

**TRANSACTIONS OF SOCIETY OF ACTUARIES
1972 REPORTS**

REPORT OF THE COMMITTEE ON AVIATION

AVIATION STATISTICS

THIS report covers statistics obtained from United States and Canadian governmental services, both civilian and military, supplemented by publications of the aviation industry. The report also includes the experience from the annual intercompany study of mortality among insured lives, to which nineteen companies are presently contributing. The emphasis in the report is primarily on new data which have become available during the past year. Data for earlier periods are included for comparison and to indicate trends.

The experience on civilian aviation is similar to that of recent years, showing a continued trend of improvement in Air Carrier flying but little change in General Aviation. The experience on United States military aviation continues to reflect the diminishing activity which preceded the truce in Southeast Asia.

The experience in the more detailed classifications of intercompany data, which were first published last year, has been enlarged by the addition of the 1971 calendar year experience.

UNITED STATES CIVIL AIR CARRIER FLEET

United States civil aviation flying is divided into two categories: Civil Air Carrier Fleet and General Aviation. The United States Civil Air Carrier Fleet is made up largely of Certificated Route Air Carriers (passenger/cargo and all cargo), which are the major airlines in the United States. The balance of the United States Civil Air Carrier Fleet, as defined in the *FAA Statistical Handbook of Aviation*, is comprised of Supplemental Carriers and Commercial Operators. Commercial Operators include all carriers operating at least one aircraft weighing over 12,500 pounds that are not classified as Certificated Route Air Carriers or Supplemental Carriers. The classification "Commercial Operators" should not be confused with the commercial flying included in the General Aviation category. The experience of Commercial Operators is very limited because of the small number of aircraft, and the number of flying hours and the number of fatal accidents are not available.

Some companies not classified as part of the United States Civil Air Carrier Fleet because they operate only aircraft weighing 12,500 pounds or less may use such terms as "airlines," "airways," and "carrier" and may provide scheduled passenger service on a limited basis (e.g., com-

muter or feeder airlines). Nevertheless, data regarding their activities are included under "Air Taxi" in the "General Aviation" section of this report.

Certificated Route Air Carriers (Passenger/Cargo)

Certificated Route Air Carriers are air carriers holding certificates of public convenience and necessity issued by the Civil Aeronautics Board, authorizing them to perform scheduled air transportation over specified routes and a limited amount of nonscheduled operations. They are divided into two groups—passenger/cargo and all cargo. A recent issue of the monthly Civil Aeronautics Board publication *Air Carrier Traffic Statistics* listed 32 such passenger/cargo air carriers (including 4 intra-Alaska, 2 intra-Hawaii, and 3 helicopter carriers) and 3 such all-cargo air carriers.

"Domestic" operations are, in general, within and between the fifty states of the United States, including intra-Alaska and intra-Hawaii operations. "International" (technically, "international and territorial") operations are, in general, outside the territory of the United States, including operations between the United States and foreign countries and the United States and its territories or possessions.

Table 1 shows the recent aviation fatality rates of United States Certificated Route Air Carriers (passenger/cargo) for passengers, first pilots, and other crew members in domestic and international flying. The lives exposed as "all pilots and copilots" and "other crew members" include persons who may do less than the normal amount of flying on account of having some supervisory duties or for other reasons.

The small number of fatal accidents and the relatively large number of passenger fatalities in some accidents result in passenger fatality rates which are subject to marked fluctuation from year to year. However, such rates have shown a trend of improvement over the years.

Pilots engaged in air carrier flying may not, under government regulations, fly more than 100 hours per month or 1,000 hours per year in domestic operations. Pilots in international operations are generally limited to either 100 hours per month or 300 hours every 90 days, depending on the size of the flight crew. In actual practice, pilots average 600–700 hours per year because they have ground duties before and after flights.

Helicopter airlines designated as "Certificated Route Air Carriers" are excluded from the experience for passengers and first pilots in Table 1. During the thirteen years 1960–72 there were 5 fatal accidents on helicopter airlines, resulting in a passenger death rate of 0.025 per 1,000 scheduled passenger hours.

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 performance of scheduled air freight express and mail transportation over specified routes as well as the conduct of nonscheduled operations, which may include passengers.

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

| Years | Passenger Rate per 1,000 Sched- uled Passenger Hours † | First-Pilot Rate per 1,000 Sched- uled Airplane Hours † | All Pilot and Copilot Rate per Life Year ‡ | Other Crew Member Rate per Life Year ‡ |
|---------------------------------------|--|---|---|---|
| Domestic Operations | | | | |
| 1960-63 | .0012 (18) | .0014 (17) | .0010 (25) | .0011 (19) |
| 1964-67 | .0008 (22) | .0013 (19) | .0007 (23) | .0005 (17) |
| 1968-71 | .0005 (14) | .0007 (13) | .0004 (18) | .0002 (14) |
| 1972§ | .0005 (5) | .0008 (4) | .0004 (4) | .0001 (3) |
| 1960-72§ | .0007 (59) | .0011 (53) | .0006 (70) | .0004 (53) |
| International Operations | | | | |
| 1960-63 | .0008 (3) | .0011 (2) | .0009 (3) | .0014 (3) |
| 1964-67 | .0007 (3) | .0013 (3) | .0008 (4) | .0011 (4) |
| 1968-71 | .0002 (3) | .0003 (1) | .0004 (2) | .0004 (3) |
| 1972§ | .0000 (0) | .0000 (0) | .0000 (0) | .0000 (0) |
| 1960-72§ | .0004 (9) | .0007 (6) | .0006 (9) | .0007 (10) |
| Domestic and International Operations | | | | |
| 1960-63 | .0011 (21) | .0014 (19) | .0010 (28) | .0012 (22) |
| 1964-67 | .0008 (25) | .0013 (22) | .0007 (27) | .0006 (21) |
| 1968-71 | .0004 (17) | .0006 (14) | .0004 (20) | .0002 (17) |
| 1972§ | .0004 (5) | .0007 (4) | .0003 (4) | .0001 (3) |
| 1960-72§ | .0007 (68) | .0010 (59) | .0006 (79) | .0005 (63) |

* Number of fatal accidents shown in parentheses.

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

‡ Based on all operations, scheduled and nonscheduled, including helicopter operations.

§ 1972 figures are preliminary.

The first-pilot fatality rates for all-cargo carriers are shown in Table 2 for recent four-year periods, together with the rates for Supplemental Carriers.

Supplemental Carriers

These airlines form a class of carriers holding temporary certificates of public convenience and necessity issued by the Civil Aeronautics Board, authorizing them to perform passenger and cargo charter services supplementing the scheduled service of the Certificated Route Air Carriers. In addition, they may perform on a limited or temporary basis, as authorized by the Civil Aeronautics Board, scheduled operations including the

TABLE 2
ALL-CARGO CARRIERS AND SUPPLEMENTAL CARRIERS
FIRST-PILOT AVIATION DEATH RATES
PER 1,000 AIRPLANE HOURS*

| Years | All-Cargo (All Operations) | Supplemental (All Operations) |
|---------------|-------------------------------|----------------------------------|
| 1960-63..... | .0040 (3) | .0066 (6) |
| 1964-67..... | .0069 (5) | .0045 (5) |
| 1968-71..... | .0051 (3) | .0018 (2) |
| 1972†..... | .0000 (0) | .0000 (0) |
| 1960-72†..... | .0050 (11) | .0038 (13) |

* Number of fatalities shown in parentheses.

