

**TRANSACTIONS OF SOCIETY OF ACTUARIES
1957 REPORTS**

**REPORT OF THE COMMITTEE ON AVIATION
AVIATION STATISTICS**

THIS report is confined to a brief summary of such new data as add to or materially change conclusions reached in previous reports. Since this procedure has now been used for several years, the following index is given of the most recent information on various classes.

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SCHEDULED FLYING

United States

Table 1 shows the recent trend of fatality rates on United States scheduled airlines. Since pilots engaged in scheduled flying are limited by government regulations to a maximum of 1,000 hours a year, the death rates per 1,000 hours form an upper limit to the annual death rate of pilots engaged full time in such flying. The columns headed "Death Rate of All Pilots Employed in Scheduled Flying" and "Death Rate of Other Crew Members Employed in Scheduled Flying" include, on the one hand, those who do less than the normal amount of flying on account of having some supervisory duties or for some other reasons, and include, on the other hand, the deaths in nonscheduled flights operated by scheduled airlines, such as tests or charter flights. The hazard of the normal airline pilot probably lies between the figures in the second and third columns of rates. The difference in recent years is not great.

With regard to the low rates in recent years in international flying, and particularly the absence of first pilot deaths in 1953-1956, the comment may be made that only two first pilot deaths in scheduled revenue passenger flights would have been expected on the basis of the observed rate for domestic and international flying combined.

Outside of United States

The International Air Transport Association has furnished to the Committee the experience of most of its member companies. By deducting the included experience of United States scheduled airlines and making reasonable assumption as to average speed in the years for which it was not specifically given, the passenger fatality rates per 1,000 hours shown in Table 2 were derived and compared with the rates from Table 1 for all flying of United States scheduled airlines (whether or not they are members of the International Air Transport Association).

The International Air Transport Association does not give out the number of deaths for individual airlines or countries. However, from a publication *Accident Trends of Individual Airlines*, compiled by Aviation Studies (International), Ltd., London, England, the Committee has been able to derive passenger death rates per 1,000 passenger hours for airlines registered in various groups of countries, as shown in Table 3. All other

TABLE 1
UNITED STATES SCHEDULED AIRLINES AVIATION DEATHS

Period	Passenger Death Rate per 1,000 Passenger Hours	Death Rate of First Pilots in Scheduled Flights per 1,000 Airplane Hours	Death Rate of All Pilots Employed in Scheduled Flying, per Life Year of Exposure	Death Rate of Other Crew Members Employed in Scheduled Flying, per Life Year of Exposure
Domestic				
1956.....	.0013	.0006*	.0004*	.0011
1949-1952.....	.0018	.0024	.0020	.0016
1950-1953.....	.0015	.0022	.0020	.0015
1951-1954.....	.0010	.0018	.0017	.0011
1952-1955.....	.0010†	.0016†	.0015†	.0010†
1953-1956.....	.0012†	.0014†	.0014†	.0011†
International				
1956.....	.0000	.0000	.0000	.0000
1949-1952.....	.0037	.0016*	.0013	.0027
1950-1953.....	.0033	.0017*	.0013	.0027
1951-1954.....	.0022	.0011*	.0009	.0019
1952-1955.....	.0015	.0005*	.0007	.0015
1953-1956.....	.0001*	.0000	.0001*	.0004*
Total				
1956.....	.0011	.0005*	.0004*	.0008
1949-1952.....	.0021	.0023	.0018	.0019
1950-1953.....	.0018	.0021	.0019	.0019
1951-1954.....	.0012	.0017	.0015	.0013
1952-1955.....	.0011†	.0014†	.0014†	.0011†
1953-1956.....	.0010†	.0012†	.0011†	.0010†

* Based on less than 5 deaths.

† Includes deaths caused by a bomb placed in an airplane.

