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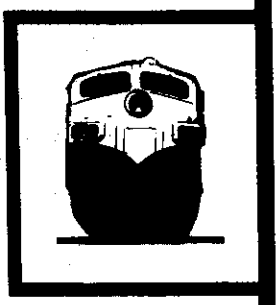
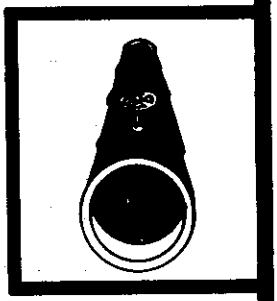


WASHINGTON, D.C. 20594

ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA

U.S. GENERAL AVIATION CALENDAR YEAR 1981



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16. Abstract

This report presents a statistical compilation and review of general aviation accidents which occurred in 1981. The accidents reported are all those involving U.S. registered aircraft not conducting air carrier revenue operations under 14 CFR 121, 14 CFR 127, or 14 CFR 135.

The report is divided into sections, each of which (except for the "All Operations" section) presents a review of a subset of all general aviation accidents. Each subset represents aircraft of similar types or aircraft being operated for particular purposes. Several tables present accident parameters for 1981 only, and each section includes tabulations which present comparative statistics for 1981 and for the five-year period 1976-1980.

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INTRODUCTION

This report presents a statistical compilation and review of general aviation accidents which occurred in 1981. The accidents reported are all those involving U.S. registered aircraft not conducting air carrier revenue operations under 14 CFR 121, 14 CFR 127, or 14 CFR 135.

Accident data upon which this review is based have been extracted from the Safety Board's automated Aviation Accident Data System. Flight hours used for computing accident rates were estimated using data published by the Federal Aviation Administration.

This report is divided into sections, each of which (except for the "All Operations" section) presents a review of a subset of all general aviation accidents. Each subset represents aircraft of similar types or aircraft being operated for particular purposes.

In general, each section begins with an overview of accidents and their consequences for 1981 and for each of the two preceding years. Several tables then present accident parameters for 1981 only. Concluding each section are tabulations which present comparative statistics for 1981 and for the five-year period 1976-1980.

ALL OPERATIONS

In 1981, a total of 3,534 U.S. registered general aviation aircraft were involved in accidents in the United States and its territories. Since a collision between aircraft is counted as one accident for the purposes of this report, and since there were 32 cases in which two general aviation aircraft collided, the number of accidents in 1981 was 3,502.

SUMMARY OF LOSSES

Table 1, summarizes general aviation accidents for 1981 and for each of the two prior years. Although the number of accidents decreased by 2.6 percent from the 1980 total, the number of fatal accidents increased by slightly more than five percent. The total of 1,282 fatalities was a 2.4 percent increase over the 1,252 fatalities in general aviation accidents the previous year. The number of aircraft destroyed increased by more than ten percent from 1,019 in 1980 to 1,122 in 1981.

Table 1 - SUMMARY OF LOSSES
ALL OPERATIONS
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	654	622	638
Involved Serious Injury	349	400	374
Involved Minor Injury	552	514	572
Involved No Injury	1947	2061	2241
Total	3502	3597	3825
Fatalities			
Passenger	571	598	567
Crew	690	645	651
Other Persons	21	9	19
Total	1282	1252	1237
Aircraft Damaged*			
Destroyed	1122	1019	998
Substantial	2391	2577	2811
Minor	14	12	28
None	7	20	21
Total	3534	3628	3858
Accident Rate per 100,000 Hours Flown			
Total	9.52	9.88	9.90
Fatal	1.78	1.71	1.65

* Number of General Aviation Aircraft

DETAILED REVIEW

This subsection presents statistical tabulations of the operational factors, environmental conditions, losses, and causes of all general aviation accidents in 1981. Most of the tables in this subsection are in the form of contingency tables. Each of these tables shows the joint frequency distribution of two characteristics of accidents, aircraft, or accident-involved pilots. When using these tables, it should be remembered that the number of aircraft involved in accidents may be slightly larger than the number of accidents. This will be the case when the accidents include a collision between two general aviation aircraft which is counted as only one accident.

Table 2 provides, for several aircraft types and for five kinds of flying, accidents and accident rates (total and fatal) and fatalities aboard the accident-involved aircraft. Accident rates are not presented for gliders nor for personal and business flying individually because reliable estimates of flight hours are not available. A combined personal/business rate is reported, however. The aircraft category "Turbine Powered Fixed Wing" in the 1980 general aviation review has been broken into "Turboprop" and "Turbojet" for 1981.

The lowest accident rates (both total and fatal) were recorded by turbojet aircraft. The highest total rate was for reciprocating engine powered rotorcraft (more than double the rate for all aircraft). The highest fatal accident rate among the reported categories was for the personal/business combination. The total and fatal accident rates are depicted graphically in Figures 1,2, and 3.

Table 2 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES BY TYPE OF AIRCRAFT AND BY KIND OF FLYING
ALL OPERATIONS
1981

Type of Aircraft	Accidents	Fatal Accidents	Fatalities Aboard	Accident Rate per 100,000 Aircraft Hours Flown	
				Total	Fatal
Fixed Wing	3164	611	1192	9.27	1.79
Single Recip. Engine	2822	497	907	10.71	1.89
Multiple Recip. Engine	289	94	218	5.98	1.94
Turboprop	49	17	48	3.05	1.06
Turbojet	9	5	19	0.53	0.30
Rotorcraft	255	29	50	11.16	1.30
Recip. Engine(s)	179	21	29	20.39	2.39
Turbine Powered	76	8	21	5.48	0.63
Gliders	59	12	13	n/a	n/a
Kind of Flying					
Personal	1959	383	738		
Business	264	74	145		
Corporate/Executive	84	30	99	1.35	0.48
Aerial Application	378	30	34	15.33	1.22
Instructional	428	40	63	6.02	0.56
All Aircraft	3502	654	1261	9.52	1.78

* The accident rate per 100,000 flying hours is presented for the combination of personal flying and business flying and not for each category separately. For reasons which are inexplicable except if assumptions traditionally used to arbitrarily separate the two categories are flawed, the rate of aircraft accidents for pleasure flying is seven times greater than that of business flying. This major -- and the Board believes, inaccurate -- disparity in rates can only be resolved, if valid and objective exposure data were to be developed. The NTSB has concluded that the two categories should be kept combined until sound exposure data are available that could justify their separation. At that time, two separate categories may well be established to facilitate safety analyses.