† 1972 figures are preliminary.

transportation of individually ticketed passengers and individually way-billed cargo. There were 11 such air carriers listed in a recent edition of the *Air Carrier Traffic Statistics*.

The figures shown in Table 2 include experience in operations under contracts with military authorities. There has been a notable decline in first-pilot fatality rates of Supplemental Carriers over the years, on the basis of limited experience.

AIR CARRIERS OF COUNTRIES OTHER THAN THE UNITED STATES

The general conditions and aviation technology peculiar to any country influence the hazards of flying in that country. Each country has its own aviation regulations and methods of enforcement. These may be different for domestic and international operations, the latter being affected by such compromises as the crossing of international boundary lines may require. From *World Air Transport Statistics*, a publication of the International Air Transport Association, the Committee has sum-

marized the experience of the Association's members. In 1971, these members carried 90 per cent of the world's scheduled airline traffic (excluding the U.S.S.R. and the People's Republic of China). Some companies operated only within the borders of a particular country, some only on an international basis, and some on both bases in varying proportions.

By making reasonable assumptions regarding average speed, passenger fatality rates per 1,000 scheduled passenger hours were derived and are shown in Table 3. The 1971 issue of *World Air Transport Statistics* lists 92 IATA members in countries other than the United States and 11 United

TABLE 3
SCHEDULED AIR CARRIERS OF
UNITED STATES AND OTHER COUNTRIES
(PASSENGER/CARGO) AVIATION 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 | |
| 1960-63..... | .0040 | .0013 | .0011 |
| 1964-67..... | .0019 | .0007 | .0008 |
| 1968-71†..... | .0014 | .0001 | .0004 |
| 1971†..... | .0004 | .0000 | .0005 |
| 1960-71†..... | .0021 | .0005 | .0007 |

* Experience of helicopter air carriers is excluded.

† IATA figures are preliminary.

States members who operate scheduled passenger flights in fixed-wing aircraft. The safety record of the scheduled services of the airlines of other countries has shown considerable improvement but continues to be less favorable than that of United States scheduled air carriers.

For 1971, 50 per cent of the scheduled passenger hours reported to IATA were flown by the United States members. These air carriers accounted for 86 per cent of the scheduled passenger hours flown by all United States Certificated Route Air Carriers in 1971. The combined international and domestic scheduled experience of all United States Certificated Route Air Carriers (passenger/cargo) is included in Table 3 for comparison.

UNITED STATES GENERAL AVIATION

General Aviation flying includes all domestic civil flying except that performed by the United States Civil Air Carrier Fleet. The annual flying

time of planes in General Aviation totals more than five times the flying time of air carriers in their domestic flights. The number of hours flown by each aircraft in General Aviation and the primary use of each aircraft are obtained at the time of FAA annual inspection of aircraft.

In 1970, a more refined method for reporting aircraft hours was used by the FAA. A new category for kind of flying is "Rental," for which the actual uses of the aircraft by the pilot are unknown. In Table 4, the Rental

TABLE 4
GENERAL AVIATION FLYING BY KIND
PILOT AVIATION DEATH RATES PER 1,000 AIRCRAFT HOURS

| Years | Estimated Hours (000) | Aviation Deaths | Rate | Estimated Hours (000) | Aviation Deaths | Rate |
|------------|-----------------------|-----------------|------|-----------------------|-----------------|------|
| | Pleasure | | | Instruction | | |
| 1969..... | 5,999 | 326 | .054 | 7,023 | 54 | .008 |
| 1970..... | 9,163 | 323 | .035 | 4,524 | 52 | .011 |
| 1971*..... | 9,359 | 349 | .037 | 4,309 | 55 | .013 |
| | Business | | | Corporate | | |
| 1969†..... | | | | | | |
| 1970..... | 4,528 | 73 | .016 | 2,676 | 8 | .003 |
| 1971*..... | 4,503 | 73 | .016 | 2,638 | 7 | .003 |
| | Aerial Application | | | Air Taxi | | |
| 1969..... | 1,478 | 32 | .022 | 2,238 | 26 | .012 |
| 1970..... | 1,396 | 40 | .029 | 2,311 | 32 | .014 |
| 1971*..... | 1,398 | 38 | .027 | 2,042 | 27 | .013 |

* 1971 figures are preliminary. See text for comments regarding change in method of reporting aircraft hours.

† 1969 data not available.

hours are included with "Pleasure," on the assumption that most pilots renting aircraft do so for pleasure purposes. Under the system used in 1969 and prior years, it is believed that most Rental hours were classified under "Instruction" because the owner's primary use of this aircraft was usually for instruction. Because of this change, the pilot aviation death rates for Pleasure flying in 1970 and 1971 are much lower than for previous years, although they remain the highest among the categories in General Aviation shown in Table 4. However, it is probable that the tendency of

individuals to underreport hours for Pleasure flying and to overreport hours for other types of flying still causes a distortion of the pilot aviation death rates, particularly in the Pleasure category, where the rates still appear to be overstated.

Death rates referred to in this section are expressed per 1,000 airplane hours. One of the many factors affecting pilot death rates is the number of hours flown in a year, and death rates per life year of exposure may be markedly lower than death rates per 1,000 aircraft hours. However, such rates cannot be reliably estimated on the basis of the material from which this information has been taken.

The experience under flight training of civilians includes the death of the instructor or the student, whichever was acting as pilot when the accident occurred. The hours of instructional flying in 1971 represented 17 per cent of the total in General Aviation. Practice flying not under the supervision of an instructor, either in the air or from the ground, is not included in the Instruction category. The higher pilot aviation death rates in 1970 and 1971 reflect the reduced number of aircraft hours due to the change in reporting method mentioned above.

The "Business" and "Corporate" categories, which accounted for 28 per cent of total General Aviation flying in 1971, are composed of non-professional pilots flying for business reasons (Business) and professional pilots receiving direct salary or compensation for piloting planes operated (not for public hire) by a corporation or business firm for the transportation of personnel or cargo in furtherance of the company's business (Corporate).

Air Taxi flying accounted for 8 per cent of the total General Aviation hours in 1971. This type of flying includes scheduled and nonscheduled passenger and cargo flying by professional pilots (other than Corporate) that is not done by the United States Civil Air Carrier fleet. In 1971, there were 6 pilot deaths in scheduled flying (4 passenger and 2 cargo) and 21 in nonscheduled flying (15 passenger and 6 cargo). The number of flying hours is not available for these categories separately.

The pilot fatality rates in Aerial Application, which accounted for 6 per cent of General Aviation flying in 1971, have been higher than those in other commercial activities. The subdivision of experience by type of aircraft in 1966-71 showed pilot aviation fatality rates per 1,000 aircraft hours of 0.028 for rotorcraft (14 deaths) and 0.030 for fixed-wing aircraft (217 deaths). Aerial Application includes any form of flying in which chemicals are distributed from aircraft upon the land below, the usual form being crop dusting. Fire control is not included in this category. The average annual flying time is believed to vary considerably among

pilots who have a local business confined to a single growing season and those who move from area to area with the season.

