

**TRANSACTIONS OF SOCIETY OF ACTUARIES
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REPORT OF THE COMMITTEE ON AVIATION

AVIATION STATISTICS

This report is supplementary to the corresponding reports which have been made by the Committee on Aviation of The Actuarial Society of America. That Committee made a comprehensive report in May 1940 in *TASA XLI* of all the relevant data on aviation mortality then available and made supplementary reports in *TASA XLII*, *XLIII*, *XLV*, *XLVII*, *XLVIII*, *XLIX*, and *L*.

INTERCOMPANY EXPERIENCE—PILOTS

Twenty-seven companies have contributed their experience on certain classes of pilots for issues since January 1, 1946, observed in the case of some companies through December 31, 1948 and in the case of others through June 30, 1949. The principal results are shown below, with fatality rates omitted in classes having less than 5 deaths.

The experience is by policies. From analysis of the deaths, however, the Committee satisfied itself that an experience by lives would not have materially changed the conclusions.

The classification is by status at time of application for insurance. Exposure was terminated upon discontinuance of extra premium, or upon discontinuance of an aviation exclusion provision unless it was replaced by an extra premium.

The experience on policies issued with aviation exclusion comprises only policies issued to applicants who appeared to be active as pilots or student pilots at time of issue, and not those where the exclusion was used merely because the insured had formerly been a pilot or because it was indicated that he might become a pilot. The more favorable experience in some classes of pilots among the policies issued with exclusion provision as compared with those issued with extra premium may have been because some of the former were about to discontinue flying and, therefore, preferred an exclusion provision. For United States military pilots, among whom there was little difference in the experience between policies issued with aviation extra premium and those issued with aviation exclusion provision, fatality rates are shown for the two policy classes combined.

The word "certificate" in the table includes the designation "license" when appropriate.

The difference in fatality rates between commercial pilots who were

doing a substantial amount of instruction at the time of application and those who were chiefly engaged in other commercial flying is in line with the differences in hourly fatality rates between instructional and other commercial flying shown in *TASA L*, 98.

The differences among pilots flying only for pleasure or personal business, according to apparent annual flying time, are less marked than those observed in the intercompany experience during the period 1929-1938, as shown in *TASA XLI*, 270. They are more nearly in line with the figures for 1931-1938 (*ibid.*) for a closed group of pilots, not necessarily insured, which had been under observation. It is noteworthy that the rate for the group whose apparent annual flying time was not stated exceeded even that for the group of pilots who were known to have flown 100 or more hours in the twelve months preceding application.

The fatality rates for the United States Army or Air Force may be compared with the figures for all rated pilots of those Services in *TASA L*, 100.

SCHEDULED PASSENGER FLYING OUTSIDE OF UNITED STATES

The International Air Transport Association has furnished to the Committee the experience of most of its member companies for the period 1946-1948. Deducting the experience of United States scheduled international airlines and making reasonable assumptions as to average speed for the purpose of translating reported miles into hours, a passenger fatality rate of .007 per 1,000 hours is deduced for reporting airlines of countries other than the United States. This compares with the rate of .003 for United States airlines, given in *TASA L*, 97.

CANADIAN CIVIL PILOTS

The following table compares the aviation death rates of Canadian civil pilots by class of license for 1946-1948 with those for 1940-1943, given in *TASA XLV*, 430. The data were furnished by the Dominion Department of Transport and Bureau of Statistics.

CLASS OF LICENSE	1940-1943			1946-1948		
	Years of Exposure	Aviation Fatalities	Rate per 1,000	Years of Exposure	Aviation Fatalities	Rate per 1,000
Transport	674	9	13	2,255	17	8
Commercial	450	5	11	257	1	4
Limited commercial	1,142	4	4	3,037	10	3
Private	2,999	4	1	4,248	20	5

MILITARY AVIATION

Type of Aircraft

The Committee has been furnished with the following figures for the United States Air Force by type of aircraft. They are chiefly useful for demonstrating the relative hazards of different types of aircraft.

