

THE INFLUENCE OF TOTAL FLIGHT
TIME, RECENT FLIGHT TIME AND AGE
ON PILOT ACCIDENT RATES

FINAL REPORT

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ACUMENICS

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INTRODUCTION

Background

This paper has been prepared for the Transportation Systems Center and the Federal Aviation Administration under Order No. DTRS57-83-P-80750 by Acumenics Research and Technology, Incorporated.

The paper presents initial findings from a research effort conducted for the Safety Analysis Division, Office of Aviation Safety, Federal Aviation Administration (FAA). The analysis considers the influence of recent pilot flight time, total pilot flight time and age on general aviation pilot accident rates in the United States for the period, 1976 through 1980. This research is based on the integration of the NTSB accident record and the FAA Medical History file to compare relative accident rates. The lack of pilot flight hour exposure data has been noted in prior research.¹ This study uses civil flight hour exposure data for all pilots (those who had accidents and those who did not) to calculate accident rates for pilots falling into certain classes based on:

- recent flight time (estimated annual hours flown),
- total flight time (cumulative lifetime experience),
- recent and total flight time together, and
- pilot age.

¹See, for example: National Transportation Safety Board, Special Study: Single-Engine Fixed-Wing General Aviation Accidents 1972-1976, NTSB-AAS-79-1, p. 40; and, Acumenics Research and Technology, Inc. Analysis of Pilot Caused Accidents for Rotorcraft and Selected Fixed Wing Aircraft (Draft Final Report) prepared for FAA Technical Center, (May 14, 1982), p. 5-3.

This method permits the FAA to focus on those classes of pilots which exhibit the highest accident rates after controlling for exposure. This is important because of the large number of accidents that involve pilot error.² Thus, it would be beneficial to examine those factors which differentiate between pilots who have had accidents and those who did not have accidents. The principal focus of the present study is on pilots with Class III medical certificates (generally Private Pilots or Student Pilots). To provide a reference point, the experience of Class III pilots is compared to that of the entire pilot population and, in selected instances, to the experience of pilots with Class I medical certificates (generally Air Transport Pilots) and Class II medical certificates (generally Commercial Pilots).

Controversy still exists regarding the appropriate exposure measure for risk in aviation. This is especially the case in accident rate comparisons between classes of aviation such as air carrier operations vs. general aviation operations or private pilots vs. air transport pilots. This occurs because the inherently different characteristics of such activity (e.g., the number of takeoffs and landings per hour, the number of persons on-board, differences in operating costs and revenues, etc.) do influence the relative risks and benefits between such classes of activity. However, the accident rate per flight hour appears to be an appropriate measure as it accounts for differential activity.³ It is an

²See, for example: National Transportation Safety Board, Annual Review of Aircraft Accidents - 1979, NTSB-ARG-81-1, November, 1981; and, Acumenics Research and Technology, Inc., op. cit.

³Brookmeyer, Ron, Recommendations and Critique of Statistical Methodologies for General Aviation Accident and Pilot Occupation Data, Department of Biostatistics, Johns Hopkins University, October 1981.

especially good measure for accident rate comparisons within a specific class of aviation (e.g., general aviation). When used for comparisons between classes of aviation, it is important to recognize the likely bias that such a measure could introduce in that exposure risk may be different between the two classes.

Method

The general approach to this study was to merge two databases on a flight hour class basis for recent pilot flight time, total pilot flight time and recent and total flight time combined. The Medical History File was used to develop annual exposure estimates for all pilots and for Class III pilots on the basis of total and recent flight time. These data derive from information provided by pilots who take mandatory flight physicals and report civil flight time (both cumulative total hours and hours flown in the last six months).

Data from the National Transportation Safety Board (NTSB) were used to calculate the number of accidents for which pilots had various levels of experience in both recent flight time and total flight time. The standard accident report contains information about total pilot flight hours and the pilot flight hours in the 90 day period preceding the accident. Each database contains information to calculate pilot age and the class of medical certificate held.

The development of accident rate data by flight hour class requires that certain calculations be made. The reliability of the resultant measures depends on whether the assumptions underlying such calculations are valid. The pilot hours database contains information obtained at the time a pilot takes a flight

physical. Three classes of medical certificates are issued and each is valid for a specific interval according to the following:

- Class I (renewed every six months),
- Class II (renewed each year), and
- Class III (renewed every two years)

The type of flight physical required depends on the nature of the pilot license which the applicant holds and wants to maintain: air transport pilot -- Class I; commercial pilot -- Class II; and, private pilot or student pilot -- Class III.

However, pilots with an out-of-date medical examination may exercise the privileges of a lower rating as long as the medical certificate is not out of date for that class. For example, an air transport pilot can exercise the privileges of a commercial pilot as long as the medical certificate is less than one year old or the privileges of a private pilot if the medical certificate is more than one year old but less than two years old.

Because of the different intervals at which certificates are renewed, the following factors were used to calculate the number of pilots and recent flight hours on an annual basis by recent flight hour class and by total flight hour class.

- Number of Pilots (per year)

Class I: $1/2 \times 1 = 1/2$

Class II: $1 \times 1 = 1$

Class III: $1 \times 2 = 2$

- Recent Flight Hours (per year)

Class I: $1/2 \times 2 = 1$

Class II: $1 \times 2 = 2$

Class III: $2 \times 2 = 4$

For those pilots with Class I medical certificates, the annual number of pilots is equal to one-half of the Class I certificates issued (to account for pilots renewing this certificate every six months). Similarly, the number of recent flight hours is calculated by multiplying the flight hours in the last six months by two and then accumulating as if this were for one-half a pilot. On the average, pilots with Class I certificates have two flight physicals a year. Thus, the total pilot count is accurately estimated, along with a correct estimate of annual hours flown. Similar logic was employed to calculate the annual number of pilots and hours flown for Class II and Class III medical certificates. (In the case of Class III medical certificates, recent flight hours are multiplied by two and then counted to represent two pilots.)

The following class boundaries were used to assign pilots and flight hours for recent and total flight time.

<u>Recent Flight Time (Hours)</u>	<u>Total Flight Time (Hours)</u>
0-20	0-100
21-50	101-500
51-100	501-1000
101-400	1001-5000
401 & Over	5001 & Over

Recent flight hours and the number of pilots were assigned to the above class structure on a record-by-record basis. It should be noted that estimated annual flight hours (recent time) were used for the calculation of accident rates for pilots in each total time class. Flight hours data and the number of pilots were developed for Class III pilots and for the entire pilot population (Class I, II & III pilots).

A second level of decomposition of the flight hours data was by pilot age. The following class boundaries were used for pilot age.

Age Classes (in years)

17-19
20-29
30-39
40-49
50-59
60-69
70 & Over

It should be noted that a pilot may be in one class in one year (for both pilot hours and accidents) and move to a higher class in a later year. Data for pilots 16 years old and younger were not included in the analysis because of a limited number of observed accidents and airmen and because some data records had certain obvious errors.

The data used in the present study are not amenable to analysis using parametric statistical techniques. Such statistical techniques are relevant when investigating the reliability of sample data to accurately portray normally distributed continuous population parameters. In the present case, the data used in this study represent the entire population of pilots and the entire population of general aviation accidents (less unusable data). Thus, the most important measure of the reliability of the results presented in this report is whether the underlying data are accurate. If this is the case, then the results presented herein accurately portray the experience of the pilot population. In addition, if the underlying data are accurate, then the significance of the findings is whether they provide a basis to FAA to alter its policies. An analysis of the validity of the Medical History File data is contained in Appendix B.

ACUMENICS

Limitations

Limitations may arise because the NTSB accident data were used in the numerator of accident rate equations while Medical History data were used as the denominator. Also, recent pilot flight times were annualized in both files. In addition, accident records had to be eliminated from the analysis where recent flight time, total flight time or pilot age was not recorded. Another limitation to the data presented in this report results from the fact that the flight hours contained in Medical History file are self-reported by the pilot.

The third major limitation is that the accident rates presented herein are calculated on the basis of pilot hours.⁴ Most other general aviation safety research has been based on aircraft hours flown. It also must be noted that the study considers all types of flying (general aviation, commuter, air carrier, etc.) in the estimate of total hours flown. However, air carrier and commuter accidents are not used here because the limited number of such accidents would not appreciably affect the relative accident rates developed in this study. However, the hours flown in such operations do affect the absolute pilot hour accident rate. Where important, the likely bias introduced by including such pilot hours is noted.