In addition to the total of 549 deaths recorded in all the categories shown in Table 4, there were 75 other pilot deaths during 1971. Of this number, 14 deaths occurred in aircraft being used for commercial purposes other than those shown in Table 4, such as power and pipeline patrol, fire control, survey, advertising, and photography; 9 deaths were classified as "noncommercial—other," a category which consists primarily of practice flying; and 52 deaths were classified as "miscellaneous," which included 4 accidents in testing (including testing of homemade aircraft), 11 in ferrying, 8 in hunting, and 3 in demonstration. The remaining 26 fatal accidents referred to as "miscellaneous" included air show participation, towing gliders, search and rescue, and unauthorized or unknown uses.

The 624 pilot deaths during 1971 in General Aviation as reported by the National Transportation Safety Board included 584 in small fixed-wing aircraft (12,500 pounds or less), 10 in large fixed-wing aircraft (over 12,500 pounds), 20 in rotorcraft, and 10 in gliders or other aircraft. Among the 674 pilots involved in fatal accidents (which resulted in the 624 pilot deaths previously mentioned) were 65 holding student certificates, 314 with private certificates, 249 with commercial certificates, 37 with airline transport certificates, and 8 with no certificate; the remaining pilot is listed as unknown or unreported.

CANADIAN CIVIL FLYING

Passenger and first-pilot aviation fatality rates per 1,000 hours in domestic and international operations of Canadian scheduled airlines derived from figures furnished by the Canadian Department of Transport and Statistics are shown in Table 5. Comparable passenger and first-pilot aviation fatality rates for Canadian nonscheduled airlines have been estimated from the same sources and are also shown in Table 5.

Canadian scheduled airlines comprise air carriers that serve designated points in accordance with a definite service schedule. Nonscheduled airlines are those that follow a route pattern with some degree of regularity or operate from a designated base to serve a defined area or on charter of an entire aircraft.

The fatality rates among Canadian civil pilots, by class of license, are shown in Table 6, separately, for the periods 1964-67 and 1968-71, based on figures furnished by the Canadian Department of Transport. It should be noted that pilots holding airline transport licenses are not necessarily flying for scheduled airlines, since they may engage in other types of flying.

TABLE 5
CANADIAN AIRLINES
AVIATION FATALITY RATES*

| Years | Passenger Rate per 1,000 Passenger Hours | First-Pilot Rates per 1,000 Aircraft Hours |
|-----------------------|--|--|
| Scheduled Airlines | | |
| 1960-63 | .0025 (2) | .0015 (2) |
| 1964-67 | .0014 (3) | .0020 (3) |
| 1968-71 | .0009 (2) | .0010 (2) |
| 1960-71 | .0014 (7) | .0015 (7) |
| 1969-72 (est.) | .0009 (2) | .0010 (2) |
| Nonscheduled Airlines | | |
| 1964-67 | .0189 (40) | .0186 (39) |
| 1968-71 | .0175 (61) | .0158 (47) |
| 1964-71 | .0180 (101) | .0169 (86) |

* Number of fatal accidents shown in parentheses.

TABLE 6
CANADIAN CIVIL PILOTS BY CLASS OF LICENSE
1964-71 AVIATION FATALITY RATES

| Class of License | Period | Life Years of Exposure | Aviation Fatalities | Rate per 1,000 Life Years of Exposure |
|------------------------------------|----------------------|---------------------------|------------------------|--|
| Airline transport | { 1964-67 1968-71 | 6,449 10,123 | 13 19 | 2.0 1.9 |
| Senior commercial | { 1964-67 1968-71 | 1,624 2,605 | 8 14 | 4.9 5.4 |
| Commercial | { 1964-67 1968-71 | 12,522 18,877 | 73 82 | 5.8 4.3 |
| Private (excluding students) | { 1964-67 1968-71 | 68,980 94,388 | 118 108 | 1.7 1.1 |
| Glider | 1968-71 | 5,136 | 3 | 0.6 |

UNITED STATES MILITARY

General

Where the necessary information is available, aviation fatality rates are shown both including and excluding deaths due to hostile action. As in the previous report, fatality rates which include deaths due to hostile action are shown without brackets and fatality rates which exclude such deaths are shown within brackets.

All the aviation fatality statistics in this report are shown on a calendar-year basis.

Age and Rank

Table 7 shows aviation fatality rates by age group, and Table 8 shows aviation fatality rates by rank for Air Force pilots and nonpilot rated officers and for Navy and Marine Corps pilots on active duty. This experience includes pilots who flew chiefly to maintain proficiency, as well as those with full-time flying duties. Rated (in contrast to nonrated) officers in the Air Force are those whose duties include flying other than as passengers.

The aviation fatality rates for Air Force pilots in 1971 were substantially lower than in 1970 and approximated the low levels of 1969. The 1971 Air Force nonpilot rated officer fatality rates were somewhat higher than the corresponding rates for 1969 and 1970 but were significantly lower than those for years prior to 1969. For Air Force pilots and nonpilot rated officers, the 1968-71 experience was more favorable than the 1964-67 experience.

Fatality rates including deaths due to hostile action for Navy and Marine Corps pilots decreased in 1971, as they had in 1970. Only a small proportion of the deaths was due to hostile action, but these deaths could not be identified by age. Navy and Marine Corps pilot fatality rates remained at substantially higher levels than the corresponding rates for Air Force pilots. In contrast to the experience for Air Force pilots, Navy and Marine Corps pilots had higher fatality rates in the period 1968-71 than in the earlier period 1964-67.

Duty Assignment

The 1971 aviation fatality rates among Air Force pilots according to duty assignment are shown in Table 9. Corresponding rates for the years 1965 and 1970 are also shown for comparison purposes; rates for 1966-69 are not available. In this table, pilots who were not assigned to a specific flying duty but flew chiefly to maintain proficiency are excluded.

Hours of Flying

On the average, in 1971, Navy pilots flew 199 hours, while Active Naval Reserve pilots flew 143 hours, which represented increases over average hours flown in 1970. During 1971, Marine Corps pilots flew an average of 124 hours, while Active Marine Reserve pilots flew an average of 107 hours. These figures were about the same in 1970.