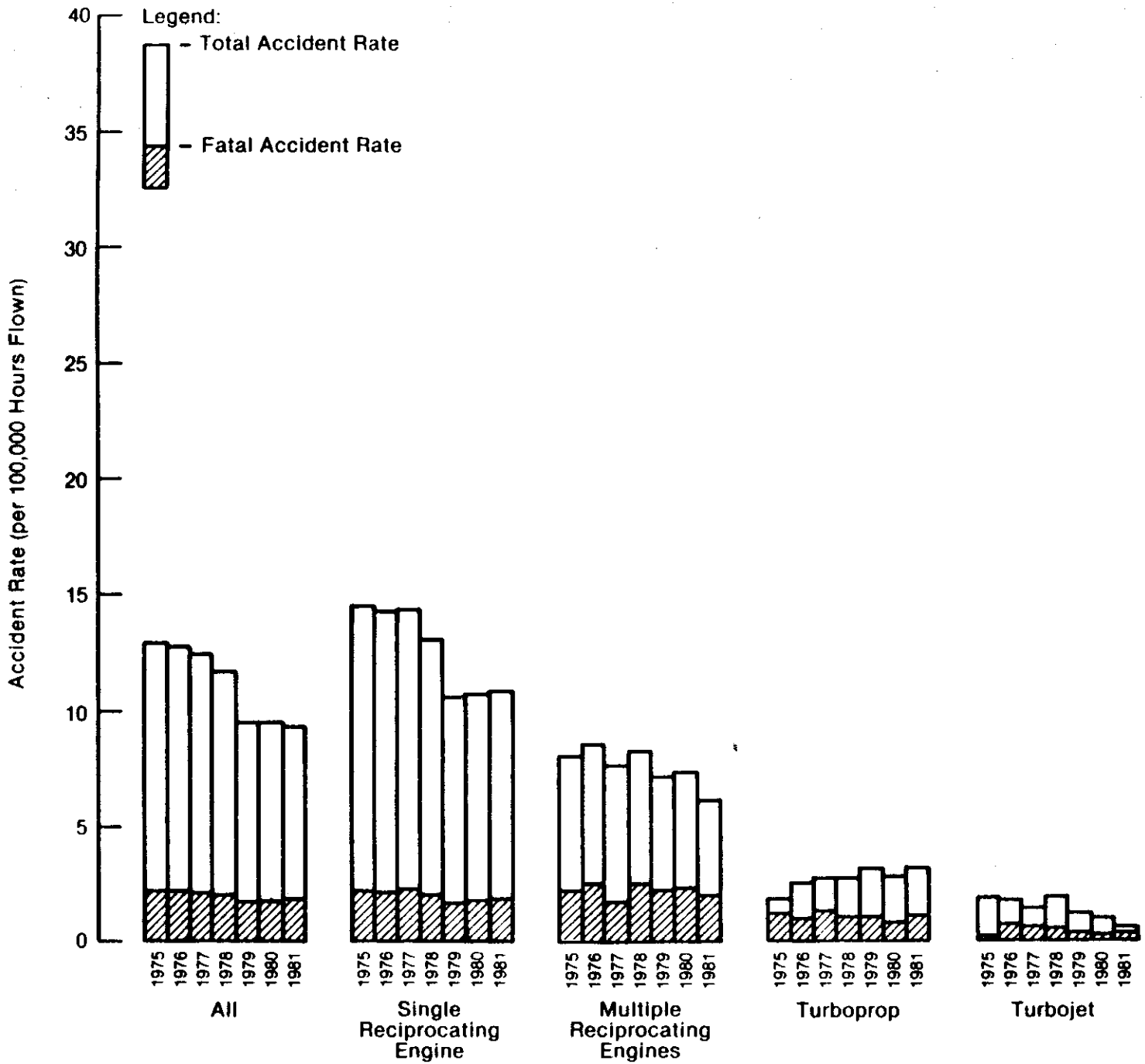

Figure 1 — Airplane Accident Rates by Type of Power

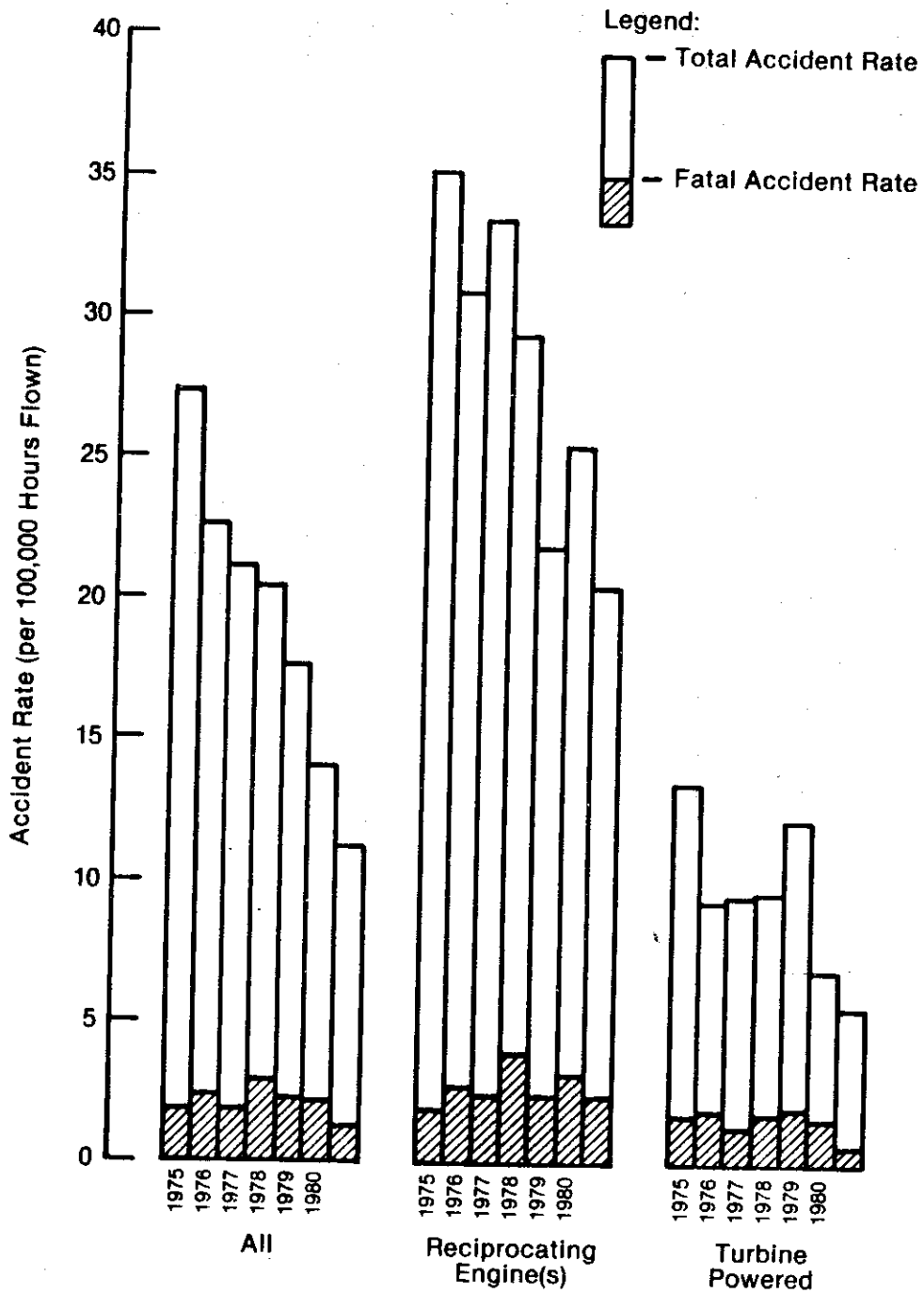

Figure 2 — Rotorcraft Accident Rates by Type of Power

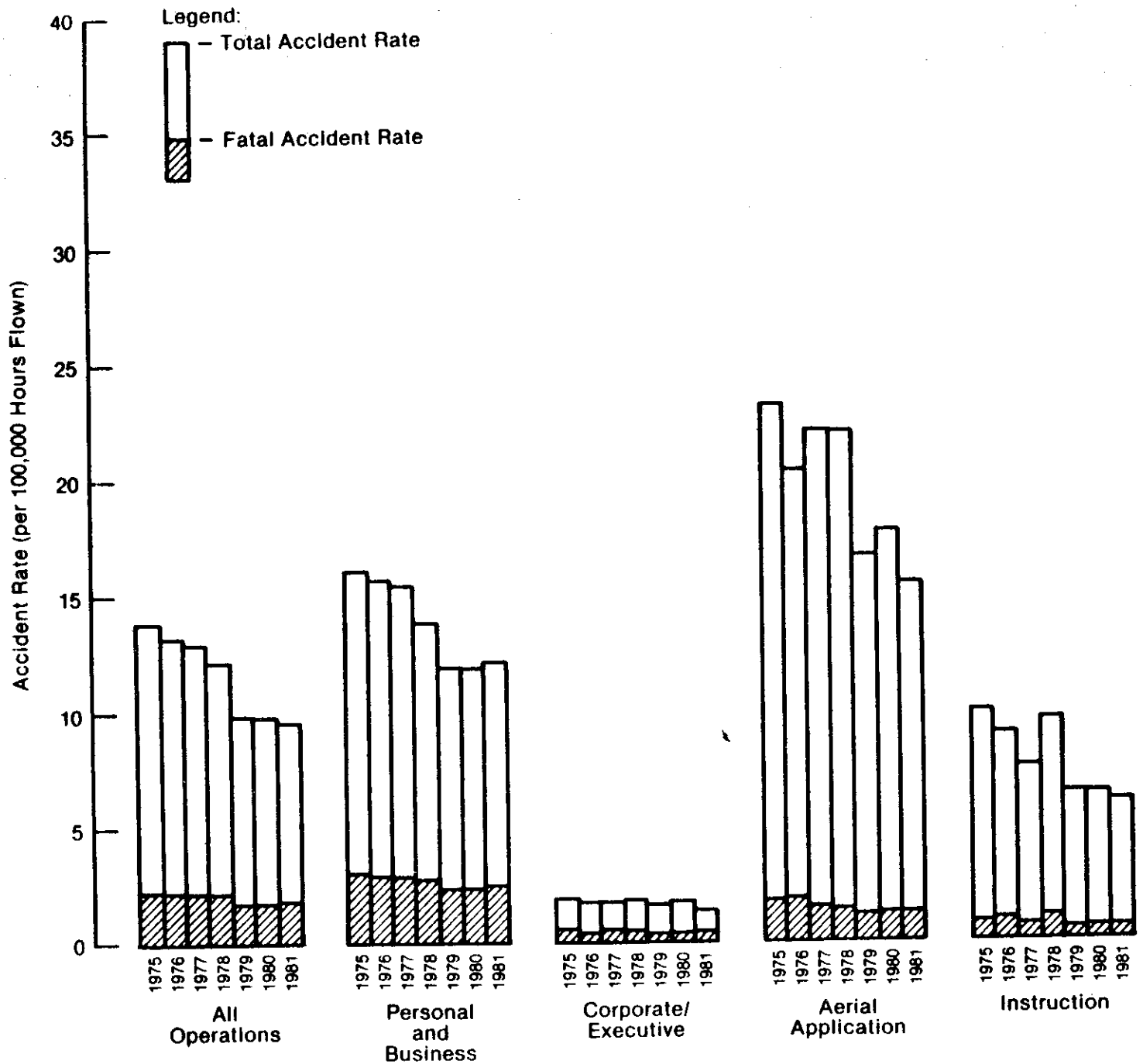

Figure 3 — Accident Rates by Kind of Flying

As shown by Table 3, more than half of all persons aboard accident-involved aircraft are the pilots of those aircraft. Just under half of the fatally injured persons aboard were pilot-in-command of involved aircraft. Among all those aboard, approximately 72 percent received minor or no injuries, 8.8 percent were seriously injured, and 18.8 percent sustained fatal injuries.