TABLE 2
SCHEDULED AIRLINES OF UNITED STATES AND
OTHER COUNTRIES
PASSENGER AVIATION DEATH RATE
PER 1,000 HOURS

Period	Airlines of Countries Other than U.S. Re- porting to I.A.T.A.	All U.S. Airlines
1955.....	.0026*	.0017*
1956.....	.0048	.0011
1949-1952.....	.0058	.0021
1950-1953.....	.0046	.0018
1951-1954.....	.0046	.0012
1952-1955.....	.0040*	.0011*
1953-1956.....	.0043*	.0010*

* The 1955 figures become .0016 and .0013, the 1952-1955 figures become .0037 and .0010, and the 1953-1956 figures become .0041 and .0009, if deaths caused by deliberate human intent—sabotage or attack—including the accident on November 1, 1955, at Longmont, Colorado, caused by a bomb which had been placed in the airplane—are omitted.

TABLE 3
SCHEDULED AIRLINES BY GROUPS OF COUNTRIES OF REGIS-
TRATION—PASSENGER AVIATION DEATH RATES PER
1,000 PASSENGER HOURS, 1950-1956

Airlines	Passenger Miles (millions)	Passenger Deaths	Passenger Death Rate per 1,000 Passenger Hours*	Fatal Accidents
North America.....	136,941	1,164	.0015	62
Latin America.....	17,107	828	.0085	60
Europe.....	36,431	980	.0047	53
Middle East.....	1,478	94	.0111	11
Africa.....	3,081	114	.0065	10
Australasia.....	7,869	48	.0011	4
Asia.....	5,770	281	.0085	25
All Regions.....	208,677	3,509	.0029	225

* Based on an assumed average speed of 175 miles per hour.

regions have a much higher rate than North America, except Australasia, the rate for which is based on only four fatal accidents.

NONSCHEDULED ("IRREGULAR" AND "SUPPLEMENTAL")
CARRIER FLYING

The figures in Table 4 for "large" irregular and supplemental¹ air carriers—those operating aircraft of more than 12,500 pounds gross weight—are based on reports of their mileage to the Civil Aeronautics Board, and the assumption of an average speed of 200 miles per hour from take-off to landing. The Committee was able to study figures

TABLE 4
NONSCHEDULED CARRIERS OPERATING AIRCRAFT OF MORE
THAN 12,500 POUNDS GROSS WEIGHT*

Period	Passenger Deaths	Rate per 1,000 Passenger Hours	First Pilot Deaths	Rate per 1,000 Airplane Hours
1956.....	0	.000	0	.000
1949-1952.....	237	.013	11	.014
1950-1953.....	274	.013	11	.012
1951-1954.....	254	.011	11	.012
1952-1955.....	203	.008	10	.012
1953-1956.....	177	.007	8	.010

* Nonpassenger operations excluded in 1953.

divided between the public services of these carriers and the contract services furnished to the armed forces. The differences in death rates between the two kinds of service do not appear significant. This class of flying has been subjected to stricter regulation in recent years but still is not subject to as close supervision as scheduled flying.

CANADIAN CIVIL PILOTS

The fatality rates of Canadian civil pilots for 1951-1956, furnished by the Department of Transport and shown in Table 5, are not greatly different from those shown in *TSA* 1955 Reports, 27, for 1949-1954.

It is not unlikely that the class of private pilots includes a considerable number whose flying time is small or nonexistent, and that the rate shown is not applicable to pilots with substantial annual flying time. The Committee has no definite information on this point, however.

¹ These two classes differ in the services they are allowed to render (*TSA* 1956 Reports, 122), not in their safety regulation.

UNITED STATES AIR FORCE

Pilots and Other Rated Personnel—By Age

Table 6 shows the aviation death rates by age group for various periods for all rated pilots of the Air Force, and for nonpilot rated officers. The rates in both classes for 1953-1956 are somewhat lower than those shown in *TSA 1955 Reports*, 28, for 1951-1954, especially at ages under 25.