TABLE 7
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 INCLUDED*

| Age Group | 1964-67 | 1968-71† | 1971‡ |
|-----------------------------------|---------|------------|-------------|
| Air Force Pilots | | | |
| Under 25..... | 6.6 | 4.8 [3.0] | 3.4 [2.2] |
| 25-29..... | 7.3 | 6.9 [4.6] | 4.5 [3.6] |
| 30-34..... | 5.4 | 3.6 [2.5] | 2.4 [2.0] |
| 35-39..... | 4.4 | 3.0 [2.0] | 2.1 [2.0] |
| 40 and over..... | 1.4 | 1.5 [1.0] | 0.3‡ [0.3]‡ |
| All..... | 4.0 | 3.8 [2.5] | 2.7 [2.0] |
| Air Force Nonpilot Rated Officers | | | |
| Under 25..... | 4.5 | 1.0 [0.8] | 1.9 [1.4]‡ |
| 25-29..... | 2.3 | 0.9 [0.7] | 0.3‡ [0.3]‡ |
| 30-34..... | 2.3 | 1.3 [1.0] | 1.2‡ [1.2]‡ |
| 35-39..... | 1.7 | 1.1 [0.8] | 1.3‡ [1.3]‡ |
| 40 and over..... | 1.3 | 1.8 [1.2]‡ | 2.4‡ [2.4]‡ |
| All..... | 2.2 | 1.1 [0.8] | 1.2 [1.1] |
| Navy and Marine Corps Pilots | | | |
| Under 25..... | 7.9 | 12.6 [8.4] | 5.3 [5.3] |
| 25-39..... | 8.6 | 10.9 [7.8] | 4.5 [4.5] |
| 30-34..... | 6.2 | 8.0 [5.2] | 3.3 [3.3] |
| 35-39..... | 4.3 | 4.1 [3.0] | 2.9 [2.9] |
| 40 and over..... | 0.9 | 1.8 [1.4] | 0.7‡ [0.7]‡ |
| All..... | 5.5 | 7.8 [5.3] | 3.6 [3.4] |

* Rates in brackets exclude deaths due to hostile action.

† A small proportion of total Navy and Marine Corps pilot deaths were not identified by age.

‡ Based on 5 or fewer deaths.

TABLE 8

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 INCLUDED*

| Rank (Pay Grade)† | 1964-67 | 1968-71‡ | 1971‡ |
|--|---------|-------------|-------------|
| Air Force Pilots | | | |
| 2d Lieutenant (01)..... | 6.2 | 5.4 [5.1] | 7.8 [7.8] |
| 1st Lieutenant (02)..... | 8.5 | 6.1 [3.6] | 3.6 [2.0] |
| Captain (03)..... | 6.0 | 5.4 [3.4] | 3.1 [2.4] |
| Major (04)..... | 2.9 | 3.7 [2.4] | 3.2 [2.4] |
| Lieutenant Colonel (05)..... | 1.1 | 1.7 [1.2] | 1.1 [1.1] |
| General and Colonel (06 and up)..... | 0.7 | 0.8 [0.8] | 0.7§ [0.7]§ |
| All..... | 4.0 | 3.8 [2.5] | 2.7 [2.0] |
| Air Force Nonpilot Rated Officers | | | |
| 2d Lieutenant (01)..... | 0.7§ | 0.0§ [0.0]§ | 0.0§ [0.0]§ |
| 1st Lieutenant (02)..... | 3.2 | 1.5 [1.3] | 3.0§ [2.3]§ |
| Captain (03)..... | 2.3 | 1.2 [0.9] | 0.9§ [0.6]§ |
| Major (04)..... | 1.8 | 1.1 [0.7] | 1.4 [1.4] |
| Lieutenant Colonel (05)..... | 0.8§ | 1.1 [0.9] | 1.0§ [1.0]§ |
| General and Colonel (06 and up)..... | 2.4§ | 0.0§ [0.0]§ | 0.0§ [0.0]§ |
| All..... | 2.2 | 1.1 [0.8] | 1.2 [1.1] |
| Navy and Marine Corps Pilots | | | |
| 2d Lieutenant (01)..... | 5.0 | 9.5 [4.7]§ | 0.0§ [0.0]§ |
| 1st Lieutenant (02)..... | 11.1 | 15.9 [10.5] | 7.5 [7.2] |
| Captain (03)..... | 7.0 | 7.8 [5.8] | 3.2 [3.0] |
| Major (04)..... | 4.0 | 6.3 [4.5] | 3.7 [3.2] |
| Lieutenant Colonel (05)..... | 2.1 | 3.0 [2.0] | 1.7 [1.7] |
| General and Colonel (06 and up)..... | 0.3§ | 0.3§ [0.3]§ | 0.0§ [0.0]§ |
| All..... | 5.5 | 7.8 [5.3] | 3.6 [3.4] |

* Rates in brackets exclude deaths due to hostile action.

† Ranks shown are for Army, Air Force, and Marine Corps; equivalent Navy ranks apply to Navy experience.

‡ A small proportion of total Navy and Marine Corps pilot deaths were not identified by rank.

§ Based on 5 or fewer deaths.

During 1971, Army pilots flew an average of 81 hours in fixed-wing aircraft and 153 hours in rotary-wing aircraft. This represented a significant decrease from 1970.

The average number of aircraft hours for Air Force pilots is not available. In 1971, the average annual flying time for Air National Guard pilots was 106 hours, somewhat less than in 1970.

TABLE 9
UNITED STATES AIR FORCE PILOTS, BY DUTY ASSIGNMENT
AVIATION FATALITY RATES PER 1,000 LIFE YEARS OF EXPOSURE
DEATHS DUE TO HOSTILE ACTION INCLUDED*

| Duty Assignment | 1965 | 1970 | 1971 |
|-----------------------|-------------|--------------|---------------|
| Pilot, helicopter | 4.1† [2.7]† | 8.2 [3.7]† | 4.3† [0.9]† |
| Pilot, search-rescue | 0.0† [0.0]† | 0.0† [0.0]† | 0.0† [0.0]† |
| Pilot, tanker | 2.0 [2.0] | 0.0† [0.0]† | 0.4† [0.4]† |
| Pilot, bomber | 3.1 [2.4] | 1.2† [0.6]† | 5.0 [5.0] |
| Pilot, reconnaissance | 7.6 [4.3]† | 3.3† [2.6]† | 2.4† [1.6]† |
| Pilot, trainer | 9.9 [9.1] | 3.8 [3.8]† | 0.9 [0.7]† |
| Pilot, cargo† | 7.4 [5.6] | 5.8 [4.8] | 2.2 [2.2] |
| Pilot, observation | | 24.3 [5.6] | 17.2 [9.2] |
| Pilot, fighter§ | 8.4 [5.1] | 12.1 [8.0] | 9.0 [6.5] |
| Pilot, utility | 3.2 [2.7] | 24.4† [6.1]† | 26.3† [26.3]† |
| All | 7.4 [5.4] | 6.5 [4.3] | 3.6 [2.7] |

* Rates in brackets exclude deaths due to hostile action.

† Based on 5 or fewer deaths.

‡ 1965 experience included "Pilot, transport" and "Pilot, troop carrier."

§ 1965 experience included "Pilot, fighter-interceptor" and "Pilot, fighter-bomber."

|| 1965 experience included "Pilot, observation," "Pilot, other," and "Pilot, unknown."

Military Air Command (MAC)

Aviation fatality rates among pilots and crew members of MAC are shown in Table 10. There were no fatalities among pilots or crew members in MAC nontransport units in 1971.

United States Army

Table 11 includes data for the years 1969-71 for Army pilots and crew members for all flying operations; data for 1968 are not available. Fatality rates for pilots continued to decline in 1971 and were about half the 1970 levels. The fatality rates for crew members also decreased, although not as substantially as the rates for pilots, and remained at much higher levels than the corresponding rates for pilots. As in 1969 and 1970, fatality rates that included deaths due to hostile action for both crew members and pilots were approximately twice the corresponding rates that excluded deaths due to hostile action.