DEATHS IN AIRCRAFT ACCIDENTS OF RATED USAF PILOTS FLYING
AS PILOT (INCLUDING CO-PILOT, ETC.)—CONTINENTAL UNITED
STATES, JANUARY 1947—JUNE 1949, INCLUSIVE

AIRCRAFT TYPE GROUP	APPROXIMATE FLYING HOURS	PILOTS KILLED IN AIRCRAFT ACCIDENTS	
		Number	Per 100,000 Flying Hours
Jet aircraft (all types)....	260,000	56	21½
Other than jet aircraft:			
Rotary Wing.....	20,000	2	10
Bombers.....	3,520,000	77	2
Transports.....	5,580,000	83	1½
Fighters.....	380,000	60	16
Trainers.....	3,290,000	73	2
Miscellaneous.....	200,000	6	3
Total.....	13,250,000	357	2½

Military Air Transport Service

Passenger fatality rates on the predecessor services of the United States Military Air Transport Service (MATs), namely, the Air Transport Command and Naval Air Transport Service, were given in *TASA XLIX*, 548, for the years 1943–1946, and were somewhat higher than the corresponding rates for United States scheduled commercial airlines. From January 1948 through June 1949 there were no fatal accidents on scheduled flights of these Services. About 1,000,000,000 passenger miles were flown during that period. Since the fatality rate in commercial scheduled flying has recently been of the order of 2 per 100,000,000 passenger miles, and since a single fatal accident could result in a large number of deaths, the experience of a year and a half is not statistically significant.

Paratroopers

The Committee is authorized by the Office of The Surgeon General of the United States Department of the Army to say that, based on the experience of one of the airborne divisions, “the fatality rate in parachute

jumps during the years following the war has been not significantly different from that during the period August 1940—July 1942 at the Parachute School, Fort Benning." The latter fatality rate is given in the Army Medical Bulletin for April 1943 as .02 per 1,000 jumps. Preliminary tabulations of Army deaths by cause of death covering the years 1946-1948, inclusive, indicate that there were only seven deaths among paratroopers during this period, due to parachute jumps, airplane crashes, and other aviation accidents. Twelve, however, were killed in a crash on January 13, 1950.

	ATTAINED INSURANCE AGE AT BEGINNING OF CALENDAR YEAR OF EXPOSURE	ISSUED WITH AVIATION EXTRA PREMIUM			ISSUED WITH AVIATION EXCLUSION PROVISION			EXTRA PREMIUM AND EXCLUSION PROVISION COMBINED
		Years of Exposure	Aviation Fatalities	Fatality Rate per 1,000	Years of Exposure	Aviation Fatalities	Fatality Rate per 1,000	Fatality Rate per 1,000
Civilian Pilots								
Having commercial or transport certificate, employed as non-airline pilot, with indication that at least half of flying time is as instructor.....		888	5	5.6	348	1	*	
Others having commercial or transport certificate and employed as non-airline pilot.....		912	8	8.8	408	2	*	
Having commercial or transport certificate but flying only for pleasure or personal business (not for hire), or having private certificate and 100 or more solo hours (or solo hours not stated)								
Less than 50 hrs. in preceding 12 mos.....		2,038	5	2.5	3,008	1†	*	
50-99 " " " " ".....		1,410	5	3.5	1,632	1†	*	
100 or more " " " " ".....		2,630	11	4.2	2,346	12‡	5.1	
Hours in preceding 12 mos. not stated.....		1,623	8	4.9	1,284	2	*	
Having private certificate and less than 100 solo hours								
Less than 50 hrs. in preceding 12 mos.....		554	2	*	1,944	3	*	
50-99 " " " " ".....		378	0	*	938	0	*	
Having student certificate.....		2,528	8	3.2	8,143	12	1.5	

* Fatality rates not shown in classes with less than 5 deaths.

† One death as passenger in private airplane.

‡ Includes 2 deaths as passenger in military aircraft.

	ATTAINED INSURANCE AGE AT BEGINNING OF CALENDAR YEAR OF EXPOSURE	ISSUED WITH AVIATION EXTRA PREMIUM			ISSUED WITH AVIATION EXCLUSION PROVISION			EXTRA PREMIUM AND EXCLUSION PROVISION COMBINED
		Years of Exposure	Aviation Fatalities	Fatality Rate per 1,000	Years of Exposure	Aviation Fatalities	Fatality Rate per 1,000	Fatality Rate per 1,000
Military Pilots on Full Time Duty, Including Student Pilots								
U S Army or Air Force	Under 25	820	11	13.4	840	13	15.5	14.5
	25-29	4,813	36	7.5	1,988	12	6.0	7.1
	30-34	3,420	11	3.2	570	3	*	3.5
	35 and Over	959	0	*	92	0	*	*
U S Navy§	Under 25	1,080	18	16.7	1,055	18	17.1	16.9
	25-29	3,484	30	8.6	1,306	9	6.9	8.1
	30-34	1,683	10	5.9	390	2	*	5.8
	35 and Over	542	0	*	136	0	*	*
Royal Canadian Air Force on full time duty, including Fleet Air Arm and including student pilots.....		58	1	*	280	1	*	

* Fatality rates not shown in classes with less than 5 deaths.

§ Includes Marine Corps but not Coast Guard.

|| Includes 1 death as passenger on commercial scheduled airline.