A fourth limitation to the data used herein was the inability to isolate only pilot hours flown in general aviation for the assignment of accidents and hours flown to the classes used in the study. For example, some air carrier pilots are engaged in personal flying in general aviation aircraft. It was impossible

⁴Also, as noted above, some accidents were excluded from analysis.

to account for this and other similar factors. Thus, as noted above, the absolute accident rates presented herein are understated. However, it is assumed that the relative accident rates are valid and can provide meaningful insights.

ANALYTIC RESULTS

The accident rates presented in this section for the total population (Class I, II & III pilots) are based on pilot hours flown in all classes of aviation. Accident rates for Class III pilots are based on pilot hours flown in general aviation. Prior research utilizes aircraft hours in the computation of accident rates. In addition, accidents without complete data for flight time and age were eliminated from the analysis. Thus, the absolute accident rates presented herein are based on a different measure than is usual (pilot hours vs. aircraft hours), include all flying activity (for the Class I, II and III pilots combined data) and do not reflect all accidents. Numeric data for the accident rate graphs are contained in Appendix A.

Recent Flight Time

The influence of recent flight time on pilot accident rates can be viewed as a measure of pilot proficiency. That is, the more that a pilot flies in a given period, the more familiar the pilot will be with the operation of the aircraft and the aviation system. It could be expected that pilots with more recent flight time would exhibit a lower accident rate (after controlling for risk) than would pilots with less recent flight time. The accident rates for Class III pilots with various levels of recent flight time are shown in Figure 1. It can be seen that, for all ages, the accident rate decreases slightly as recent time increases except that for pilots with substantial recent flight time (over 400 hours) the accident rate reduction is more pronounced. For very low values of recent flight

1976-1980

CLASS III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM

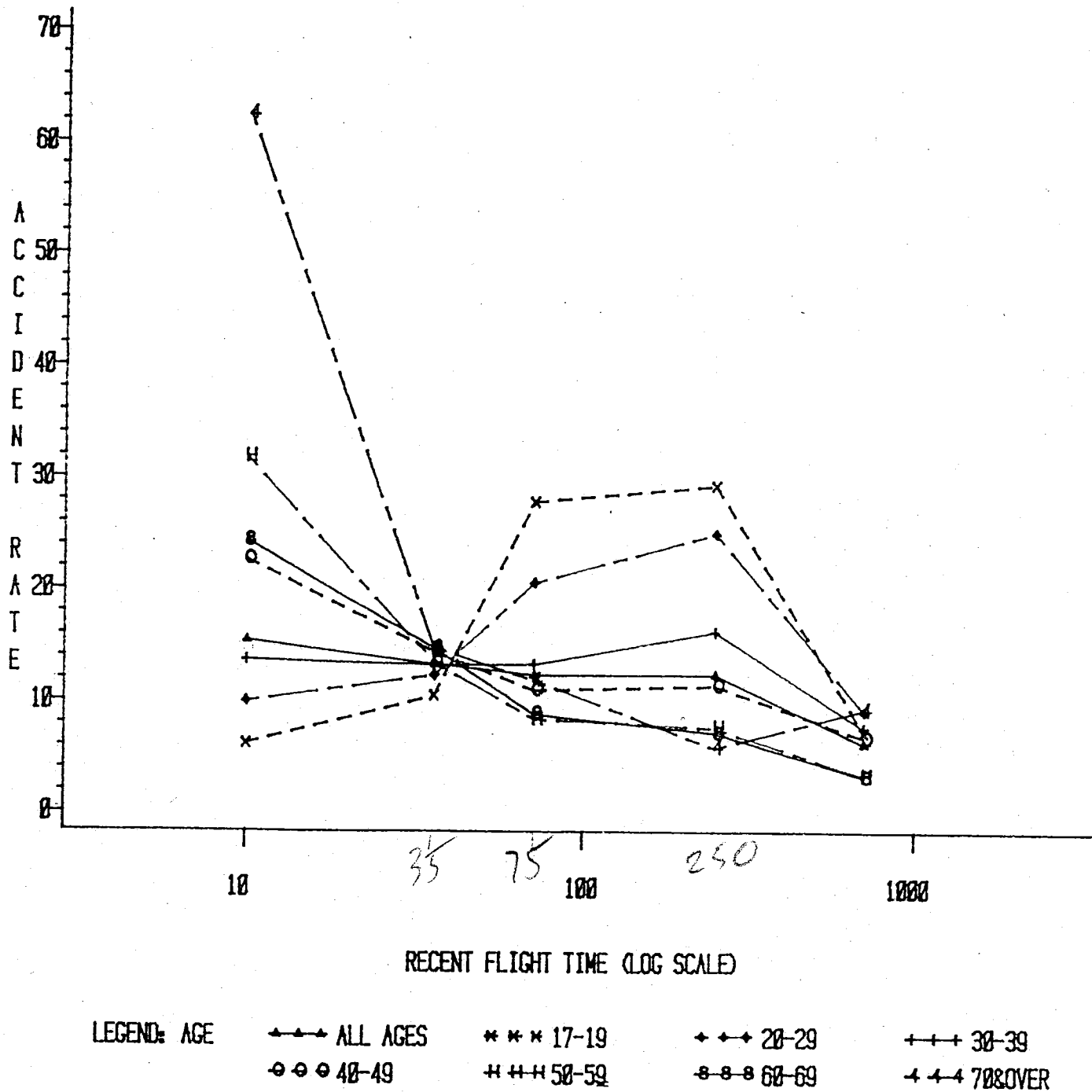


Figure 1

time (under 50 hours a year) accident rates generally increase with the age of the pilot. Past the 50 hour level, the accident rates generally decrease with age. Also, for younger pilots (under age 30), the accident rate is highest for those Class III pilots with between 50 and 400 hours of recent flight time.

In comparison to the total pilot population (Figure 2), Class III pilots exhibit a higher pilot hour accident rate. The Class III rate is 12.5 accidents per 100,000 pilot hours and the rate for Class I and II pilots is 4.3 accidents per 100,000 pilot hours.⁵ However, for low values of recent flight time (0-50 hours), Class I and Class II pilots exhibit a higher accident rate than Class III pilots (22.3 vs. 11.0 accidents per 100,000 pilot hours). Class I and II pilots, however, show a decreasing accident rate with increased values of recent flight time. The data from Figure 1 and Figure 2 are displayed with age as the horizontal axis in Figure 3 and Figure 4. These graphs highlight the trend in accident rates by age for specific values of recent flight time.