The experience of Army pilots flying rotary-wing and fixed-wing aircraft are also compared in Table 11. While the fatality rates for pilots of fixed-wing aircraft decreased slightly in 1971 from the corresponding rates in 1970, the decrease in the rates for pilots of rotary-wing aircraft was much greater. Nevertheless, rates for pilots of rotary-wing aircraft continued to be higher than the corresponding rates for pilots of fixed-wing

TABLE 10
MILITARY AIR COMMAND (MAC)
AVIATION FATALITY RATES PER 1,000 LIFE YEARS OF EXPOSURE
DEATHS DUE TO HOSTILE ACTION INCLUDED*

| | 1964-67 | 1968-71 | 1971 |
|----------------------|---------|-----------|-------------|
| Pilots: | | | |
| Transport units..... | 2.0 | 0.8 [0.6] | 1.9† [1.2]† |
| Other units..... | 0.5† | 2.1 [1.0] | 0.0† [0.0]† |
| All..... | 1.4 | 1.3 [0.8] | 1.0† [0.6]† |
| Crew members: | | | |
| Transport units..... | 2.2 | 0.7 [0.7] | 0.8† [0.6]† |
| Other units..... | 1.1 | 3.2 [1.9] | 0.0† [0.0]† |
| All..... | 2.0 | 1.6 [1.1] | 0.6† [0.4]† |

* Rates in brackets exclude deaths due to hostile action.

† Based on 5 or fewer deaths.

TABLE 11
UNITED STATES ARMY, ALL FLYING OPERATIONS
DEATHS DUE TO HOSTILE ACTION INCLUDED*

| | 1964-67 | 1969-71† | 1971 |
|--|---------------|---------------|---------------|
| Aviation Fatality Rates per 1,000 Life Years of Exposure | | | |
| Pilots..... | 15.7 [9.8] | 14.0 [6.9] | 8.6 [4.4] |
| Crew members..... | 16.8 [8.8] | 27.5 [11.9] | 24.8 [11.9] |
| Pilot Fatality Rates per 1,000 Aircraft Hours | | | |
| Fixed-wing aircraft..... | .0275 [.0221] | .0283 [.0221] | .0312 [.0250] |
| Rotary-wing aircraft..... | .0694 [.0398] | .0687 [.0321] | .0570 [.0275] |
| All types of aircraft.... | .0567 [.0344] | .0622 [.0305] | .0528 [.0271] |

* Rates in brackets exclude deaths due to hostile action.

† 1968 experience not available.

aircraft—although, when deaths due to hostile action were excluded, the differential between the rates was minimal.

Student Pilots

Table 12 presents aviation fatality rates for student pilots in the military services. Fatality rates for student pilots in all services were markedly lower in 1971 than in 1970. There was an especially significant reduction in the 1971 fatality rates for student pilots in the Navy and

TABLE 12
UNITED STATES AIR FORCE, NAVY AND MARINE CORPS,
AND ARMY STUDENT PILOTS
AVIATION FATALITY RATES PER 1,000 LIFE YEARS OF EXPOSURE

| | 1964-67 | 1968-71 | 1971 |
|-------------------------|---------|---------|------|
| Air Force* | 2.4 | 2.1 | 1.5 |
| Navy and Marine Corps:* | | | |
| Basic course | 2.6 | 2.6 | 0.6† |
| Advanced course | 9.6 | 8.2 | 0.0† |
| Army | 2.6 | 4.6 | 1.6† |

* Commissioned officers only.

† Based on 5 or fewer deaths.

TABLE 13
UNITED STATES COAST GUARD PERSONNEL
ON FLIGHT ORDERS
AVIATION FATALITY RATES PER 1,000
LIFE YEARS OF EXPOSURE

| | 1964-67 | 1968-71 | 1971 |
|---------|---------|---------|------|
| Pilots | 4.0 | 1.2* | 0.0* |
| Crewmen | 1.6 | 0.1* | 0.0* |

* Based on 5 or fewer deaths.

Marine Corps in both the basic course and the advanced course categories. However, it should be noted that 1971 fatality rates, except those for the Air Force, were based on five or fewer deaths.

Coast Guard

The aviation fatality rates for Coast Guard personnel on flight orders are shown in Table 13. During 1971, there were no aviation fatalities among Coast Guard personnel. There have been no aviation fatalities among Coast Guard student pilots or observers during the last fifteen years.

Active Reserves and National Guard

Table 14 shows the aviation fatality rates for Army, Navy, and Marine Corps pilots in the active reserves and Air and Army National Guard pilots. Such pilots are not on full-time active duty but fly on weekend and/or short-term (usually two weeks) training duty.

TABLE 14
PILOTS IN THE ACTIVE RESERVES AND
NATIONAL GUARD, BY AGE
AVIATION FATALITY RATES PER 1,000
LIFE YEARS OF EXPOSURE

| | 1964-67 | 1968-71 | 1971 |
|-----------------------|---------------------------------------|---------|------|
| | Navy and Marine Corps Active Reserves | | |
| Ages under 30..... | 5.5 | 2.1 | 2.6* |
| Ages 30 and over..... | 2.6 | 1.7 | 0.8* |
| All ages..... | 3.0 | 1.8 | 1.2 |
| | Air National Guard | | |
| All ages..... | 4.2 | 2.1 | 2.7 |
| | Army National Guard | | |
| All ages..... | 0.3* | 0.7 | 1.4* |
| | Army Reserves | | |
| All ages..... | N.A.† | N.A. | 1.2* |

* Based on 5 or fewer deaths.

†N.A. = Not available.

The rates for Navy and Marine Corps pilots in 1971 continued to show an improvement over those in prior years. For all other pilots, the rates in 1971 were higher than in 1970.

Air Force Flight Surgeons and Nurses

The aviation fatality rates among Air Force flight surgeons were 1.2 per 1,000 life years of exposure in 1971 and 2.7 during the four-year period 1968-71.

There have been no fatalities among Air Force flight nurses in the last ten years.

Graduates of Academies—Assignment to Aviation

In 1971, 1.1 per cent of Military Academy graduates but no Naval Academy graduates were placed in the Air Force for flight training.

Of the commissioned Air Force Academy graduates in 1971, 99.8 per cent were placed in the Air Force, while 0.1 per cent received assignment in the Marine Corps, 0.1 per cent in the Navy, and none in the Army.

CANADIAN MILITARY

Aviation fatality rates among Canadian regular military forces, excluding reserves, for the period 1969–71 are shown in Table 15 by age, rank, and functional classification. Fatality rates are based upon flying hours rather than upon life years of exposure. The average number of flying hours for all pilots combined has remained steady over the three-year period at approximately 300 hours per year and shows little variation by age group. Crew members average around 350 hours per year. There appears to be some variation by functional classification, but this cannot be accurately determined because of duplicate counting in different functions. It would appear that the average annual flying time for transport and maritime pilots and crew is considerably higher than those in the categories of fighter, training, and helicopter. The former would appear to average in excess of 400 hours per year, the latter near 200 hours per year.