TABLE 5
CANADIAN CIVIL PILOTS BY CLASS OF LICENSE
1951-1956

Class of License	Life Years of Exposure	Aviation Deaths	Rate per 1,000 Life Years of Exposure
Airline Transport	4,270	24	5.6
Senior Commercial	1,578	12	7.6
Commercial	8,386	57	6.8
Private (excluding Students)	28,316	60	2.1

TABLE 6
UNITED STATES AIR FORCE ON ACTIVE DUTY, BY AGE
AVIATION DEATH RATES PER 1,000
LIFE YEARS OF EXPOSURE
Deaths Due to Enemy Action Excluded—Other Deaths
in Combat Missions Included

Age Group	1954	1955	1956	1953-1956
All Rated Pilots				
Under 25	20.8	12.1	8.3	15.1
25-29	12.9	12.5	11.9	12.6
30-34	5.3	5.0	4.4	5.0
35 and over	2.9	3.8	3.5	3.5
All	7.7	7.0	6.1	7.2
Nonpilot Rated Officers				
Under 25	9.3	4.3*	5.3	6.3
25-29	6.1	5.5	5.3	5.6
30-34	2.9	4.4	3.1	4.0
35 and over	2.1	3.3	3.4	3.3
All	4.9	4.3	4.3	4.8

* Based on less than 5 deaths.

It may be interesting to note that the fatality rate for all pilots aged 40 and over was 2.5 per 1,000 for 1953-1956.

Pilots—By Rank

Table 7 shows fatality rates by rank for various periods, for pilots and other rated officers. As might be expected, the 1953-1956 rate for second lieutenants shows a decrease similar to that noted above for pilots under age 25.

Student Pilots

Table 8 shows aviation death rates of Air Force student pilots for various periods, according to the present names of the phases of training. Students in the advanced course are rated pilots and are included in Table 6. The rates for 1953-1956 are lower than those for 1949-1952 shown in T.S.A 1953 Reports, 45.

TABLE 7
UNITED STATES AIR FORCE ON ACTIVE DUTY, BY RANK
AVIATION DEATH RATES PER 1,000
LIFE YEARS OF EXPOSURE
Deaths Due to Enemy Action Excluded—Other Deaths in
Combat Missions Included

Rank	1954	1955	1956	1953-1956
<i>All Rated Pilots</i>				
Lt. Col. and higher	2.5	2.6	2.0	2.4
Major	3.1	2.7	3.4	3.3
Captain	5.2	6.4	4.8	5.6
1st Lieutenant	11.7	10.6	10.8	11.2
2nd Lieutenant	19.5	13.5	9.1	16.3
All	7.7	7.0	6.1	7.2
<i>Nonpilot Rated Officers</i>				
Lt. Col. and higher	0.0*	0.0*	1.8*	1.1*
Major	2.3*	0.0*	0.9*	1.8
Captain	3.2	2.9	5.1	4.1
1st Lieutenant	4.9	2.8	4.6	4.4
2nd Lieutenant	8.6	10.7	5.3	8.4
All	4.9	4.3	4.3	4.8

* Based on less than 5 deaths.

Duty Assignment

Table 9 gives aviation fatality rates of rated pilots according to duty assignment for various periods.

The classification "All Other" includes the so-called proficiency pilots, whose primary duty is in some capacity other than as pilot—*e.g.*, administration—but who do a minimum amount of flying to maintain proficiency and qualify for flight pay.

It will be seen that the 1956 rate for bomber pilots, when most of the exposure was in jet bombers, was lower than for the whole period 1953–1956, even though the exposure in the earlier years of the period was predominantly in propeller-driven bombers.

Military Air Transport Service

For the period 1953–1956 the passenger fatality rate in the Military Air Transport Service was 2.1 per 100,000,000 passenger miles. This com-

TABLE 8
UNITED STATES AIR FORCE STUDENT PILOTS
AVIATION DEATH RATES PER 1,000 LIFE YEARS
OF EXPOSURE

Course	1955	1956	1953–1956
Primary.....	2.2	2.5	2.3
Basic.....	4.4	6.4	8.3

TABLE 9
UNITED STATES AIR FORCE ON ACTIVE DUTY
BY DUTY ASSIGNMENT
AVIATION DEATH RATES PER 1,000
LIFE YEARS OF EXPOSURE

Duty Assignment	1955	1956	1953–1956
Pilot, Helicopter.....	13.2	0.0*	11.4
Pilot, Amphibian.....	10.5	3.8	8.3
Pilot, Transport.....	7.9	4.2	4.2
Pilot, Troop Carrier.....	8.1	4.1	7.5
Pilot, Fighter.....	23.7	18.7	24.2
Pilot, Bomber.....	10.1	6.2	7.3
Pilot, Reconnaissance.....	3.6	8.9	7.2
Pilot, AOB†.....	4.8	7.4	6.8
Operations Officer.....	2.1	2.6	2.6
All Other.....	1.8	3.0	2.7

* Based on less than 5 deaths.