Table 3 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL OPERATIONS
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	622	306	518	2088	3534
Copilot	41	12	10	42	105
Dual Student	18	13	24	130	185
Check Pilot	2	0	2	6	10
Extra Crew	7	1	2	12	22
Passengers	571	261	406	1609	2847
Total Aboard	1261	593	962	3887	6703
Other Aircraft*	15	0	0	25	40
Other Ground	6	4	12	1	23
Grand Total	1282	597	974	3913	6766
Percent	18.9	8.8	14.4	57.8	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

The percentage of persons aboard who received serious or fatal injuries varies considerably among the different kinds of flying (See Table 4). In 1981, more than 49 percent of persons aboard aircraft conducting corporate/executive operations were seriously or fatally injured. The corresponding percentage was 14.5 for instructional flying and 20.4 for aerial application.

Table 4 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL OPERATIONS
1981

	Degree of Injury				
Kind of Flying	Fatal	Serious	Minor	None	Total
Personal	738	368	638	2419	4163
Business	145	44	62	279	530
Corporate/Executive	99	26	18	110	253
Aerial Application	34	46	50	262	392
Instructional	63	33	91	473	660
Other	182	76	103	344	705
Total	1261	593	962	3887	6703
Percent	18.8	8.8	14.4	58.0	

Table 5 presents accident-involved aircraft tabulated by the degree of damage and the degree of personal injury produced. While more than 99 percent of the aircraft were either substantially damaged or destroyed, only 28.7 percent of the aircraft were involved in accidents in which some person was seriously or fatally injured.

Table 5 - AIRCRAFT BY DAMAGE AND DEGREE OF INJURY
ALL OPERATIONS
1981

	Degree of Injury				Aircraft	
Degree of Damage	Fatal	Serious	Minor	None	No.	Percent
Destroyed	603	175	163	180	1121	31.7
Substantial	57	168	391	1775	2391	67.7
Minor	2	4	1	7	14	0.4
None	0	5	1	1	7	0.2
Unk/Not Reported	1	0	0	0	1	0.0
No. of Aircraft	663	352	556	1963	3534	
Percent	18.8	10.0	15.7	55.5		

The NTSB aviation accident data system permits the entry of either one or two types of accident to describe the occurrences in an accident. In Table 6, all valid accident types are listed with the number of aircraft involved in each type recorded. Second accident types are listed for approximately one-half of all accident-involved aircraft. The most frequent accident type in 1981 general aviation accidents - engine failure or malfunction - is seldom coded as the only accident type. Typically such an occurrence does not produce damage or injury sufficient to meet the criteria for an accident, but rather leads to a subsequent damage-and/or injury-producing event. Table 6 is the only table in this report which provides information on the second type of accident. In all other tables which present data on type of accident, only the data involving the first type of accident are used.

Table 6 - AIRCRAFT BY FIRST AND SECOND TYPE OF ACCIDENT
ALL OPERATIONS
1981

Type of Accident	First	Second	Either First or Second	
			Number	Percent of Accident-Involved Aircraft
Ground-Water Loop-Swerve	369	30	399	11.3
Dragged Wingtip Pod or Float	2	1	3	0.1
Wheels-up Landing	49	23	72	2.0
Wheels-down Landing in Water	5	0	5	0.1
Gear Collapsed	48	222	270	7.6
Gear Retracted	37	0	37	1.0
Hard Landing	205	85	290	8.2
Nose Over/Down	98	296	394	11.1
Roll Over	18	24	42	1.2
Overshoot	164	0	164	4.6
Undershoot	114	1	115	3.3
Col. Between Aircraft-Both in Flight	54	0	54	1.5
Col. Between Aircraft-One Airborne	2	0	2	0.1
Col. Between Aircraft-Both on Ground	12	2	14	0.4
Col. with Ground/Water-Controlled	220	188	408	11.5
Col. with Ground/Water-Uncontrolled	137	23	160	4.5
Col. with Wires/Poles	153	74	227	6.4
Col. with Trees	161	221	382	10.8
Col. with Residence/s	2	2	4	0.1
Col. with Building/s	9	10	19	0.5
Col. with Fence, Fenceposts	44	86	130	3.7
Col. with Electronic Towers	8	0	8	0.2
Col. with Runway or Approach Lights	6	15	21	0.6
Col. with Airport Hazard	5	4	9	0.3
Col. with Animals	5	1	6	0.2
Col. with Crop	15	28	43	1.2
Col. with Flagman Loader	0	0	0	0.0
Col. with Ditches	29	82	111	3.1

Table 6 - (continued)

Type of Accident	First	Second	Either First or Second: Number	Either First or Second: Percent of Accident-Involved Aircraft
Col. with Snowbank	9	34	43	1.2
Col. with Parked Aircraft (Unattended)	12	19	31	0.9
Col. with Automobile	8	10	18	0.5
Col. with Dirt Bank	34	57	91	2.6
Col. with Other	74	73	147	4.2
Bird Strike	3	0	3	0.1
Stall	123	39	162	4.6
Spin	71	22	93	2.6
Spiral	4	1	5	0.1
Mush	124	18	142	4.0
Fire or Explosion in Flight	13	3	16	0.5
Fire or Explosion on Ground	8	1	9	0.3
Airframe Failure	2	1	3	0.1
Airframe Failure in Flight	56	3	59	1.7
Airframe Failure on Ground	9	0	9	0.3
Engine Tearaway	1	0	1	0.0
Engine Failure or Malfunction	914	1	915	25.9
Propeller/Rotor Failure	1	0	1	0.0
Propeller Failure	19	0	19	0.5
Tail Rotor Failure	16	0	16	0.5
Main Rotor Failure	11	0	11	0.3
Prop/Rotor Accident to Person	5	0	5	0.1
Jet Intake/Exh Accident to Person	0	0	0	0.0
Propeller/Jet/Rotor Blast	0	0	0	0.0
Turbulence	10	0	10	0.3
Hail Damage to Aircraft	0	0	0	0.0
Lightning Strike	0	0	0	0.0
Evasive Maneuver	0	0	0	0.0
Uncontrolled Alt Deviation	0	0	0	0.0
Ditching	4	44	48	1.4
Missing Aircraft Not Recovered	10	0	10	0.3
Miscellaneous/Other	12	1	13	0.4
Undetermined	10	0	10	0.3
Number of Aircraft	3534	1745		

Table 7 tabulates accidents by type and degree of injury. Collisions with the ground, either controlled or uncontrolled, accounted for more than one-third of the fatal accidents in 1980. These accidents produced fatalities in 63.0 percent of the cases. Engine failure or malfunction, the most frequent accident type, caused fatal injuries in only 8.2 percent of the 914 occurrences. Less than one percent of ground-water loop-swerve accidents (the second most frequent type) produced fatal injuries.

