	Rate per 1,000	Years of Exposure	Aviation Fatalities	Rate per 1,000
By type of flying certificate:							
Private	{ 1971-74	16,293	18	1.1	67,862	67	1.0
	{ 1975-78	19,654	17	0.9	83,690	85	1.0
	{ 1979-80	8,678	5	0.6	42,359	36	0.8
	{ 1981-82	5,138	1	0.2	36,831	24	0.7
	{ 1983-84	1,899	3	1.6	17,114	10	0.6
By attained age:							
Under 35	{ 1971-74	14,069	11	0.8	19,134	18	0.9
	{ 1975-78	16,929	8	0.5	19,577	10	0.5
	{ 1979-80	7,102	2	0.3	8,126	12	1.5
	{ 1981-82	4,041	2	0.5	9,020	5	0.6
	{ 1983-84	1,356	2	1.5	3,179	0	0.0
35-49	{ 1971-74	6,198	12	1.9	50,507	49	1.0
	{ 1975-78	6,856	11	1.6	60,573	56	0.9
	{ 1979-80	3,169	2	0.6	29,617	22	0.7
	{ 1981-82	2,191	0	0.0	23,462	13	0.6
	{ 1983-84	1,158	0	0.0	10,747	4	0.4
50 and over	{ 1971-74	2,008	1	0.5	15,460	20	1.3
	{ 1975-78	2,972	6	2.0	25,972	32	1.2
	{ 1979-80	1,628	3	1.8	16,405	13	0.8
	{ 1981-82	697	0	0.0	14,737	12	0.8
	{ 1983-84	335	1	3.0	7,607	7	0.9
Total	{ 1971-74	22,275	24	1.1	85,101	87	1.0
	{ 1975-78	26,757	25	0.9	106,122	98	0.9
	{ 1979-80	11,899	7	0.6	54,148	47	0.9
	{ 1981-82	6,929	2	0.3	47,219	30	0.6
	{ 1983-84	2,850	3	1.1	21,533	11	0.5

*Exposure in "With Aviation Extra Premium" category is terminated upon discontinuance of extra premium. Exposure in "Without Aviation Extra Premium" category consists of pilots active at time of issue and rated standard or reduced to standard through liberalization of underwriting rules.

†Omits data where hours are not stated.

Military Aviation

Table 16 shows aviation fatality rates for military aviation pilots with policies issued only with an aviation extra premium separately for operational and administrative pilots. Administrative pilots are defined as those flying 40–150 hours annually, whereas operational pilots are defined as those flying more than 150 hours annually. Again, because of limited data in the 1983–84 experience, any trends should be viewed with caution.

TABLE 16
 INTERCOMPANY EXPERIENCE ON MILITARY PILOTS BY BRANCH OF SERVICE
 AND FLYING DUTIES—WITH AVIATION EXTRA PREMIUM*
 (1971–74, 1975–78, 1979–80, 1981–82 and 1983–84 Experience
 on 1967 and Subsequent Issues—by Policies)

Status at Issue and Attained Insurance Age	Years	Operational			Administrative		
		Years of Exposure	Aviation Fatalities	Rate per 1,000	Years of Exposure	Aviation Fatalities	Rate per 1,000
U.S. Air Force:							
Under 35.....	{ 1971–74	5,228	8	1.5	486	2	4.1
	{ 1975–78	3,546	3	0.8	469	0	0.0
	{ 1979–80	2,409	2	0.8	120	0	0.0
	{ 1981–82	1,262	0	0.0	45	0	0.0
	{ 1983–84	118	0	0.0	18	0	0.0
35 and over.....	{ 1971–74	3,369	5	1.5	1,726	3	1.7
	{ 1975–78	2,957	3	1.0	1,180	1	0.8
	{ 1979–80	4,486	7	1.6	489	0	0.0
	{ 1981–82	2,372	6	2.5	259	0	0.0
	{ 1983–84	503	0	0.0	149	0	0.0
Total.....	{ 1971–74	8,597	13	1.5	2,212	5	2.3
	{ 1975–78	6,503	6	0.9	1,649	1	0.6
	{ 1979–80	6,895	9	1.3	609	0	0.0
	{ 1981–82	3,634	6	1.6	304	0	0.0
	{ 1983–84	621	0	0.0	167	0	0.0
U.S. Army:							
Under 35.....	{ 1971–74	3,830	11	2.9	2,436	2	0.8
	{ 1975–78	3,367	6	1.8	1,810	0	0.0
	{ 1979–80	2,076	0	0.0	471	1	2.1
	{ 1981–82	1,113	0	0.0	97	0	0.0
	{ 1983–84	82	0	0.0	47	0	0.0
35 and over.....	{ 1971–74	783	1	1.3	1,172	2	1.7
	{ 1975–78	1,208	4	3.3	1,351	1	0.7
	{ 1979–80	1,546	0	0.0	763	0	0.0
	{ 1981–82	478	0	0.0	375	0	0.0
	{ 1983–84	367	0	0.0	218	0	0.0
Total.....	{ 1971–74	4,613	12	2.6	3,608	4	1.1
	{ 1975–78	4,575	10	2.2	3,161	1	0.3
	{ 1979–80	3,622	0	0.0	1,234	1	0.8
	{ 1981–82	1,591	0	0.0	472	0	0.0
	{ 1983–84	449	0	0.0	265	0	0.0

TABLE 16—Continued

Status at Issue and Attained Insurance Age	Years	Operational			Administrative		
		Years of Exposure	Aviation Fatalities	Rate per 1,000	Years of Exposure	Aviation Fatalities	Rate per 1,000
U.S. Navy	{ 1971-74	2,337	3	1.3	1,128	0	0.0
	{ 1975-78	1,788	2	1.1	846	1	1.2
	{ 1979-80	2,345	7	3.0	345	1	2.9
	{ 1981-82	1,290	0	0.0	212	0	0.0
	{ 1983-84	296	0	0.0	111	0	0.0
U.S. Marines Corps	{ 1971-74	737	0	0.0	380	0	0.0
	{ 1975-78	758	3	4.0	344	1	2.9
	{ 1979-80	519	3	5.8	131	1	7.6
	{ 1981-82	228	1	4.4	61	0	0.0
	{ 1983-84	106	0	0.0	38	0	0.0
U.S. Air Force, Army, Navy, and Marine Corps Reserve	{ 1971-74				926	2	2.2
	{ 1975-78				656	1	1.5
	{ 1979-80				280	1	3.6
	{ 1981-82				13	1	7.4
	{ 1983-84				73	0	0.0
U.S. Air National Guard	{ 1971-74				877	2	2.3
	{ 1975-78				1,185	0	0.0
	{ 1979-80				392	0	0.0
	{ 1981-82				217	0	0.0
	{ 1983-84				96	0	0.0
Total	{ 1971-74	16,284	28	1.7	9,131	13	1.4
	{ 1975-78	13,624	21	1.5	7,841	5	0.6
	{ 1979-80	13,381	19	1.4	2,991	4	1.3
	{ 1981-82	6,743	7	1.0	1,401	1	0.7
	{ 1983-84	1,472	0	0.0	750	0	0.0

*Exposure is terminated on discontinuance of extra premium.