† Pilot qualified also as a bombardier and a radar observer.

compares with a rate of 0.5 for all United States scheduled commercial airlines for the same period.

Aviation death rates of flying personnel of the MATS per 1,000 life years of exposure have been obtained as shown in Table 10. These rates are generally higher than those shown in *TSA 1956 Reports*, 127, for periods beginning at the same times and ending June 30, 1956.

Air National Guard

The fatality rate of pilots of the Air National Guard not federally activated was 8.3 per 1,000 life years of exposure in 1953-1956. This compares with the rate of 9.8 for 1951-1953 in spite of a higher proportion of jet flying in the later period. These rates count only the deaths of Air

TABLE 10
MILITARY AIR TRANSPORT SERVICE
AVIATION DEATH RATES PER 1,000 LIFE YEARS
OF EXPOSURE

Period	Pilots	Other Crew
July 1, 1954—June 30, 1957		
Transport units.....	5.2	7.2
Other units.....	2.7	3.7
Total.....	3.3	4.9
July 1, 1953—June 30, 1957		
Total.....	3.1	4.4

National Guard pilots while flying on military orders and in uniform on temporary active duty. The Committee is informed that there have been instances where Air National Guard pilots, in addition to their duties as such, are employed by the Guard as civilians and have been killed in aircraft accidents in ANG aircraft while technically in a civilian status.

The rates quoted are much higher than those shown for Air National Guard pilots in the section of this report on the intercompany experience. This may perhaps be explained by the fact that most of the intercompany exposure was at ages 30 and over.

Flight Surgeons

The fatality rate of flight surgeons in 1953-1956 was 5.5 per 1,000 life years of exposure.

Graduates of Military Academy—Assignment to Aviation

Of the 1956 graduating class of the United States Military Academy, 25% were accepted for flying training by the Air Force. Some graduates

of the Naval Academy have also been accepted for Air Force training (see below under "United States Navy").

Deaths Resulting from Aviation and from Other Causes

An Air Force report "Non-Combat Aircraft Accidents and Motor Vehicle Accidents, Air Force Personnel, 1951-55" yields the following accidental death rates classified between personnel on flying status and those not on flying status.

TABLE 11
DEATH RATES DUE TO NONCOMBAT CAUSES
UNITED STATES AIR FORCE PERSONNEL BY FLYING STATUS
1951-1955

FLYING STATUS	DEATH RATES PER 1,000 LIFE YEARS OF EXPOSURE DUE TO			
	Disease	All Injuries	Injury Associated with	
			Aviation	Motor Vehicle Accidents
On Flying Status	0.2	7.0	6.3	0.5
Not on Flying Status	0.4	1.3	0.2	0.7
All	0.4	2.0	0.9	0.7

*Circumstances of Military Aircraft Accidents
Involving Air Force Personnel*

The tabulation of the circumstances of fatal military aircraft accidents in 1955, from the report of the USAF Medical Service for the fiscal year 1956, may be of interest (Table 12, p. 54).

UNITED STATES NAVY

(Includes Marine Corps unless otherwise stated)

Pilots by Age

Table 13 shows fatality rates by age group for various periods, for all naval aviators (officers) on active duty.

It may be interesting to note that the fatality rate for all naval aviators aged 40 and over was 1.2 per 1,000 for 1953-1956.