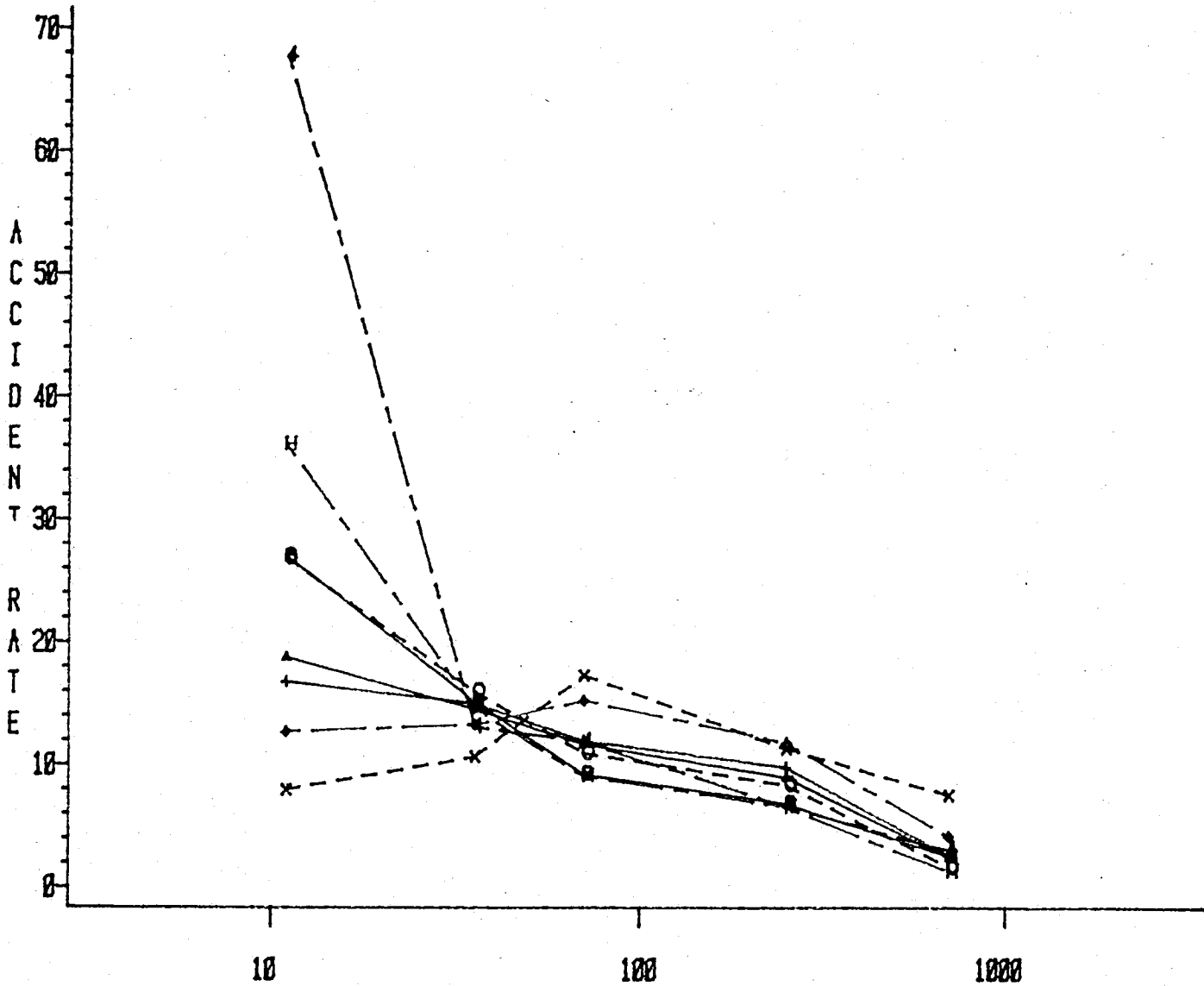
Total Flight Time

The influence of total flight time on pilot accident rates can be viewed as a measure of the effects of cumulative pilot experience. That is, the more that a pilot has flown over the years, the more likely it is for the pilot to have encountered diverse operating conditions and to have developed means of handling non-routine situations. Such reasoning accounts for employers and insurance

⁵Accident rate data for Class I and Class II pilots (as a group) are derived from subtracting the Class III pilot data from that for all pilots.

1976-1980

CLASS I, II, AND III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM



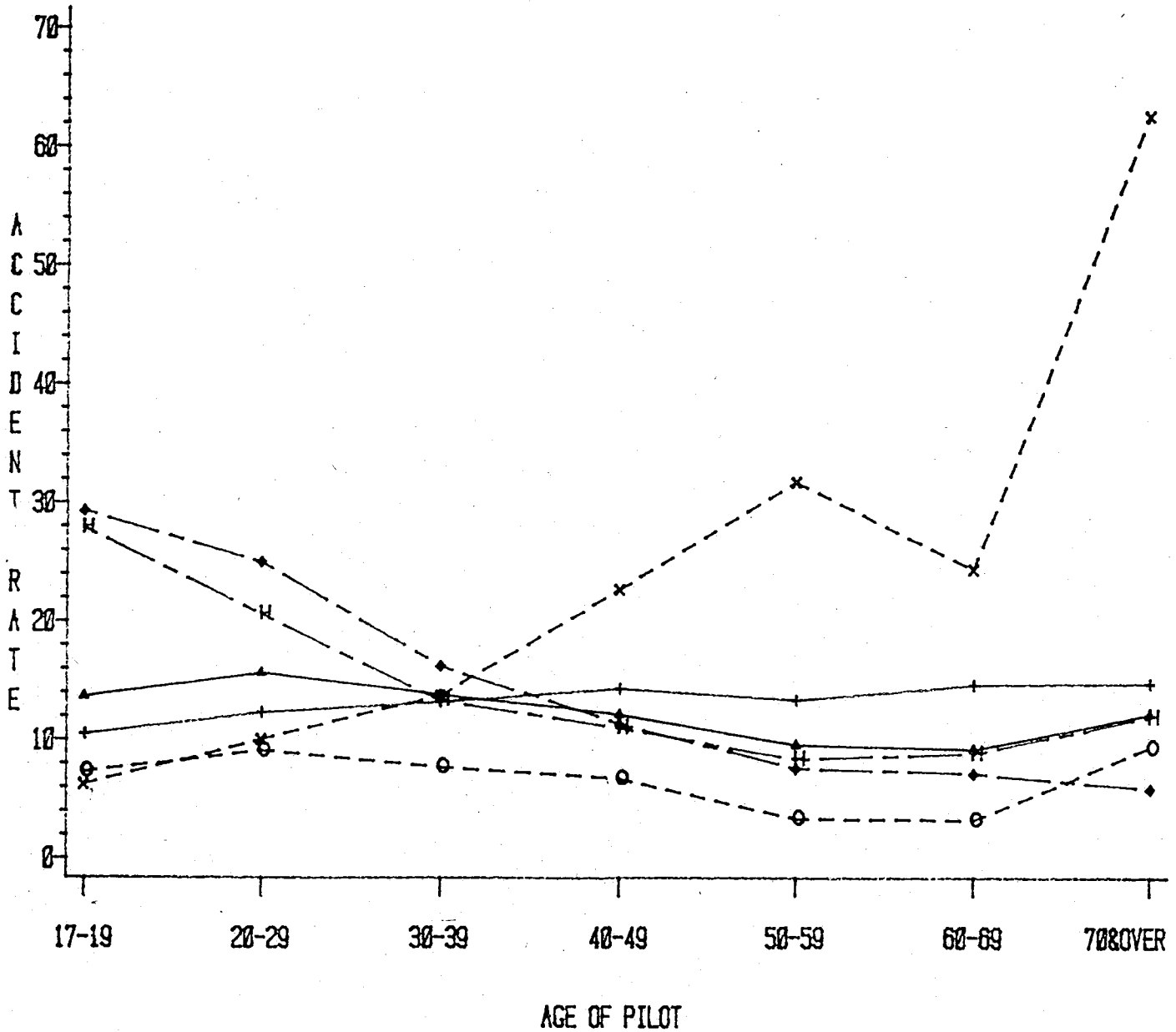
RECENT FLIGHT TIME (LOG SCALE)