Table 7 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL OPERATIONS
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	3	7	33	326*	369*	10.5
Dragged Wingtip Pod or Float	0	0	0	2	2	0.1
Wheels-up Landing	0	1	1	47	49	1.4
Wheels-down Landing in Water	1	0	1	3	5	0.1
Gear Collapsed	0	0	2	46	48	1.4
Gear Retracted	0	0	1	36	37	1.1
Hard Landing	3	13	19	170	205	5.9
Nose Over/Down	0	1	8	89	98	2.8
Roll Over	1	1	8	8	18	0.5
Overshoot	4	6	29	125+	164+	4.7
Undershoot	9	17	21	67	114	3.3
Col. Between Aircraft-Both in Flight	12	3	3	11	29	0.8
Col. Between Aircraft-One Airborne	0	0	1	0*+	1*+	0.0
Col. Between Aircraft-Both on Ground	0	0	1	7	8	0.2
Col. with Ground/Water-Controlled	116	20	37	47	220	6.3
Col. with Ground/Water-Uncontrolled	109	14	6	8	137	3.9
Col. with Wires/Poles	48	28	22	55	153	4.4
Col. with Trees	60	25	31	45	161	4.6
Col. with Residence/s	2	0	0	0	2	0.1
Col. with Building/s	1	1	0	7	9	0.3
Col. with Fence, Fenceposts	0	0	8	36	44	1.3
Col. with Electronic Towers	7	1	0	0	8	0.2
Col. with Runway or Approach Lights	1	0	0	5	6	0.2
Col. with Airport Hazard	0	0	0	5	5	0.1
Col. with Animals	0	0	0	5	5	0.1
Col. with Crop	1	0	4	10	15	0.4
Col. with Ditches	0	1	3	25	29	0.8

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted only as one accident in the totals at the end of the table.

\+ In one collision between aircraft, one of the two aircraft involved experienced an overshoot, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted only as one accident in the totals at the end of the table.

Table 7 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Col. with Snowbank	0	0	0	9	9	0.3
Col. with Parked Aircraft (Unattended)	0	0	0	12	12	0.3
Col. with Automobile	1	0	2	5	8	0.2
Col. with Dirt Bank	0	3	8	23	34	1.0
Col. with Other	4	3	12	55	74	2.1
Bird Strike	2	0	0	1	3	0.1
Stall	37	41	15	30	123	3.5
Stall/Spin	58	7	5	1	71	2.0
Stall/Spiral	4	0	0	0	4	0.1
Stall/Mush	18	18	24	64	124	3.5
Fire or Explosion in Flight	5	0	4	4	13	0.4
Fire or Explosion on Ground	0	0	2	6	8	0.2
Airframe Failure	1	0	0	1	2	0.1
Airframe Failure in Flight	46	0	3	7	56	1.6
Airframe Failure on Ground	0	0	1	8	9	0.3
Engine Tearaway	0	0	0	1	1	0.0
Engine Failure or Malfunction	75	120	226	493	914	26.1
Propeller/Rotor Failure	0	0	0	1	1	0.0
Propeller Failure	0	2	3	14	19	0.5
Tail Rotor Failure	1	5	3	7	16	0.5
Main Rotor Failure	2	0	1	8	11	0.3
Prop/Rotor Accident to Person	1	4	0	0	5	0.1
Turbulence	2	2	3	3	10	0.3
Ditching	1	0	0	3	4	0.1
Missing Aircraft Not Recovered	10	0	0	0	10	0.3
Miscellaneous/Other	2	5	1	4	12	0.3
Undetermined	6	0	0	4	10	0.3
No. of Accidents	654	349	552	1947	3502	
Percent	18.7	10.0	15.8	55.6		

Table 8 tabulates accident-involved aircraft by the type of accident and the degree of aircraft damage. More than one-half of the aircraft destroyed in 1981 were involved in colliison with ground or water (either controlled or uncontrolled), collision with trees, or engine failure/malfunction.

Table 8 - AIRCRAFT BY TYPE OF ACCIDENT AND DAMAGE
ALL OPERATIONS
1981

Type of Accident	Degree of Damage				Aircraft	
	Des.	Sub.	Min.	None	No.	Percent
Ground-Water Loop-Swerve	32	337	0	0	369	10.4
Dragged Wingtip Pod or Float	0	2	0	0	2	0.1
Wheels-up Landing	1	48	0	0	49	1.4
Wheels-down Landing in Water	1	4	0	0	5	0.1
Gear Collapsed	1	47	0	0	48	1.4
Gear Retracted	3	34	0	0	37	1.0
Hard Landing	23	179	0	3	205	5.8
Nose Over/Down	4	94	0	0	98	2.8
Roll Over	3	15	0	0	18	0.5
Overshoot	17	146	1	0	164	4.6
Undershoot	27	87	0	0	114	3.2
Col. Between Aircraft-Both in Flight	25	24	4	1	54	1.5
Col. Between Aircraft-One Airborne	1	0	1	0	2	0.1
Col. Between Aircraft-Both on Ground	1	10	1	0	12	0.3
Col. with Ground/Water-Controlled	137	83	0	0	220	6.2
Col. with Ground/Water-Uncontrolled	117	20	0	0	137	3.9
Col. with Wires/Poles	78	75	0	0	153	4.3
Col. with Trees	95	66	0	0	161	4.6
Col. with Residence	1	1	0	0	2	0.1
Col. with Building/s	2	7	0	0	9	0.3
Col. with Fence, Fenceposts	3	41	0	0	44	1.2
Col. with Electronic Towers	8	0	0	0	8	0.2
Col. with Runway or Approach Lights	1	5	0	0	6	0.2
Col. with Airport Hazard	0	5	0	0	5	0.1
Col. with Animals	0	5	0	0	5	0.1
Col. with Crop	2	13	0	0	15	0.4
Col. with Ditches	1	27	0	1	29	0.8
Col. with Snowbank	1	8	0	0	9	0.3
Col. with Parked Aircraft (Unattended)	1	11	0	0	12	0.3
Col. with Automobile	1	7	0	0	8	0.2
Col. with Dirt Bank	6	27	0	1	34	1.0
Col. with Other	10	63	1	0	74	2.1
Bird Strike	2	0	1	0	3	0.1
Stall	62	61	0	0	123	3.5
Stall/Spin	57	14	0	0	71	2.0
Stall/Spiral	3	1	0	0	4	0.1
Stall/Mush	49	74	1	0	124	3.5
Fire or Explosion in Flight	8	5	0	0	13	0.4
Fire or Explosion on Ground	5	3	0	0	8	0.2