In recent years the fatality rates in the age groups under 25 and 30-34 have been consistently higher than those for Air Force pilots of the same

TABLE 12

CIRCUMSTANCES OF MILITARY AIRCRAFT ACCIDENTS RESULTING
IN NONCOMBAT DEATHS TO AIR FORCE PERSONNEL—1955

CAUSATIVE AGENT	ALL PERSONNEL			OFFICERS			AIRMEN		
	Total	On Flying Status	Not on Flying Status	Total	On Flying Status	Not on Flying Status	Total	On Flying Status	Not on Flying Status
Take-off	42	39	3	34	33	1	8	6	2
Midair Collision	37	35	2	31	31	0	6	4	2
Explosion, in Flight	9	8	1	7	7	0	2	1	1
Landing, Taxiing	36	31	5	32	29	3	4	2	2
Other Termination of Flight	491	435	56	315	310	5	176	125	51
Parachuting	29	29	0	25	25	0	4	4	0
Personnel Not in Flight	4	0	4	0	0	0	4	0	4
Other Military Aircraft Accidents	1	1	0	1	1	0	0	0	0

NOTE.—Crash landings are included under "Other Termination of Flight." "Landing, Taxiing" includes only those cases where a normal landing had been started.

TABLE 13

UNITED STATES NAVY ON ACTIVE DUTY BY AGE
ALL NAVAL AVIATORS (OFFICERS)
AVIATION DEATH RATES PER 1,000 LIFE YEARS OF EXPOSURE
Deaths Due to Enemy Action Excluded—Other Deaths
in Combat Missions Included

Age Group	1954	1955	1956	1953-1956
Under 25	27.9	26.8	25.2	28.8
25-29	13.0	13.5	15.0	12.6
30-34	9.1	6.3	8.2	8.0
35 and over	3.2	3.0	2.6	3.0
All	10.9	10.4	10.1	10.3

TABLE 14

UNITED STATES NAVY ON ACTIVE DUTY BY RANK
ALL NAVAL AVIATORS (OFFICERS)
AVIATION DEATH RATES PER 1,000 LIFE YEARS OF EXPOSURE

Rank	1955	1956	1955-1956
Ensign, 2nd Lt., Chief Warrant Officer and Warrant Officer	27.2	15.7	21.1
Lt. (j.g.) and 1st Lt.	16.7	19.3	18.0
Lt. (Navy) and Captain (M.C.)	7.3	7.3	7.3
Lt. Commander and Major	3.8	4.8	4.3
Commander, Lt. Colonel, and higher	3.0	3.0	3.0

age group, and the same has been observed in the intercompany experience.

Pilots by Rank

Table 14 shows fatality rates of naval aviators by rank for 1955-1956.

The corresponding rates for pilots of the regular service differed little from those for all pilots of the same rank, except in the lowest group of ranks (Ensigns, etc.) where the rate for 1955-1956 was 3.6. While this was based on very few deaths, the difference from the rate for all pilots seems great enough to have some significance. The Department of the Navy has made the following comment:

You ask if there is any inherent reason for the low fatality rates for regular Ensigns and 2nd Lieutenants. Aside from chance variations in these rates from year to year, one may consider two factors which favorably affect the rates of these regular officers. One factor is that they are older and more mature by virtue of four years at the Naval Academy or, as required by various programs, a near equivalent to such training. A second factor is the absence of these officers from fleet and operational duty assignments. Their tours of duty as Ensigns and 2nd Lieutenants are spent in the Training Command where the accident rates are lower than in the fleet.

Student Pilots

Fatality rates of student naval aviators are shown in Table 15 for various periods. The rate in advanced training, which appeared to have leveled off in 1955, increased again in 1956.

TABLE 15
UNITED STATES NAVY STUDENT PILOTS
AVIATION DEATH RATES PER 1,000 LIFE YEARS OF EXPOSURE

Course	1954	1955	1956	1953-1956
Basic.....	6.5	3.0	6.3	5.8
Advanced.....	18.4	17.3	20.0	17.6

Inactive Reservists

For inactive reserve pilots in drill pay status the fatality rates for the period 1953-1956 were 3.8 per 1,000 life years for ages under 30 and 1.7 for ages 30 and over. The former figure is slightly lower than, and the latter figure the same as, for 1952-1955.

For inactive reservists not receiving drill pay, the fatality rate in 1953-1956 for those who did some flying was negligible. These pilots are

attached to volunteer aviation companies and do not receive pay for drills performed. As a general rule the only flying done by pilots in this group occurs during their 2-week period of annual training duty.