LEGEND: AGE ◆◆◆ ALL AGES *** 17-19 ◆◆◆ 20-29 + + + 30-39
 ○○○ 40-49 + + + 50-59 - - - 60-69 + + + 70&OVER

Figure 2

1976-1980

CLASS III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM-RECENT HOURS



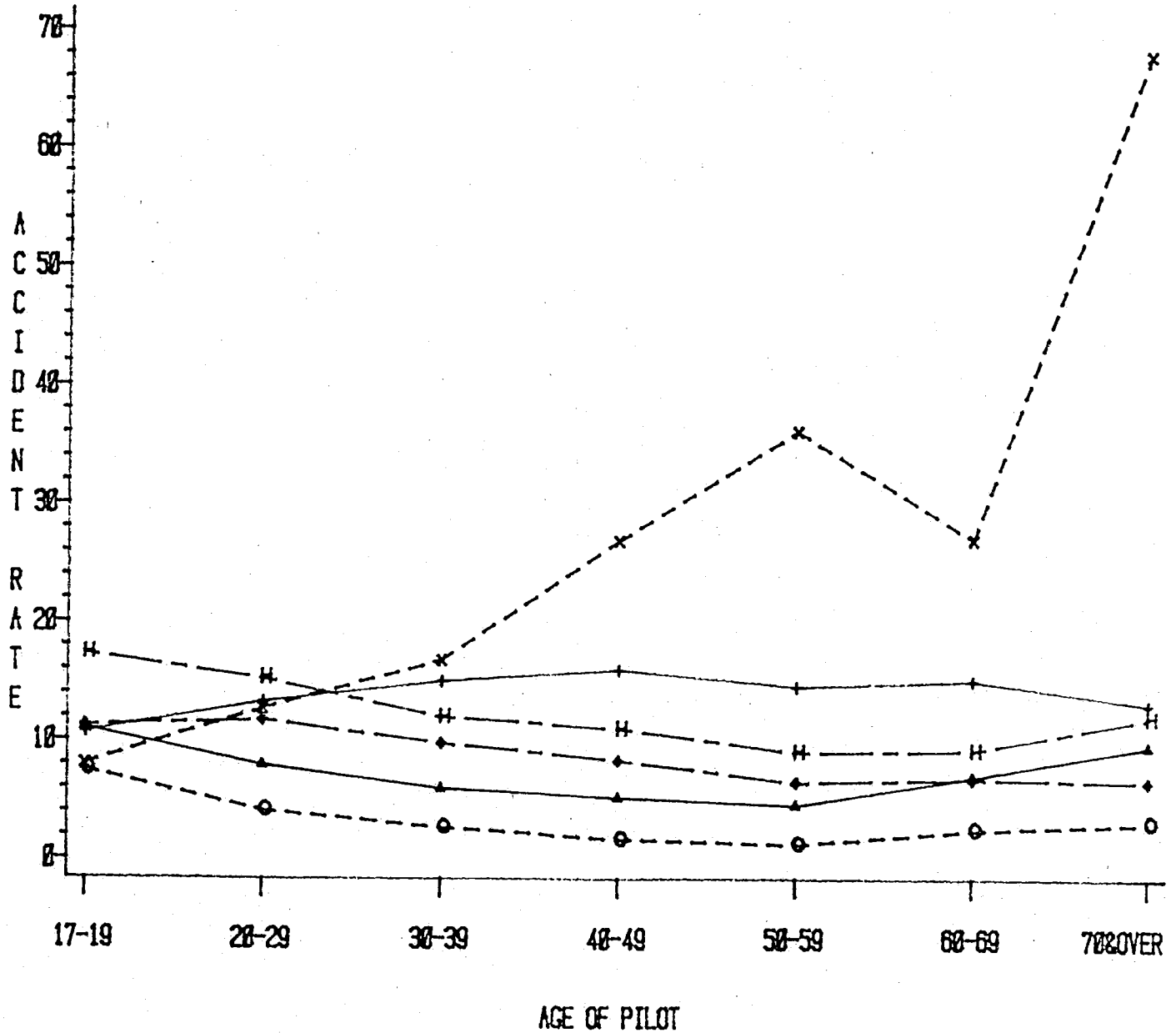
LEGEND: FTIME* ▲▲▲ ALL TIME *** 0- 20 ◆◆◆ 101- 400
 +++ 21- 50 ○○○ 401 & OVER + + + 51- 100

Figure 3

*FTIME=RECENT TIME

1976-1980

CLASS I, II AND III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM-RECENT HOURS



LEGEND: FTIME * ◆◆◆ ALL TIME *** 0- 20 ◆◆◆ 101- 400
 ◆◆◆ 21- 50 ○○○ 401 & OVER ◆◆◆ 51- 100

Figure 4

*FTIME=RECENT TIME

companies specifying minimum experience levels in order to hire and insure pilots. Thus, pilots with more total flight time could be expected to exhibit a lower accident rate than pilots with less total flight time.

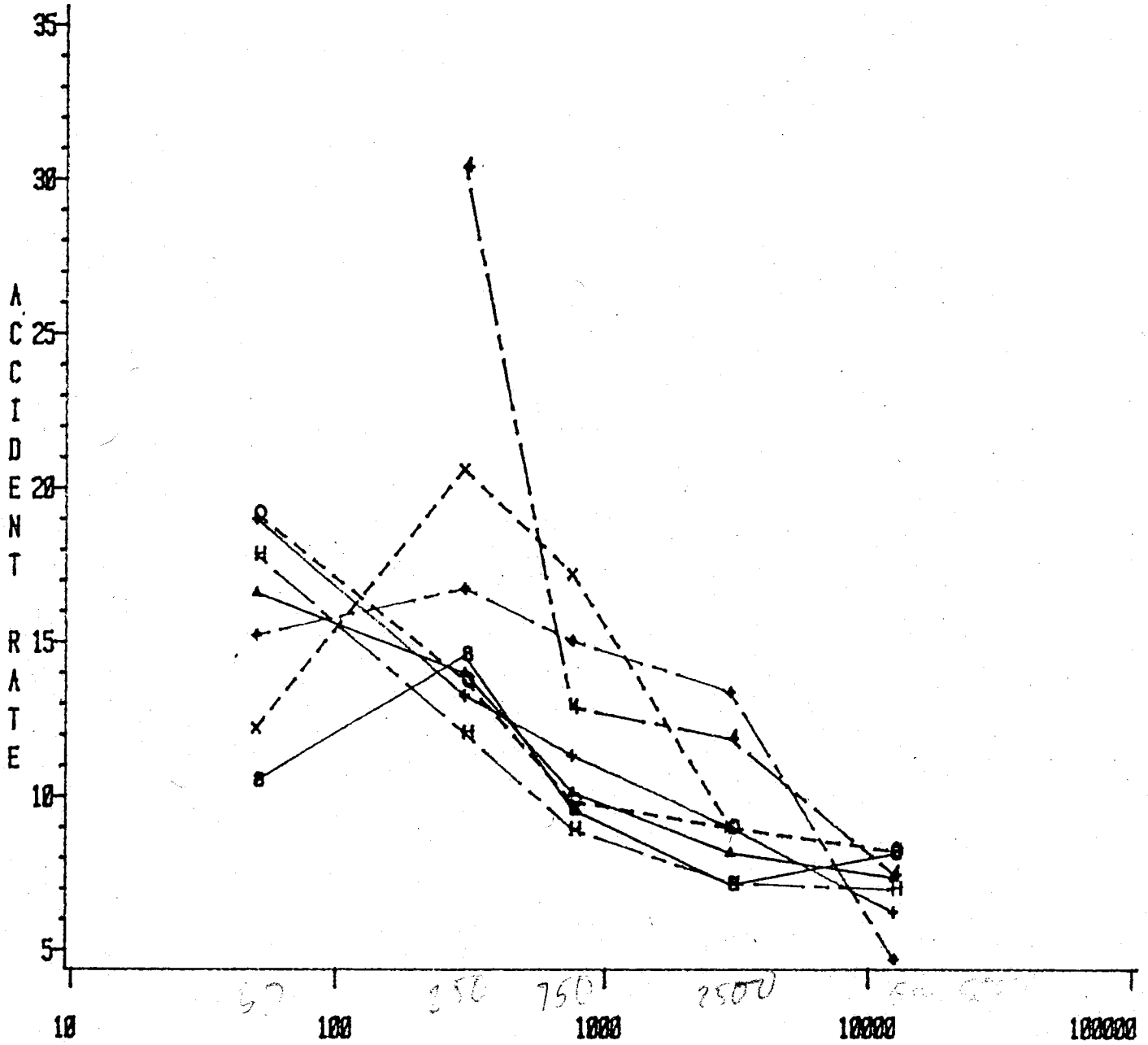
Accident rates for Class III pilots are shown on the basis of total flight time in Figure 5. It can be seen that, for all ages, the accident rate decreases with cumulative flight time.⁶ With respect to age classes, the data indicate that pilots of age 70 and over and younger pilots have higher accident rates at total experience levels from 500 to 5,000 hours. Class III pilots have a higher accident rate than do Class I and Class II pilots (12.5 accidents per 100,000 pilot hours vs 5.1 accidents per 100,000 pilot hours) at all total flight time levels (see Figure 6). Also, it is interesting to note that older pilots have a higher accident rate when considering the entire pilot population. Such a finding warrants further investigation in that older and presumably more experienced pilots are contributing to an increased accident rate.

The data in Figure 7 show that, except for the most and least experienced Class III pilots, accident rates generally decline as age increases except for pilots of age 60 and over and for those pilots with over 5,000 hours of total flight time. However, Class III pilots of age 60 and over account for only five percent of all Class III pilot accidents. Corresponding data for all pilot classes, as depicted in Figure 8, show that accident rates generally increase

⁶Total flight time accident rates are calculated on the basis of estimated annual hours flown (recent flight time) in the 1976-1980 period. The data were then distributed to pilots on the basis of the total flight time classes for those pilots.