Table 8 (continued)

Type of Accident	Degree of Damage				Aircraft	
	Des.	Sub.	Min.	None	No.	Percent
Airframe Failure	1	1	0	0	2	0.1
Airframe Failure in Flight	48	8	0	0	56	1.6
Airframe Failure on Ground	2	7	0	0	9	0.3
Engine Tearaway	0	1	0	0	1	0.0
Engine Failure or Malfunction	234	680	0	0	914	25.9
Propeller/Rotor Failure	0	1	0	0	1	0.0
Propeller Failure	5	14	0	0	19	0.5
Tail Rotor Failure	8	8	0	0	16	0.5
Main Rotor Failure	4	7	0	0	11	0.3
Prop/Rotor Accident to Person	0	1	4	0	5	0.1
Turbulence	6	4	0	0	10	0.3
Ditching	2	2	0	0	4	0.1
Missing Aircraft Not Recovered	10	0	0	0	10	0.3
Miscellaneous/Other	4	7	0	1	12	0.3
Undetermined	9	1	0	0	10	0.3
No. of Aircraft	1122	2391	14	7	3534	
Percent	31.7	67.7	0.4	0.2		

Of the 727 aircraft involved in accidents during takeoff, 235 (or 32.3 percent) experienced an engine failure or malfunction as the first type of accident (See Table 9). Also, more than 42 percent of in-flight accidents involved engine failure/malfunction. There was no similarly predominant type of landing accident. The most frequent landing accident type was ground-water loop-swerve which accounted for 18.9 percent of accidents during landing.

Table 9 - AIRCRAFT BY TYPE OF ACCIDENT AND PHASE OF OPERATION
ALL OPERATIONS
1981

Type of Accident	Phase of Operation						Aircraft	
	Static	Taxi	Takeoff	In flight	Landing	Unk/NR	No.	Percent
Ground-Water Loop-Swerve	0	5	96	0	267	1	369	10.4
Dragged Wingtip Pod or Float	0	0	2	0	0	0	2	0.1
Wheels-up Landing	0	0	0	0	49	0	49	1.4
Wheels-down Landing in Water	0	0	0	0	5	0	5	0.1
Gear Collapsed	0	4	9	0	35	0	48	1.4
Gear Retracted	0	2	4	0	31	0	37	1.0
Hard Landing	0	1	0	2	202	0	205	5.8
Nose Over/Down	2	18	13	0	65	0	98	2.8
Roll Over	1	3	7	2	5	0	18	0.5
Overshoot	0	0	0	0	164	0	164	4.6
Undershoot	0	0	0	0	114	0	114	3.2
Col. Between Aircraft-Both in Flight	0	0	3	27	24	0	54	1.5
Col. Between Aircraft-One Airborne	0	0	1	0	1	0	2	0.1
Col. Between Aircraft-Both on Ground	2	7	1	0	2	0	12	0.3
Col. with Ground/Water-Controlled	0	1	26	142	50	1	220	6.2
Col. with Ground/Water-Uncontrolled	0	0	20	98	17	2	137	3.9
Col. with Wires/Poles	0	2	17	98	36	0	153	4.3
Col. with Trees	0	1	45	80	33	2	161	4.6
Col. with Residence	0	0	0	2	0	0	2	0.1
Col. with Building/s	0	6	1	0	2	0	9	0.3
Col. with Fence, Fenceposts	0	1	28	0	15	0	44	1.2
Col. with Electronic Towers	0	0	0	6	2	0	8	0.2
Col. with Runway or Approach Lights	0	1	1	0	4	0	6	0.2
Col. with Airport Hazard	0	4	0	0	1	0	5	0.1
Col. with Animals	0	0	2	0	3	0	5	0.1
Col. with Crop	0	0	9	4	2	0	15	0.4
Col. with Ditches	0	7	10	0	12	0	29	0.8
Col. with Snowbank	0	1	3	1	4	0	9	0.3
Col. with Parked Aircraft (Unattended)	1	7	1	0	3	0	12	0.3
Col. with Automobile	0	2	4	1	1	0	8	0.2
Col. with Dirt Bank	0	2	13	5	14	0	34	1.0
Col. with Other	0	8	28	6	32	0	74	2.1
Bird Strike	0	0	0	3	0	0	3	0.1
Stall	0	0	35	57	31	0	123	3.5
Stall/Spin	0	0	10	47	13	1	71	2.0
Stall/Spiral	0	0	1	3	0	0	4	0.1
Stall/Mush	0	0	78	29	17	0	124	3.5

Table 9 (continued)

Type of Accident	Phase of Operation						Aircraft	
	Static	Taxi	Takeoff	In flight	Landing	Unk/NR	No.	Percent
Fire or Explosion in Flight	0	0	1	10	2	0	13	0.4
Fire or Explosion on Ground	1	2	1	0	3	1	8	0.2
Airframe Failure	0	0	0	2	0	0	2	0.1
Airframe Failure in Flight	0	0	5	50	1	0	56	1.6
Airframe Failure on Ground	0	0	6	1	2	0	9	0.3
Engine Tearaway	0	0	0	1	0	0	1	0.0
Engine Failure or Malfunction	0	2	235	541	136	0	914	25.9
Propeller/Rotor Failure	0	0	0	0	1	0	1	0.0
Propeller Failure	0	0	6	13	0	0	19	0.5
Tail Rotor Failure	0	0	2	14	0	0	16	0.5
Main Rotor Failure	0	0	2	8	1	0	11	0.3
Prop/Rotor Accident to Person	4	1	0	0	0	0	5	0.1
Turbulence	0	0	1	3	6	0	10	0.3
Ditching	0	0	0	0	4	0	4	0.1
Missing Aircraft Not Recovered	0	0	0	0	0	10	10	0.3
Miscellaneous/Other	0	1	0	9	2	0	12	0.3
Undetermined	0	0	0	2	1	7	10	0.3
No. of Aircraft	11	89	727	1267	1415	25	3534	
Percent	0.3	2.5	20.6	35.9	40.0	0.7		