INTERCOMPANY EXPERIENCE

Aviation is undergoing continual change in various ways, so that the experience of recent years is felt to be more pertinent in gauging future experience than is the experience of earlier years. Reflecting the above combined with the change four years ago in the form of submission of data, the format of our tables has been somewhat altered this year. In another two or three years we expect also to display data covering experience since 1971 limited to issues of 1967 and later. Nineteen companies were able to contribute data this year, as against twenty last year. It should be noted that current flying activity is not necessarily the same as the category recorded at issue, on which the statistics are tabulated.

Civilian Aviation

Tables 16 and 17 show the fatality rates experienced in recent years among civilian pilots. They represent a simplification and consolidation of the data presented last year in Tables 20–23. The experience is by

number of policies, and the classification of the insured is according to status at the time of application for insurance. Exposure in the "With Aviation Extra Premium" category is terminated when the extra premium is discontinued. If discontinuance is due to liberalization of underwriting practices, companies have been encouraged to transfer the exposure to the

TABLE 15
CANADIAN FORCES
1969-71 AVIATION FATALITY RATES PER 1,000 FLYING HOURS OF EXPOSURE
REGULAR FORCES

| | Pilots | Crew Members |
|---|--------|--------------|
| Age group: | | |
| Under 25..... | .0383 | .0043* |
| 25-29..... | .0129 | .0076* |
| 30-34..... | .0089* | .0046* |
| 35-39..... | .0065* | .0077* |
| 40 and over..... | .0026* | .0026* |
| All..... | .0129 | .0057 |
| Rank: | | |
| Lieutenant and others of lower rank..... | .0294 | .0059 |
| Captain..... | .0115 | .0057* |
| Major..... | * | * |
| Lieutenant Colonel and others of higher rank..... | * | * |
| All..... | .0129 | .0057 |
| Functional classification: | | |
| Fighter..... | .0386 | .0457* |
| Training..... | .0151 | * |
| Transport..... | .0064* | .0054* |
| Maritime..... | .0060* | .0024* |
| Helicopter..... | .0164* | .0168* |
| Others..... | .0111* | .0058* |
| All..... | .0129 | .0057 |

* Based on 5 or fewer deaths.

NOTE.—The functional classification "Others" is composed largely of 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.

"Without Aviation Extra Premium" classification. Not all companies have been able to do this, and consequently the experience for such policies includes only a portion of such cases.

Table 16 covers the experience for various categories of pilots when issued with and without aviation extra premium. The "Scheduled airline" category is defined by the coding instructions as United States Certificated Route Air Carriers and corresponding major Canadian airlines. The "Cor-

porate" category is defined as hired pilots flying company-owned planes. "Charter and other airlines" includes the supplemental air carriers and intrastate and foreign airlines, as well as air-taxi and charter operations, the latter two probably constituting more than half the exposure. The "Others" category includes corporate and charter pilots of companies unable to subdivide their data as well as 2,395 years of exposure with 3 deaths for specialty pilots such as aerial application, pipeline survey,

TABLE 16
INTERCOMPANY EXPERIENCE ON PILOTS IN CIVILIAN
AVIATION—BY POLICIES*
(1968-71 Experience on 1959 and Subsequent Issues)

| STATUS AT ISSUE | 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 | 740 | 4 | 5.4† | 10,441 | 8 | 0.8 |
| Other commercial pi- lots flying for hire: | | | | | | |
| Instructing (at least half-time) | 3,956 | 11 | 2.8 | 118 | 0 | |
| Corporate | 2,107 | 6 | 2.8 | 3,681 | 6 | 1.6 |
| Charter and other airlines | 2,894 | 13 | 4.5 | 729 | 1 | |
| Others‡ | 4,509 | 15 | 3.3 | 1,387 | 2 | 1.4† |
| Private pilots | 27,276 | 70 | 2.6 | 113,749 | 112 | 1.0 |
| Student pilots | 42,259 | 50 | 1.2 | 2,646 | 1 | |

* 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.

† Based on 5 or fewer deaths.

‡ Includes exposure of companies unable to subdivide data.

advertising, and photography. Private pilots are those with 100 or more solo hours flying for pleasure or personal business only, and student pilots are those with less than 100 solo hours. There were 8 war deaths among the 50 deaths of student pilots.

Table 17 displays details for private pilots subdivided by hours flown, type of flying certificate, and attained age. In all subdivisions the fatality rate is higher for issues with aviation extra premium than for those without extra premium. The exposures for those without aviation extra premium include an unknown proportion of lives who have discontinued

their flying activities. Such persons do not, of course, notify the insurer when terminating their flying, because they have no reason to do so. However, a special tabulation was made using 1967 and subsequent issues only for private pilots issued without aviation extra premium. This produced exactly the same fatality rate overall as well as for the two categories flying less than 200 hours per year. It was a limited experience

TABLE 17
 INTERCOMPANY EXPERIENCE ON PILOTS FLYING FOR PLEASURE
 OR PERSONAL BUSINESS—BY POLICIES*
 (1968-71 Experience on 1959 and Subsequent Issues)

| | 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..... | 14,337 | 21 | 1.5 | 77,435 | 48 | 0.6 |
| 100-199..... | 6,986 | 13 | 1.9 | 29,928 | 50 | 1.7 |
| 200-299..... | 2,838 | 19 | 6.7 | 3,164 | 11 | 3.5 |
| 300 or more..... | 2,813 | 17 | 6.0 | 1,424 | 3 | 2.1‡ |
| By type of flying certificate: | | | | | | |
| Commercial or transport..... | 6,438 | 21 | 3.3 | 23,975 | 19 | 0.8 |
| Private..... | 20,838 | 49 | 2.4 | 89,774 | 93 | 1.0 |
| By attained age: | | | | | | |
| Under 35..... | 12,522 | 22 | 1.8 | 17,923 | 14 | 0.8 |
| 35-49..... | 10,994 | 39 | 3.5 | 70,897 | 73 | 1.0 |
| 50 and over..... | 3,760 | 9 | 2.4 | 24,929 | 25 | 1.0 |
| Total..... | 27,276 | 70 | 2.6 | 113,749 | 112 | 1.0 |

* 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 not stated.

‡ Based on 5 or fewer deaths.

covering only 16,495 years of exposure with 16 deaths. Interestingly, half the deaths were at attained age 50 and over, with a fatality rate of 3.2 for these ages.

Military Aviation

Tables 18-21 display the aviation fatality rates separately for the years 1963-67 and 1968-71 among military aviation personnel on policies issued with an aviation extra premium. The experience is by number of

policies, and the classification of the insured is determined by his status at the time of application for insurance. Exposure was terminated when the extra premium was discontinued. Deaths due to enemy action are excluded in the figures and rates shown in brackets.

Table 18 continues the general format of Table 24 in last year's report, adding the age groups shown last year in Table 28. It should be noted that the 1963-67 experience includes that of pilots and crew members with administrative duties, because such experience could not be separated; the 1968-71 experience includes only such personnel with operational duties. If the experience of administrative personnel were included in the 1968-71 data, the fatality rates would be somewhat lower.