1976-1980

CLASS III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM



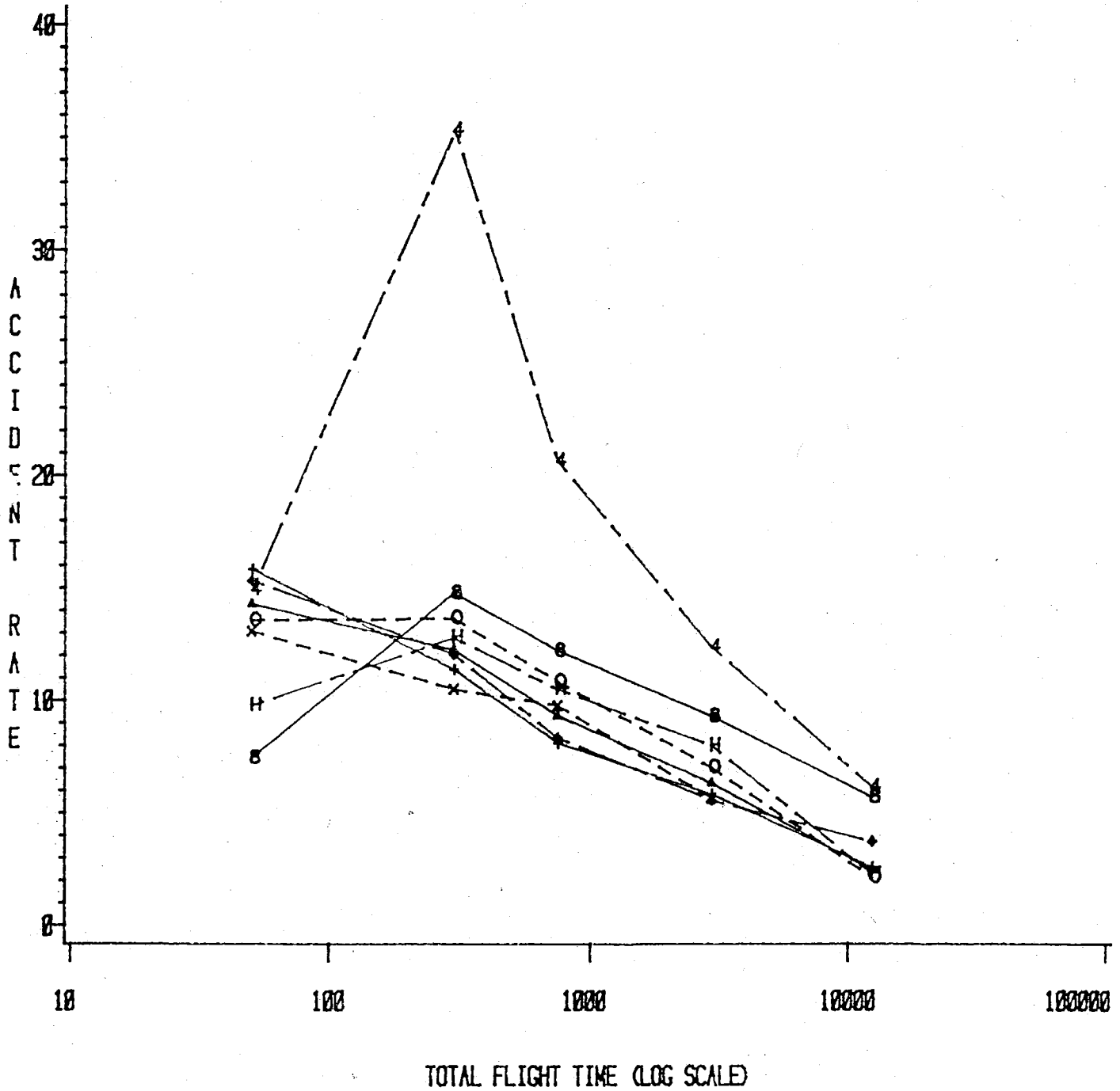
TOTAL FLIGHT TIME (LOG SCALE)