Some of these reservists may do other flying as civilians, and it is possible that the hazard of those reservists who do no other flying than their reserve flying may be greater than the average figures given above in which those pilots are also included whose experience is supplemented by civilian flying. This is not borne out, however, by the intercompany experience.

Annual Flying Time

The average number of flight hours per pilot on active duty in 1956, including students, was 283, and that for inactive reservists who did some flying was 80. These numbers are approximately the same as in 1955.

TABLE 16
UNITED STATES COAST GUARD PERSONNEL
ON FLIGHT ORDERS
1953-1956

Class	Life Years of Exposure	Aviation Deaths	Rate per 1,000 Life Years of Exposure
Pilots.....	1,305	4	3.1
Student Pilots.....	108	1	*
Observers.....	66	1	*
Crew Members....	3,843	14	3.6

* Fatality rate not shown because of small number of deaths.

Graduates of Naval Academy—Assignment to Aviation

Of the 1957 graduating class of the United States Naval Academy who were commissioned in the Navy or Air Force, 22% have been ordered to flight training or are on the waiting list for flight training in the Navy, and 11% in the Air Force. Those commissioned in the Marine Corps are not yet eligible to apply for flight training. These percentages are slightly smaller than in 1956.

UNITED STATES COAST GUARD

The figures in Table 16 have been derived from information supplied by United States Coast Guard headquarters. The fatality rates in the principal classes are somewhat lower than those for 1952-1955, shown in TSA 1956 Reports, 134, especially for pilots.

ROYAL CANADIAN AIR FORCE

Table 17 gives fatality rates for the period 1952-1956 for pilots of the RCAF and of the RCAF Auxiliary (reserve personnel who undergo weekly training in organized squadrons). The rates by age group and by rank are not materially different from those for 1951-1955 shown in *TSA* 1956 Reports, 134. The table also gives rates by functional formation.

Pilot air casualties per 1,000 flying hours for the years 1954-1956 were 0.127 for pilots flying jet aircraft and 0.034 for pilots flying other aircraft. The approximate average number of flight hours in 1956 per pilot on active duty was 300 hours for the RCAF Regular and 130 hours for the RCAF Auxiliary.

In applying the rates by functional formation to the calculation of extra premiums for life insurance it should be noted that it is a policy of the RCAF to transfer pilots from one formation to another throughout their whole career as active pilots. This means that a pilot in a transport

TABLE 17
ROYAL CANADIAN AIR FORCE PILOTS
AVIATION DEATH RATES PER 1,000 LIFE YEARS OF EXPOSURE

	Regular 1952-1956	Auxiliary 1952-1956
<i>Age Group</i>		
Under 25	20.1	21.8
25-29	15.7	20.0
30-34	11.4	11.8
35-39	4.5	16.7
40 and over	0	0
All	12.9	17.4
<i>Rank</i>		
Pilot Officer and Flight Cadet	9.4	16.7
Flying Officer	18.9	21.3
Flight Lieutenant	8.2	10.5
Squadron Leader	2.5	6.7
Wing Commander and Higher Ranks	2.3	18.2
All	12.9	17.4
<i>Functional Formation</i>		
Fighter	29.1
Training	9.7
Transport	2.4
Tactical	4.8
Maritime*	9.7
Other	3.1

* No deaths since 1953.

formation may later be transferred to a fighter formation. There are, however, some pilots who are not qualified as jet pilots or whose qualifications on other than jet aircraft in combination with other factors can be expected to preclude their training and employment on jets.

INTERCOMPANY EXPERIENCE

Table 18 shows the experience of thirty-two companies on certain classes of pilots and military crew members for issues since January 1, 1946, observed through December 31, 1956. Fatality rates are omitted in classes having less than five deaths.

Certain classes discussed in the 1956 Report (*TSA 1956 Reports*, 135-141), in which it was believed that the addition of a year's experience would not significantly change the results, were omitted from this year's study. The experience on military pilots for the periods prior to July 1, 1950 and from July 1, 1950 to June 30, 1953 is not repeated from the 1956 Report. Obviously the addition of the 1956 experience would not affect these figures.