Using only issues of 1967 and later, when underwriting restrictions were generally being applied on new issues, a special tabulation of the 1968-71 experience for United States Air Force and Army pilots yielded 2,761 years of exposure with 11 [8] deaths, for a fatality rate of 4.0 [2.9] per 1,000. Young attained ages predominate in this limited experience, making the rate much higher than the rate of 2.9 [1.4] experienced with issues 1959-66 included in the exposures. However, for attained ages under 25, the respective rates are 33.8 [19.3] based on 7 [4] deaths and 19.6 [8.6] based on 16 [7] deaths. Apparently, underwriting restrictions were only partially effective at the young ages.

Fatality rates generally decrease as the age increases. For Air Force pilots, fatality rates tend to be about half those for Army, Navy, and Marine pilots in the all-ages category. The Army portion of the experience on crew members is quite limited, and, for the 1963-67 experience, the subdivision of data for ages 35-39 and 40 and over is not available.

Table 19 conforms to Table 25 of last year with another year's experience included. It covers experience during the years 1968-71 among pilots in military aviation by branch of service and flying duties in two attained age groups. Administrative pilots are those flying only 40-150 hours annually; operational pilots are those flying over 150 hours annually. The added year of experience did not produce any really significant changes in fatality rates. However, it should be noted that the figures for the Navy in last year's report were incorrect. For all branches combined, administrative pilots experienced higher fatality rates than operational pilots at attained ages under 35; and, at attained ages 35 and over, the expected result of lower rates for administrative pilots was experienced.

Table 20 corresponds to Table 27 of last year with the experience years

TABLE 18

INTERCOMPANY EXPERIENCE ON PILOTS AND CREW MEMBERS IN
MILITARY AVIATION—WITH AVIATION EXTRA PREMIUM*
FATALITIES IN COMBAT MISSIONS INCLUDED WHETHER
OR NOT RESULTING FROM ENEMY ACTION†

(1963-67 Experience on 1953 and Subsequent Issues—by Policies;
1968-71 Experience on 1959 and Subsequent Issues—by Policies)

| STATUS AT ISSUE AND ATTAINED INSURANCE AGE | YEARS OF EXPOSURE | | AVIATION FATALITIES | | RATE PER 1,000 | |
|--|-------------------|-----------|---------------------|------------|----------------|---------------|
| | 1963-67 | 1968-71‡ | 1963-67 | 1968-71‡ | 1963-67 | 1968-71‡ |
| U.S. Air Force pilots:§ | | | | | | |
| Under 25..... | 675 | 223 | 3 [2] | 2 [1] | 4.4 [3.0] | 9.0 [4.5] |
| 25-29..... | 8,633 | 3,032 | 43 [27] | 13 [3] | 5.0 [3.1] | 4.3 [1.0] |
| 30-34..... | 26,145 | 6,024 | 93 [68] | 12 [7] | 3.6 [2.6] | 2.0 [1.2] |
| 35-39..... | 22,870 | 10,287 | 62 [46] | 28 [13] | 2.7 [2.0] | 2.7 [1.3] |
| 40 and over... | 47,778 | 7,572 | 47 [42] | 9 [7] | 1.0 [0.9] | 1.2 [0.9] |
| Total..... | 106,101 | 27,138 | 248 [185] | 64 [31] | 2.3 [1.7] | 2.4 [1.1] |
| U.S. Army pilots:§ | | | | | | |
| Under 25..... | 371 | 594 | 9 [5] | 14 [6] | 24.3 [13.5] | 23.6 [10.1] |
| 25-29..... | 2,273 | 1,304 | 15 [10] | 6 [3] | 6.6 [4.4] | 4.6 [2.3] |
| 30-34..... | 4,710 | 1,813 | 23 [6] | 7 [1] | 4.9 [1.3] | 3.9 [0.6] |
| 35-39..... | 3,497 | 2,239 | 10 [5] | 8 [6] | 2.9 [1.4] | 3.6 [2.7] |
| 40 and over... | 2,407 | 1,226 | 4 [4] | 1 [1] | 1.7 [1.7] | 0.8 [0.8] |
| Total..... | 13,258 | 7,176 | 61 [30] | 36 [17] | 4.6 [2.3] | 5.0 [2.4] |
| U.S. Air Force and Army crew members: | | | | | | |
| Under 25..... | 3,367 | 441 | 11 [10] | 1 [1] | 3.3 [3.0] | 2.3 [2.3] |
| 25-29..... | 15,867 | 4,081 | 43 [30] | 18 [14] | 2.7 [1.9] | 4.4 [3.4] |
| 30-34..... | 24,603 | 8,725 | 50 [36] | 13 [9] | 2.0 [1.5] | 1.5 [1.0] |
| 35-39..... | 23,533 | { 7,998 } | 28 [20] | { 11 [8] } | 1.2 [0.8] | { 1.4 [1.0] } |
| 40 and over} | | | | { 4,196 } | | { 6 [6] } |
| Total..... | 67,370 | 25,441 | 132 [96] | 49 [38] | 2.0 [1.4] | 1.9 [1.5] |
| U.S. Navy and Marine pilots: | | | | | | |
| Under 25..... | 817 | 197 | 8 [8] | 0 [0] | 9.8 [9.8] | |
| 25-29..... | 6,117 | 2,024 | 28 [24] | 14 [5] | 4.6 [3.9] | 6.9 [2.5] |
| 30-34..... | 11,676 | 3,170 | 74 [54] | 14 [10] | 6.3 [4.6] | 4.4 [3.2] |
| 35-39..... | 11,350 | 3,469 | 68 [45] | 14 [10] | 6.0 [4.0] | 4.0 [2.9] |
| 40 and over... | 17,795 | 2,315 | 27 [19] | 5 [4] | 1.5 [1.1] | 2.2 [1.7] |
| Total..... | 47,755 | 11,175 | 205 [150] | 47 [29] | 4.3 [3.1] | 4.2 [2.6] |
| U.S. Air Force, Army, Navy, and Marine Reserve pilots..... | 8,003 | 3,186 | 14 [14] | 8 [8] | 1.7 [1.7] | 2.5 [2.5] |
| U.S. Air National Guard pilots | 3,811 | 1,932 | 3 [2] | 1 [1] | | |

* Exposure is terminated on discontinuance of extra premium.

† Figures in brackets exclude deaths from enemy action.

‡ 1968-71 experience excludes administrative pilots and crew members (flying 40-150 hours in the 12 months preceding issue).

§ Excludes a small amount of experience for the 1963-67 years of exposure of those companies which were unable to subdivide experience between Air Force and Army.

|| Based on 5 or fewer deaths.