LEGEND: AGE ▲▲▲ ALL AGES *** 17-19 +++ 20-29 +++ 30-39
 ○○○ 40-49 + + + 50-59 - - - 60-69 + + + 70&OVER

Figure 5

1976-1980

CLASS I, II AND III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM

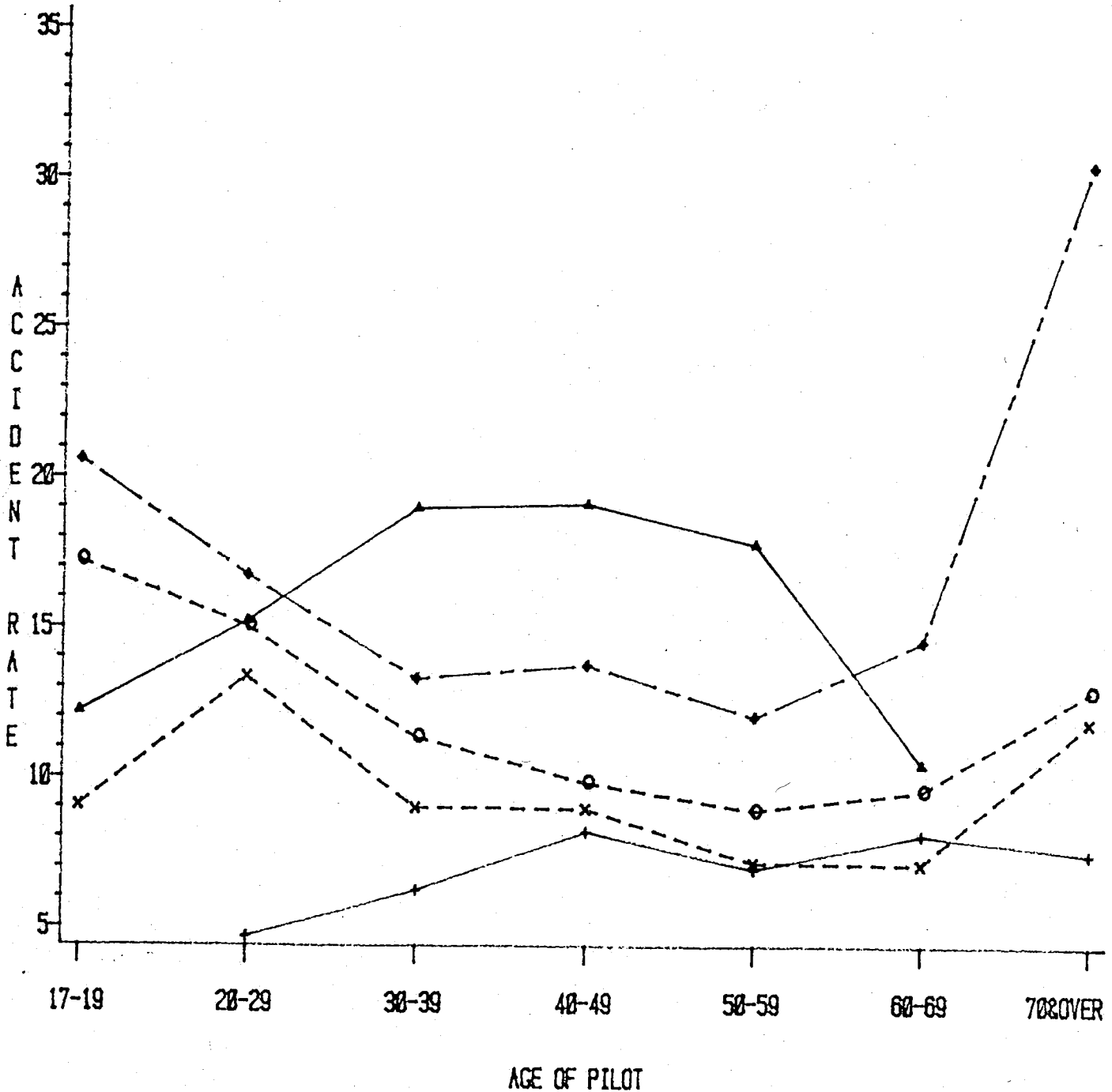


LEGEND: AGE --- ALL AGES *** 17-19 +--+ 20-29 +++ 30-39
 ○○○ 40-49 +--+ 50-59 - - - 60-69 +--+ 70&OVER

Figure 6

1976-1980

CLASS III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM-TOTAL HOURS



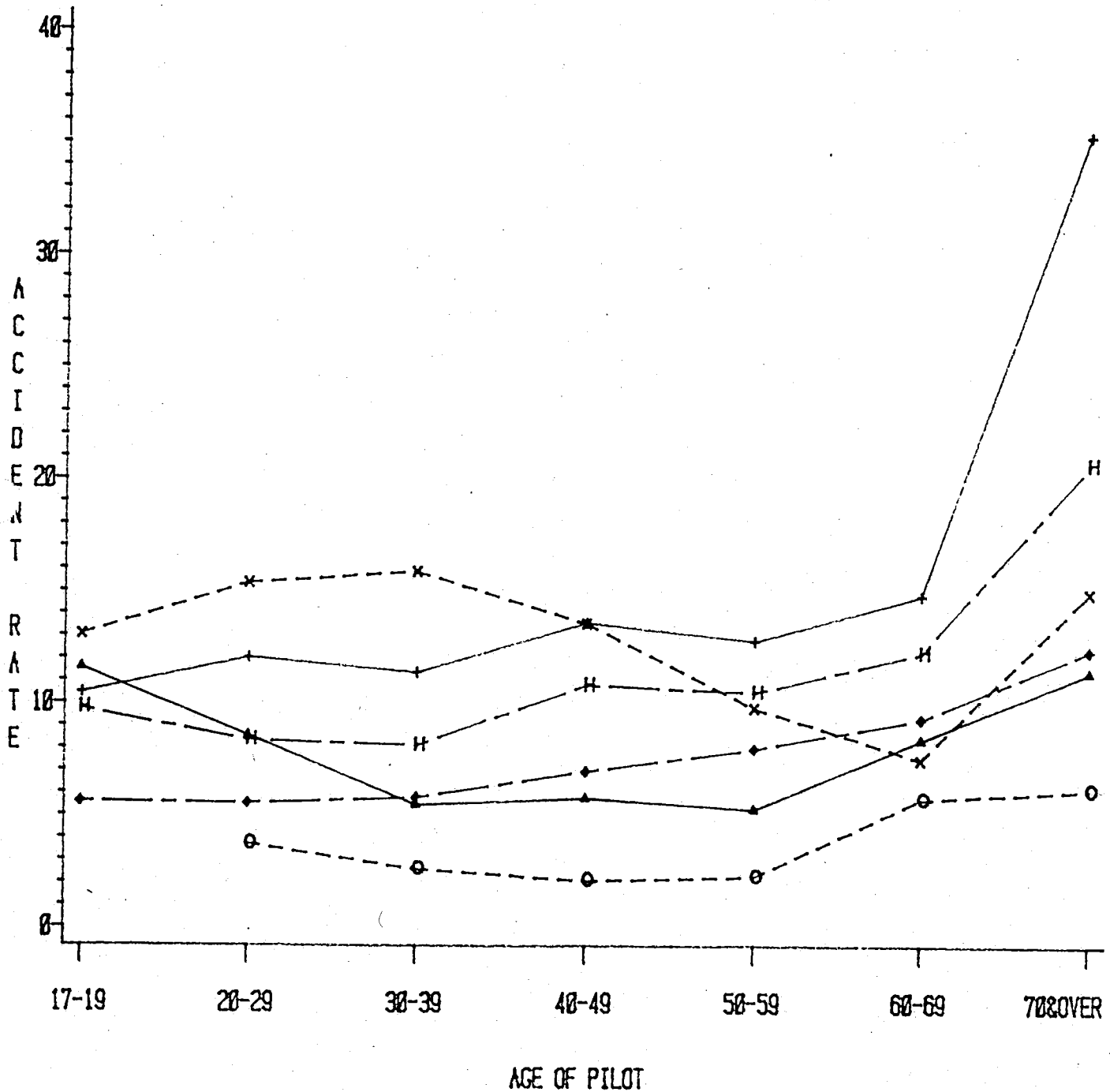
LEGEND: FTIME * +--+ 1- 100 *** 1001- 5000 +--+ 101- 500
 +--+ 5001 & OVER ○○○ 501- 1000

Figure 7

*FTIME=TOTAL TIME

1976-1980

CLASS I, II AND III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM-TOTAL HOURS



LEGEND: FTIME * ◆◆◆ ALL TIME *** 1- 100 ◆◆◆ 1001- 5000
 +++ 101- 500 ○○○ 5001 & OVER +++ 501- 1000

Figure 8

*FTIME=TOTAL TIME

with age for all experience levels beyond 100 hours of total flight time. Also, accident rates are lower for pilots with the most cumulative experience. The substantial increase in accident rates beyond age 70 represents less than one percent of all accidents.

Recent and Total Time

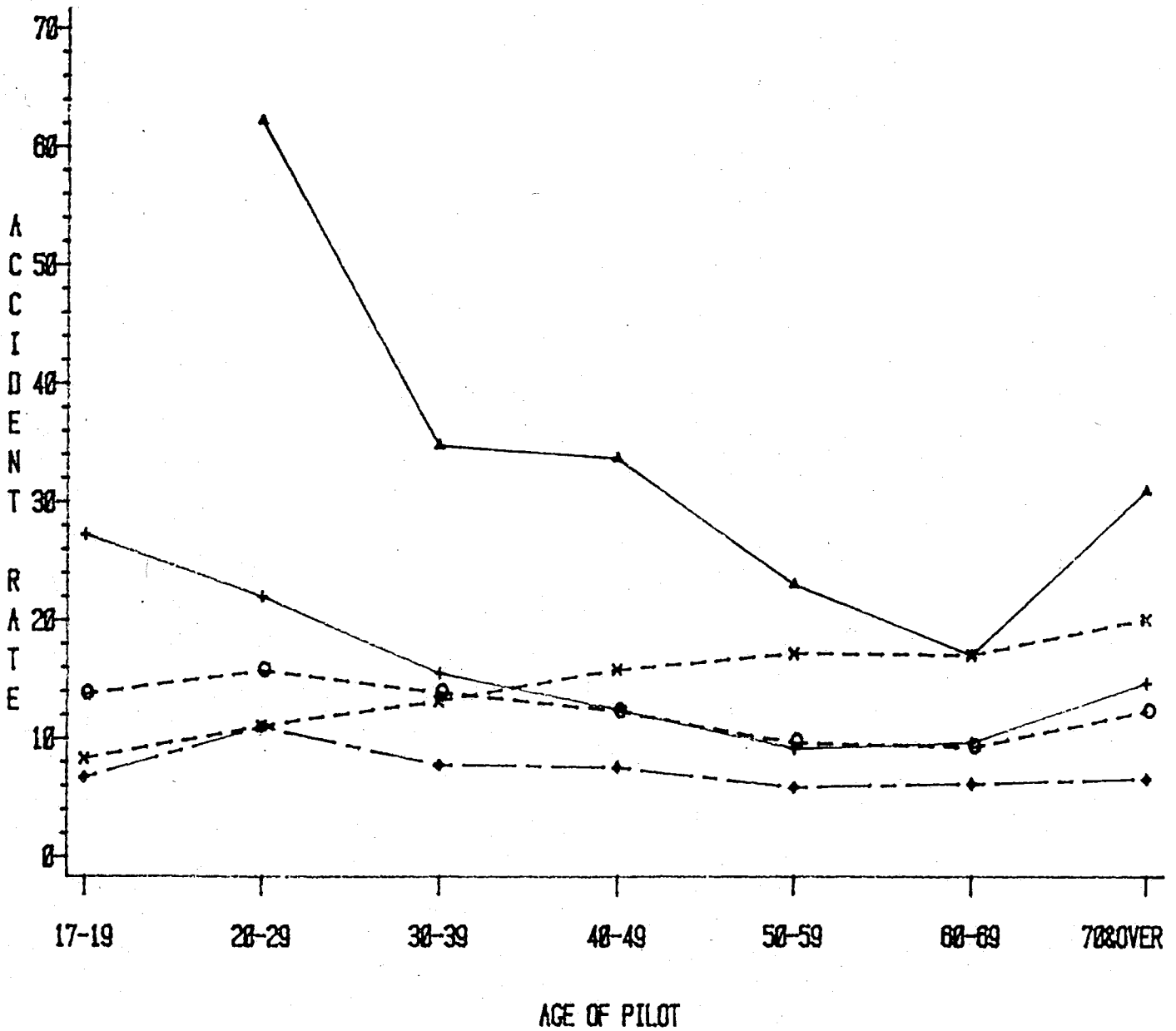
The final level of data decomposition in this analysis was to examine the effects of recent flight time and age while controlling for cumulative experience (total flight time). Also, the comparison of Class III pilots to the overall population is a method of examining the effects of pilot training. The pilot population was divided into the following four elements:

- Less than or equal to 50 hours recent flight time and less than or equal to 1,000 hours total flight time;
- Less than or equal to 50 hours recent flight time and greater than 1,000 hours total flight time;
- Greater than 50 hours recent flight time and less than or equal to 1,000 hours total flight time; and,
- Greater than 50 hours recent flight time and greater than 1,000 hours total flight time.