The experience is by policies. Classification is by status at time of application for insurance. Only policies issued standard or with aviation extra premium were studied this year.

The exposure on policies issued with extra premium runs only until discontinuance of the extra premium. The classification of deaths of

TABLE 18
INTERCOMPANY EXPERIENCE ON PILOTS AND CREW MEMBERS
ISSUED WITH AVIATION EXTRA PREMIUM
Issued since January 1, 1946 unless Otherwise Stated—By Policies

CIVILIAN PILOTS				
Status at Issue and Exposure Period	Policy Year	Years of Exposure	Aviation Deaths	Rate per 1,000
Employed as scheduled airline pilot				
1946-1956.....	All	30,347	60	2.0
1949-1956.....	All	27,417	47	1.7
1952-1956.....	All	19,263	27	1.4
1955-1956.....	All	7,166	16	2.2
Student pilots apparently active at time of issue 1946-1956....	{ 1	4,196	6	1.4
	{ 2	2,712	9	3.3
	{ 3 and over	8,148	3	*
	{ All	15,056	18	1.2

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

TABLE 18—Continued

MILITARY PERSONNEL					
Deaths in Combat Missions Included, Whether or Not Resulting from Enemy Action†					
Status at Issue and Exposure Period	Attained Insurance Age at Beginning of Calendar Year of Exposure, and Solo Hours at Issue	Years of Exposure	Aviation Deaths	Rate per 1,000	
U.S. Army or Air Force rated pilots on full-time duty July 1, 1953—Dec. 31, 1956..	Under 25				
	800+ hours	298	2	*	
	Others	490	2(1)	*	
	25-29				
	800+ hours	4,978	29	5.8	
	Others	2,275	13	5.7	
	30-34	34,625	121(1)	3.5[3.5]	
	35 and over	39,623	121(4)	3.1[3.0]	
Issues and exposures, 1953-1956 (Air Force only)					
	40-150 hours in 12 months preceding issue	30-34	4,494	9	2.0
	35 and over	5,136	13	2.5	
Over 150 hours in 12 months preceding issue					
	30-34	6,355	28	4.4	
	35 and over	4,569	16	3.5	
U.S. Navy‡ rated pilots on full-time duty July 1, 1953—Dec. 31, 1956..	Under 25				
	800+ hours	369	4	*	
	Others	480	4	*	
	25-29				
	800+ hours	3,897	19	4.9	
	Others	1,708	18	10.5	
	30-34	17,504	112	6.4	
	35 and over	16,398	74	4.5	
Issues and exposures, 1953-1956					
	40-150 hours in 12 months preceding issue	30-34	1,700	15	8.8
	35 and over	1,800	7	3.9	
Over 150 hours in 12 months preceding issue					
	30-34	3,196	36	11.3	
	35 and over	1,714	16	9.3	
U.S. Army or Air Force crew members	Under 25	378	4	*	
	25-29	1,626	19(1)	11.7[11.1]	
	30-34	1,296	12	9.3	
	35 and over	170	0	*	
		Under 25	266	2(1)	*
July 1, 1950—June 30, 1953..	25-29	2,715	24(7)	8.8[6.3]	
	30-34	4,436	40(13)	9.0[6.1]	
	35 and over	1,524	11(3)	7.2[5.3]	
July 1, 1953—Dec. 31, 1956..	Under 25	1,208	1	*	
	25-29	2,455	17(1)	6.9[6.5]	
	30-34	6,680	17	2.5	
	35 and over	6,319	24	3.8	
U.S. Army or Air Force student pilots 1946-1956					
	Policy year 1	All	590	10	16.9
	2	All	500	21(6)	42.0[30.0]
	3 and over	All	1,723	18(3)	10.4[8.7]