In Table 10, the detailed phase of operation and degree of injury are tabulated for all accident-involved general aviation aircraft. Most accidents in 1981 occurred during one of four phases of operation - level off/touchdown (14.5 percent), normal cruise (13.6 percent), initial climb (13.4 percent), and landing roll (11.4 percent). The percentage of accidents producing fatal or serious injuries varies substantially among these four groups, from a low of 1.7 percent for landing roll, to a high of 36.3 percent for normal cruise accidents.

Table 10 - AIRCRAFT BY PHASE OF OPERATION AND DEGREE OF INJURY
ALL OPERATIONS
1981

Phase of Operation	Degree of Injury				Aircraft	
	Fatal	Serious	Minor	None	No.	Percent
Static:						
Starting Engine/s	0	1	0	2	3	0.1
Idling Engine/s	1	1	0	3	5	0.1
Engine Runup	0	0	0	1	1	0.0
Idling Rotors	0	1	0	0	1	0.0
Other	0	1	0	0	1	0.0
Taxi:						
To Takeoff	0	0	0	32	32	0.9
From Landing	0	1	2	36	39	1.1
Other	0	0	0	9	9	0.3
Ground Taxi, Other	0	0	0	1	1	0.0
Aerial Taxi to Takeoff	0	0	0	3	3	0.1
Aerial Taxi, Other	0	0	1	4	5	0.1
Takeoff:						
Run	5	5	20	133	163	4.6
Initial Climb	76	75	102	219	472	13.4
Vertical	1	3	10	5	19	0.5
Running (Rotorcraft/VTOL-STOL)	0	0	0	2	2	0.1
Aborted (Fixed-Wing)	1	3	13	45	62	1.8
Aborted (Rotorcraft/VTOL)	0	0	0	1	1	0.0
Aborted (Rotorcraft/STOL)	0	0	0	2	2	0.1
Other	3	1	0	2	6	0.2
Inflight:						
Climb to Cruise	26	10	23	32	91	2.6
Normal Cruise	121	54	103	204	482	13.6
Descending	16	3	10	37	66	1.9
Holding (IFR)	0	0	1	0	1	0.0
Hovering	1	2	5	11	19	0.5
Autorotative Descent	0	1	1	1	3	0.1
Acrobatics	42	5	1	3	51	1.4
Buzzing	24	3	3	0	30	0.8
Uncontrolled Descent	88	2	1	3	94	2.7

Table 10 (continued)

Phase of Operation	Degree of Injury				Aircraft	
	Fatal	Serious	Minor	None	No.	Percent
Low Pass	31	8	15	13	67	1.9
Other	78	17	21	30	146	4.1
En Route to Treat Crop*	1	2	1	4	8	0.2
En Route to Reloading Area*	1	1	1	3	6	0.2
Survey Field/Area*	1	0	3	2	6	0.2
Starting Swath Run*	2	5	3	13	23	0.7
Swath Run*	4	12	5	32	53	1.5
Flareout for Swath Run*	0	0	0	2	2	0.1
Pullup from Swath Run*	6	5	4	20	35	1.0
Procedure Turnaround*	10	14	14	27	65	1.8
Cleanup Swath*	1	2	0	3	6	0.2
Maneuver to Avoid Obstruction*	0	1	1	0	2	0.1
Return to Strip*	0	1	2	8	11	0.3
Landing:						
Traffic Pattern-Circling	27	17	27	31	102	2.9
Final Approach (VFR)	30	40	38	119	227	6.4
Initial Approach	4	0	0	1	5	0.1
Final Approach (IFR)	14	4	5	2	25	0.7
Level Off/Touchdown	11	27	55	418	511	14.5
Roll (Fixed Wing)	2	5	33	364	404	11.4
Roll-On/Run-On (Rotorcraft)	0	0	0	2	2	0.1
Power-On Landing (Rotorcraft)	0	1	7	8	16	0.5
Power-Off Autorotative Ldg	1	1	3	19	24	0.7
Go-Around (VFR)	8	12	19	35	74	2.1
Missed Approach (IFR)	5	2	0	1	8	0.2
Other	3	3	3	8	17	0.5
Unknown/Not Reported	18	0	0	7	25	0.7
No. of Aircraft	663	352	556	1963	3534	
Percent	18.8	10.0	15.7	55.5		

* These special inflight phases of operation are associated with aerial application operations.

Table 11 tabulates the specific phase of operation and the degree of aircraft damage to the aircraft. Aircraft destroyed in accidents during initial climb or normal cruise represent 32.4 percent of all aircraft destroyed in 1981.

Table 11 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL OPERATIONS
1981

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Min.	None	No.	Percent
Static:						
Starting Engine/s	1	2	0	0	3	0.1
Idling Engine/s	0	3	2	0	5	0.1
Engine Runup	0	1	0	0	1	0.0
Idling Rotors	0	1	0	0	1	0.0
Other	0	0	1	0	1	0.0
Taxi:						
To Takeoff	3	28	1	0	32	0.9
From Landing	3	35	1	0	39	1.1
Other	0	9	0	0	9	0.3
Ground Taxi, Other	0	1	0	0	1	0.0
Aerial Taxi to Takeoff	0	3	0	0	3	0.1
Aerial Taxi, Other	2	3	0	0	5	0.1
Takeoff:						
Run	17	144	2	0	163	4.6
Initial Climb	173	297	1	1	472	13.4
Vertical	6	13	0	0	19	0.5
Running (Rotorcraft/VTOL-STOL)	0	2	0	0	2	0.1
Aborted (Fixed-Wing)	5	57	0	0	62	1.8
Aborted (Rotorcraft/VTOL)	0	1	0	0	1	0.0
Aborted (Rotorcraft/STOL)	0	2	0	0	2	0.1
Other	5	1	0	0	6	0.2
Inflight:						
Climb to Cruise	40	50	1	0	91	2.6
Normal Cruise	191	290	1	0	482	13.6
Descending	24	42	0	0	66	1.9
Holding (IFR)	0	1	0	0	1	0.0
Hovering	5	14	0	0	19	0.5
Autorotative Descent	1	2	0	0	3	0.1
Acrobatics	41	10	0	0	51	1.4
Buzzing	23	7	0	0	30	0.8
Uncontrolled Descent	89	5	0	0	94	2.7
Low Pass	38	29	0	0	67	1.9
Other	95	51	0	0	146	4.1
En Route to Treat Crop	4	4	0	0	8	0.2
En Route to Reloading Area	2	4	0	0	6	0.2
Survey Field/Area	3	3	0	0	6	0.2