Accident rates for Class III pilots divided into the above four categories are shown in Figure 9. It can be seen that the Class III pilot group with the lowest accident rate has the highest level of both recent flight time and total flight time. This group accounts for almost 13 percent of all Class III pilot accidents. The highest accident rate group consists of those pilots with less than or equal to 50 hours of recent flight time and greater than 1,000 hours of total flight time. However, this group accounts for only 3.4 percent of all Class III pilot accidents.

1976-1980

CLASS III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM-RECENT/TOTAL HOURS



LEGEND: FTIME * <--> <=50 >1000 * * * <=50 <=1000 <--> >50 >1000
 <--> >50 <=1000 <--> ALL TIME

Figure 9

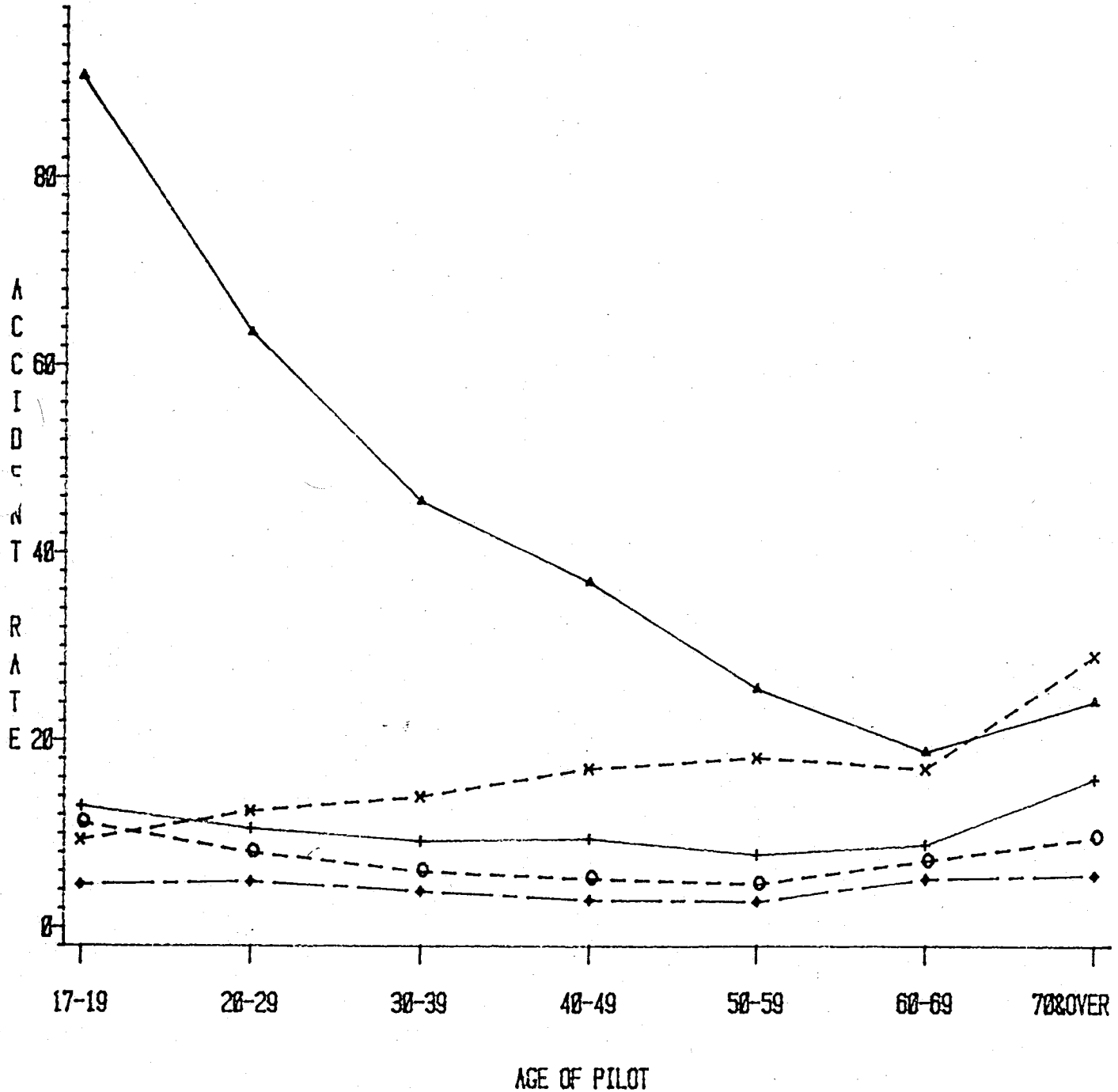
*FTIME=RECENT AND TOTAL TIME

Pilots with less than 1,000 hours of total flight time account for nearly 84 percent of Class III pilot accidents. Such Class III pilots with less than 50 hours of recent flight time have an overall accident rate of 13.4 accidents per 100,000 flight hours while pilots with over 50 hours of recent flight time have an accident rate of 14.3 accidents per 100,000 flight hours. The data indicate that younger pilots with more than 50 hours of recent flight time have a higher accident rate than do older pilots with equivalent recent flight time. For pilots with less than 50 hours of recent flight time, older pilots have a higher accident rate than do younger pilots. Thus, for pilots with low recent and total flight time, accident rates increase with age, and for pilots with high recent flight time and low total flight time, accident rates decrease with age, except for pilots of age 60 and over.

Data for all pilot classes arrayed into the above four groups are shown in Figure 10. As for Class III pilots, pilots with both the highest recent and total flight time to exhibit the lowest accident rate. Such pilots account for 40 percent of all accidents. Pilots with less than 50 hours of recent flight time and more than 1,000 hours of total flight time have the highest accident rate but account for only 3.8 percent of all accidents. It is interesting to note that, in this group, Class I and II pilots exhibit a higher accident rate than do Class III pilots (36.9 accidents per 100,000 flight hours vs. 25.4 accidents per 100,000 flight hours). Such a finding may indicate that well-trained pilots with substantial lifetime experience who do little annual flying may become complacent. The analysis of additional total and recent flight time intervals could provide additional insights in this area.

1976-1980

CLASS I, II AND III PILOTS OVERALL ACCIDENT RATE
 NUMBER OF ACCIDENTS PER 100,000 RECENT FLIGHT-HOURS
 FROM ASF-200 FAA HIERARCHY SYSTEM-RECENT/TOTAL HOURS



LEGEND: FTIME * —▲—▲—▲— <=50 >1000 * * * <=50 <=1000 ◆◆◆ >50 >1000
 —+—+—+— >50 <=1000 ○○○ ALL TIME

Figure 10

*FTIME=RECENT AND TOTAL TIME

For all pilots with less than 1,000 hours of total flight experience, those with over 50 hours of recent flight time exhibit a lower accident rate (9.6 accidents per 100,000 flight hours vs. 14.6 accidents per 100,000 flight hours) than do those with less than 50 hours of recent flight time except in the 17-19 age class. Class I and II pilots with less than 50 hours of recent experience and less than 1,000 hours of total flight time have a higher accident rate than do Class III pilots (18.3 accidents per 100,000 flight hours for Class I and II pilots vs. 13.4 accidents per 100,000 flight hours for Class III pilots).

For pilots with less than 50 hours of recent flight time and less than 1,000 hours of total flight time, accident rates increase with age. Pilots who have less than 50 hours of recent flight time and more than 1,000 hours of total flight experience exhibit an accident rate that declines with age up to age 60. For the remaining two groups, pilots with greater than 50 hours of recent flight time, accident rates decrease with increasing age and then increase again. The age cohort of 50-59 is the one with the lowest accident rate for both groups as was the case for Class III pilots.