TABLE 18—Continued

Status at Issue and Exposure Period	Attained Insurance Age at Beginning of Calendar Year of Exposure, and Solo Hours at Issue	Years of Exposure	Aviation Deaths	Rate per 1,000
Exposures 1946-1956, all policy years.....	All	2,814	49(9)	17.4[14.2]
Exposures 1949-1956, all policy years.....	All	2,649	44(9)	16.6[13.2]
Exposures 1952-1956, all policy years.....	All	1,844	22(2)	11.9[10.8]
Exposures 1955-1956, all policy years.....	All	786	8	10.2
U.S. Navy† student pilots 1946-1956				
Policy year 1.....	All	373	10	26.8
2.....	All	322	8	24.8
3 and over.....	All	1,391	21(3)	15.1[12.9]
Exposures 1946-1956, all policy years.....	All	2,089	39(3)	18.7[17.2]
Exposures 1949-1956, all policy years.....	All	1,711	30(3)	17.5[15.8]
Exposures 1952-1956, all policy years.....	All	1,145	15(1)	13.1[12.2]
Exposures 1955-1956, all policy years.....	All	486	6	12.3
U.S. Army or Air Force paratroops and other airborne troops 1946-1956.....	All	2,525	1	*
U.S. reserve rated pilots (all services) not on full-time duty and doing no flying as civilian pilot 1953-1956.....	All	15,204	11	0.7
1955-1956.....	All	7,978	6	0.8
U.S. Air National Guard rated pilots doing no flying as civilian pilot 1953-1956.....	All	2,382	3	*

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

† Figures in parentheses indicate included deaths from enemy action. Figures in brackets indicate aviation death rates with deaths from enemy action excluded.

‡ Includes Marine Corps but not Coast Guard.

military personnel as to combat was based on the remarks on the company death cards sent to the Committee. Cards which stated "killed (or missing) in action" or similar definite statements were counted as deaths from enemy action. All others were assumed noncombat.

In the civilian and Air Force classes insured as student pilots the increase in death rate in the second policy year is of interest. It may indicate a relaxing of caution, or perhaps greater annual flying time, after the pilot goes beyond the student classification.

The current investigation included a subdivision of military pilots aged 30 and over according to the amount of flying in the twelve months preceding application, as bearing on the underwriting of "proficiency" pilots (see page 51). This subdivision and that by solo hours were made only in those age groups where the Committee believed they would have the most significance for underwriting. Pilots who had flown less than 40 hours in the year preceding application were excluded from the study as not being typical of "proficiency" pilots. Pilots insured at ages under 30 entered the experience upon reaching age 30. However, since the study

TABLE 19
 INTERCOMPANY EXPOSURES ON PILOTS APPARENTLY
 ACTIVE AT TIME OF ISSUE—ISSUED STANDARD
 (No aviation deaths in any class)

Status at Issue	Policy Years of Exposure
Employed as scheduled airline pilot.....	597
Having commercial or transport certificate, employed as non-airline pilot, with indication that at least half of flying time is as instructor.....	30
Others having commercial or transport certificate and employed as non-airline pilot.....	61
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 hours in preceding 12 months.....	1,050
50-99 hours in preceding 12 months.....	537
100 or more hours in preceding 12 months.....	325
Hours in preceding 12 months not stated.....	1,576

was confined to issues of 1953 and later, all of the experience at attained ages 35 and over, and much of that at ages 30 to 34, is derived from policies issued at ages 30 and over. The results show a distinct difference in annual death rate between pilots who had flown not over 150 hours in the year preceding application, and those who had flown more. In the Navy, however, the death rate even in the former class was relatively high at ages 30 to 34.

The aviation death rate among military inactive reservists doing no flying as civilian pilot was almost negligible. If these pilots had been subject to the same annual death rates as all full-time military pilots of the same age and solo hours for the exposure of July 1, 1953 to December 31, 1956 there would have been 64 deaths in lieu of the 11 observed.

In the case of the Air National Guard if the pilots had been subject to the same death rate as full time Army or Air Force pilots of the same age

and solo hours for the period July 1, 1953 to December 31, 1956 there would have been 9 deaths in lieu of the 3 observed.

The differences in death rates between full-time pilots and these two classes undoubtedly reflect differences in annual flying time.

In the classes insured standard there were no deaths. The policy years of exposure are listed in Table 19. Seven deaths would have been expected on the basis of the latest experience on the corresponding classes issued with extra premium.