TABLE 19
INTERCOMPANY EXPERIENCE ON PILOTS IN MILITARY AVIATION—WITH
AVIATION EXTRA PREMIUM*—FATALITIES IN COMBAT MISSIONS IN-
CLUDED WHETHER OR NOT RESULTING FROM ENEMY ACTION†
(1968-71 Experience on 1959 and Subsequent Issues—by Policies)

| STATUS AT ISSUE AND CLASSIFICATION BY BRANCH OF SERVICE AND FLYING DUTIES | ATTAINED AGES UNDER 35 | | | ATTAINED AGES 35 AND OVER | | |
|--|---------------------------|------------------------|-------------------|------------------------------|------------------------|-------------------|
| | Years of Exposure | Aviation Fatalities | Rate per 1,000 | Years of Exposure | Aviation Fatalities | Rate per 1,000 |
| Pilots, operational: | | | | | | |
| U.S. Air Force: | | | | | | |
| MAC | 2,124 | 2 [1] | 0.9 [0.5]‡ | 2,999 | 6 [3] | 2.0 [1.0] |
| All others | 7,155 | 25 [10] | 3.5 [1.4] | 14,860 | 31 [17] | 2.1 [1.1] |
| U.S. Army: | | | | | | |
| Helicopter | 1,921 | 18 [9] | 9.4 [4.7] | 1,311 | 2 [2] | 1.5 [1.5]‡ |
| All others | 1,790 | 9 [1] | 5.0 [0.6] | 2,154 | 7 [5] | 3.2 [2.3] |
| U.S. Navy and Mar- ines: | | | | | | |
| Carrier-based§ | 651 | 4 [1] | 6.1 [1.5]‡ | 543 | 2 [2] | 3.7 [3.7]‡ |
| All others | 4,740 | 24 [14] | 5.1 [3.0] | 5,241 | 17 [12] | 3.2 [2.3] |
| All branches | 18,381 | 82 [36] | 4.5 [2.0] | 27,108 | 65 [41] | 2.4 [1.5] |
| Pilots, administrative (all plane types): | | | | | | |
| U.S. Air Force | 838 | 4 [3] | 4.8 [3.6]‡ | 7,364 | 12 [10] | 1.6 [1.4] |
| U.S. Army | 1,528 | 10 [3] | 6.5 [2.0] | 2,570 | 4 [1] | 1.6 [0.4]‡ |
| U.S. Navy and Mar- ines | 884 | 4 [4] | 4.5 [4.5]‡ | 3,527 | 5 [5] | 1.4 [1.4]‡ |
| All branches | 3,250 | 18 [10] | 5.5 [3.1] | 13,461 | 21 [16] | 1.6 [1.2] |

* Exposure terminated on discontinuance of extra premium.
† Figures in brackets exclude deaths from enemy action.
‡ Based on 5 or fewer deaths.
§ All deaths except one (a combat death under 35) were in fighter planes which had a combat rate of 22.7 under age 35 and 13.1 for all ages.

TABLE 20

INTERCOMPANY EXPERIENCE ON PILOTS IN MILITARY AVIATION
WITH AVIATION EXTRA PREMIUM*

FATALITIES IN COMBAT MISSIONS INCLUDED WHETHER
OR NOT RESULTING FROM ENEMY ACTION†

(1963-67 Experience on 1953 and Subsequent Issues—by Policies;
1968-71 Experience on 1959 and Subsequent Issues—by Policies)

| STATUS AT ISSUE AND ATTAINED INSURANCE AGE | YEARS OF EXPOSURE | | AVIATION FATALITIES | | RATE PER 1,000 | |
|--|-------------------|---------|---------------------|---------|----------------|------------|
| | 1963-67 | 1968-71 | 1963-67 | 1968-71 | 1963-67 | 1968-71 |
| U.S. Air Force and Army | | | | | | |
| Administrative (40- 150 hours): | | | | | | |
| Ages 30-34‡ | 6,393 | 2,185 | 25 [20] | 14 [6] | 3.9 [3.1] | 6.4 [2.7] |
| Ages 35 and over | 30,668 | 9,934 | 30 [24] | 16 [11] | 1.0 [0.8] | 1.6 [1.1] |
| Total | 37,061 | 12,199 | 55 [44] | 30 [17] | 1.5 [1.2] | 2.5 [1.4] |
| Operational (over 150 hours): | | | | | | |
| Ages 30-34 | 24,247 | 7,837 | 89 [55] | 19 [8] | 3.7 [2.3] | 2.4 [1.0] |
| Ages 35 and over | 46,723 | 21,324 | 94 [76] | 46 [27] | 2.0 [1.6] | 2.2 [1.3] |
| Total | 70,970 | 29,161 | 183 [131] | 65 [35] | 2.6 [1.8] | 2.2 [1.2] |
| U.S. Navy and Marines | | | | | | |
| Administrative (40- 150 hours): | | | | | | |
| Ages 30-34‡ | 2,839 | 696 | 18 [12] | 4 [4] | 6.3 [4.2] | 5.7 [5.7]§ |
| Ages 35 and over | 12,266 | 3,527 | 34 [25] | 5 [5] | 2.8 [2.0] | 1.4 [1.4]§ |
| Total | 15,105 | 4,223 | 52 [37] | 9 [9] | 3.4 [2.4] | 2.1 [2.1] |
| Operational (over 150 hours): | | | | | | |
| Ages 30-34 | 8,472 | 3,170 | 54 [40] | 14 [10] | 6.4 [4.7] | 4.4 [3.2] |
| Ages 35 and over | 15,978 | 5,784 | 58 [38] | 19 [14] | 3.6 [2.4] | 3.3 [2.4] |
| Total | 24,450 | 8,954 | 112 [78] | 33 [24] | 4.6 [3.2] | 3.7 [2.7] |

* Exposure is terminated on discontinuance of extra premium.

† Figures in brackets exclude deaths from enemy action.

‡ A small part of the data includes ages under 30.

§ Based on 5 or fewer deaths.

|| Includes flying carrier-based plane types.

corresponding to those now shown in Table 18. This table is included for the purpose of comparing 1963-67 experience with 1968-71 experience; the 1968-71 experience also appears in Table 19.

Table 21 presents the experience of operational crew members by branch of service and corresponds to Table 26 of last year with another year's experience included.

TABLE 21
INTERCOMPANY EXPERIENCE ON OPERATIONAL CREW MEMBERS IN
MILITARY AVIATION WITH AVIATION EXTRA PREMIUM*—FATALITIES
IN COMBAT MISSIONS INCLUDED WHETHER OR NOT
RESULTING FROM ENEMY ACTION†
 (1968-71 Experience on 1959 and Subsequent Issues—by Policies)

| Status at Issue and Attained Insurance Age | Years of Exposure | Aviation Fatalities | Rate per 1,000 |
|---|----------------------|------------------------|-------------------|
| U.S. Air Force: | | | |
| MAC..... | 3,961 | 7 [4] | 1.8 [1.0]‡ |
| Bombers..... | 3,667 | 9 [7] | 2.5 [1.9] |
| All others: | | | |
| Under age 35..... | 9,273 | 22 [16] | 2.4 [1.7] |
| 35 and over..... | 8,097 | 10 [10] | 1.2 [1.2] |
| U.S. Army..... | 443 | 1 [1] | |
| U.S. Navy and Marine Corps§..... | 3,517 | 6 [3] | 1.7 [0.9]‡ |

* Exposure terminated on discontinuance of extra premium.

† Figures in brackets exclude deaths from enemy action.

‡ Based on 5 or fewer deaths.

§ Includes 65 years of exposure in carrier-based plane types.