SUMMARY FINDINGS

Recent Flight Time

- On the basis of recent flight time alone, pilot accident rates decrease as flight time increases. This holds for both Class III pilots and for the entire pilot population.
- For low values of recent flight time, older pilots exhibit higher accident rates. For high values of recent flight time, younger pilots exhibit some-what higher accident rates. Such findings are independent of medical certificate class.
- Class I and II pilots (who are presumably better trained) exhibit a higher accident rate than Class III pilots for low values of recent flight time (less than 50 hours per year).

Seems unusual

Total Flight Time

- Accident rates decrease as total flight time increases for both Class III pilots and the entire pilot population. However, Class III pilots have a higher overall accident rate at all levels of total flight time.
- Older Class I and II pilots have a higher accident rate at all levels of total flight time between 101 hours and 5,000 hours. For Class III pilots, the accident rate initially decreases with age and then increases at age 60 and over.

Recent and Total Flight Time

- Pilots with over 1,000 hours total time and less than 50 hours recent time exhibit the highest accident rates for both Class III pilots and the entire pilot population. Also, Class I and II pilots exhibit a higher accident rate than Class III pilots at this level of experience.
- All pilot classes with over 50 hours of recent flight time and over 1,000 hours of total flight time exhibit the lowest accident rate for all age classes.
- For Class III pilots with low total flight time, accident rates generally decrease as age increases when recent flight time exceeds 50 hours per year. Accident rates increase with age when recent flight time is less than 50 hours per year.
- For the overall pilot population with total flight time of less than 1,000 hours, those pilots with more than 50 hours of recent flight time have the lowest accident rate at all age levels except that of 17-19 years old.
- Class III pilots with less than 50 hours of recent flight time and less than 1,000 hours of total flight time exhibit a lower accident rate than do Class I and II pilots with this experience level.
- The accident rate for both Class III pilots and all pilots with more than 50 hours recent time and less than 1,000 hours total time decreases with age (up to age 60).
- The accident rate for both Class III pilots and the entire pilot population who have less than 1,000 hours total flight time and less than 50 hours of recent flight time increases with age.

APPENDIX A

NUMERIC DATA FOR ACCIDENT RATE GRAPHS

RECENT FLIGHT TIME

ALL AGES

Class III Pilots

Recent Time Interval	Pilots (000)	Recent Flight Hours (000)	Accidents	Accident Rate (per 100,000 recent flight hours)
0-20	1365.7	7444.9	1140	15.3
21-50	344.2	12200.8	1609	13.2
51-100	221.0	17476.1	2148	12.3
101-400	116.9	21258.0	2614	12.3
401 & Over	5.3	3722.6	227	6.1
<u>ALL</u>	<u>2053.0</u>	<u>62102.4</u>	<u>7738</u>	<u>12.5</u>

Class I, II, and III Pilots

0-20	1930.2	9030.6	1684	18.6
21-50	459.0	16659.7	2415	14.5
51-100	381.6	307578.8 30758.6	3577	11.6
101-400	338.8	74006.2	6585	8.9
401 & Over	241.0	177123.7	4105	2.3
<u>ALL</u>	<u>3350.5</u>	<u>307578.8</u>	<u>18366</u>	<u>6.0</u>

RECENT FLIGHT TIME

AGE 70 & OVER

Class III Pilots

Recent Time Interval	Pilots (000)	Recent Flight Hours (000)	Accidents	Accident Rate (per 100,000 recent flight hours)
0-20	3.9	19.2	12	62.5
21-50	1.8	61.0	9	14.7
51-100	1.5	109.7	13	11.8
101-400	0.9	154.5	9	5.8
401 & Over	*	32.5	3	9.2
<hr/> ALL	<hr/> 8.2	<hr/> 377.0	<hr/> 46	<hr/> 12.2

Class I, II, and III Pilots

0-20	4.3	23.6	16	67.8
21-50	2.0	76.5	10	13.1
51-100	1.9	151.5	18	11.9
101-400	1.6	305.7	20	6.5
401 & Over	0.2	165.1	5	3.0
<hr/> ALL	<hr/> 10.0	<hr/> 722.3	<hr/> 69	<hr/> 9.6

* Less than 100 pilots.

RECENT FLIGHT TIME

AGE 60-69

Class III Pilots

Recent Time Interval	Pilots (000)	Recent Flight Hours (000)	Accidents	Accident Rate (per 100,000 recent flight hours)
0-20	33.9	181.5	44	24.2
21-50	14.1	535.3	78	14.6
51-100	14.4	1152.7	101	8.8
101-400	9.0	1643.4	116	7.1
401 & Over	0.4	254.1	8	3.1
<hr/> ALL	<hr/> 71.8	<hr/> 3766.9	<hr/> 347	<hr/> 9.2

Class I, II, and III Pilots

0-20	43.3	230.1	62	26.9
21-50	18.4	703.4	106	15.1
51-100	20.1	1619.0	148	9.1
101-400	17.7	3604.5	243	6.7
401 & Over	3.9	2717.6	66	2.4
<hr/> ALL	<hr/> 103.4	<hr/> 8874.6	<hr/> 625	<hr/> 7.0

RECENT FLIGHT TIME

AGE 50-59

Class III Pilots

Recent Time Interval	Pilots (000)	Recent Flight Hours (000)	Accidents	Accident Rate (per 100,000 recent flight hours)
0-20	144.8	754.0	239	31.7
21-50	56.5	2155.3	287	13.3
51-100	55.3	4438.7	369	8.3
101-400	33.2	6108.2	462	7.6
401 & Over	1.4	970.9	32	3.3
<hr/> ALL	<hr/> 291.2	<hr/> 14427.0	<hr/> 1389	<hr/> 9.6

Class I, II, and III Pilots

0-20	189.6	923.3	333	36.1
21-50	71.5	2744.8	399	14.5
51-100	77.6	6286.8	567	9.0
101-400	69.5	14951.9	968	6.5
401 & Over	47.1	33121.6	398	1.2
<hr/> ALL	<hr/> 455.3	<hr/> 58028.5	<hr/> 2665	<hr/> 4.6

Numeric Data for Figures 1 through 4

RECENT FLIGHT TIME

AGE 40-49

Class III Pilots

Recent Time Interval	Pilots (000)	Recent Flight Hours (000)	Accidents	Accident Rate (per 100,000 recent flight hours)
0-20	235.0	1203.3	272	22.6
21-50	73.2	2728.3	392	14.4
51-100	61.9	4952.1	543	11.0
101-400	36.4	6708.5	759	11.3
401 & Over	1.6	1022.5	68	6.7
<hr/> ALL	<hr/> 408.1	<hr/> 16614.8	<hr/> 2034	<hr/> 12.2

Class I, II, and III Pilots

0-20	340.8	1496.5	401	26.8
21-50	97.6	3686.9	588	13.6
51-100	97.9	7952.6	868	10.8
101-400	90.1	19903.8	1653	7.0
401 & Over	70.9	50250.8	795	2.1
<hr/> ALL	<hr/> 697.3	<hr/> 83290.7	<hr/> 4305	<hr/> 5.2

ACUMENICS

RECENT FLIGHT TIME

AGE 30-39

Class III Pilots

Recent Time Interval	Pilots (000)	Recent Flight Hours (000)	Accidents	Accident Rate (per 100,000 recent flight hours)
0-20	357.7	1922.5	263	13.7
21-50	86.4	3055.2	404	13.2
51-100	52.4	4118.0	548	13.3
101-400	24.9	4508.1	730	16.2
401 & Over	1.3	931.4	71	7.6
<hr/> ALL	<hr/> 522.6	<hr/> 14535.2	<hr/> 2016	<hr/> 13.9

Class I, II, and III Pilots

0-20	555.1	2447.3	410	16.8
21-50	123.2	4501.3	674	15.0
51-100	105.2	8502.9	1015	11.9
101-400	94.7	21443.6	2093	9.8
401 & Over	79.8	58799.0	1530	2.6
<hr/> ALL	<hr/> 958.0	<hr/> 95694.2	<hr/> 5722	<hr/> 6.0