Table 11 (continued)

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Min.	None	No.	Percent
Starting Swath Run	12	11	0	0	23	0.7
Swath Run	22	31	0	0	53	1.5
Flareout for Swath Run	2	0	0	0	2	0.1
Pullup from Swath Run	15	20	0	0	35	1.0
Procedure Turnaround	30	35	0	0	65	1.8
Cleanup Swath	3	3	0	0	6	0.2
Maneuver to Avoid Obstruction	1	1	0	0	2	0.1
Return to Strip	1	10	0	0	11	0.3
Landing:						
Traffic Pattern-Circling	42	59	1	0	102	2.9
Final Approach (VFR)	59	166	2	0	227	6.4
Initial Approach	5	0	0	0	5	0.1
Final Approach (IFR)	20	5	0	0	25	0.7
Level Off/Touchdown	57	447	1	6	511	14.5
Roll (Fixed Wing)	17	387	0	0	404	11.4
Roll-On/Run-On (Rotorcraft)	1	1	0	0	2	0.1
Power-On Landing (Rotorcraft)	3	13	0	0	16	0.5
Power-Off Autorotative Ldg	4	20	0	0	24	0.7
Go-Around (VFR)	25	49	0	0	74	2.1
Missed Approach (IFR)	6	2	0	0	8	0.2
Other	4	13	0	0	17	0.5
Unknown/Not Reported	22	3	0	0	25	0.7
No. of Aircraft	1122	2391	14	7	3534	
Percent	31.7	67.7	0.4	0.2		

Table 12 illustrates that nearly 78 percent of general aviation accidents in 1981 occurred in daylight and in VFR weather conditions. Of the 29 mid-air collisions involving U.S. general aviation aircraft, all but two occurred in these light and weather conditions.

Table 12 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL OPERATIONS
1981

	Type of Weather				Accidents	
Light Conditions	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	31	7	1	0	39	1.1
Daylight	2723	150	7	20	2900	82.8
Dusk	123	18	0	3	144	4.1
Night (Dark)	223	89	12	14	338	9.7
Night (Moonlight-Bright)	50	2	0	0	52	1.5
Unknown/Not Reported	3	2	0	24	29	0.8
No. of Accidents	3153	268	20	61	3502	
Percent	90.0	7.7	0.6	1.7		

Table 13 presents the number of accidents in each state by the month of occurrence. More than one third of all accident in 1981 occurred in one of five states — California, Texas, Florida, Alaska, or Arizona. The number of accidents monthly varies seasonally. July, with the highest number of accidents, had more than 2.6 times as many accidents as occurred in December, the month with the lowest total.

Table 13 - ACCIDENTS BY STATE AND MONTH
ALL OPERATIONS
1981

State	Month of Occurrence												Accidents	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Percent
Alabama	3	3	5	2	2	2	7	8	4	3	3	2	44	1.3
Alaska	4	9	19	6	11	19	18	30	28	8	6	4	162	4.6
Arizona	15	8	11	8	11	11	8	16	13	6	11	9	127	3.6
Arkansas	1	2	4	8	15	14	9	5	7	2	2	2	71	2.0
California	21	32	32	42	49	33	38	38	33	27	25	19	389	11.1
Colorado	5	2	7	7	13	8	15	7	8	6	6	6	90	2.6
Connecticut	0	1	2	0	2	2	0	4	1	0	1	0	13	0.4
Delaware	0	2	0	0	1	0	1	0	0	0	1	0	5	0.1
Florida	9	11	15	22	25	18	21	16	23	13	8	9	190	5.4
Georgia	0	5	4	8	5	12	14	15	7	7	4	2	83	2.4
Hawaii	1	1	1	1	3	0	2	1	0	1	1	1	13	0.4
Idaho	3	0	1	0	5	6	6	4	2	2	5	1	35	1.0
Illinois	6	3	8	16	12	10	16	13	4	10	5	7	110	3.1
Indiana	3	2	2	3	3	13	5	0	8	3	3	4	49	1.4
Iowa	4	5	2	9	2	4	7	10	4	5	2	2	56	1.6
Kansas	4	5	6	15	7	9	3	6	2	3	6	4	70	2.0
Kentucky	5	1	2	2	6	2	3	1	0	3	3	0	28	0.8
Louisiana	2	2	4	7	7	10	12	13	9	5	6	1	78	2.2
Maine	1	0	0	1	1	1	2	4	2	1	1	1	15	0.4
Maryland	1	4	3	0	1	1	1	1	0	3	2	1	18	0.5
Massachusetts	4	4	3	4	2	2	5	3	5	5	3	1	41	1.2
Michigan	8	6	9	8	8	10	18	16	10	7	6	4	110	3.1
Minnesota	4	5	10	4	6	9	9	7	10	10	8	3	85	2.4
Mississippi	3	2	2	3	4	9	7	3	3	7	1	0	44	1.3
Missouri	4	3	6	9	8	7	16	7	3	5	12	6	86	2.5
Montana	3	1	3	2	3	7	5	4	7	8	5	3	51	1.5
Nebraska	1	0	2	3	3	7	2	8	4	0	1	1	32	0.9
Nevada	3	3	4	4	2	4	4	5	5	1	4	2	41	1.2
New Hampshire	0	0	1	0	0	1	1	1	1	0	0	0	5	0.1
New Jersey	2	2	2	4	7	8	5	6	6	4	5	1	52	1.5
New Mexico	4	4	4	7	9	6	8	9	3	8	8	4	74	2.1
New York	5	5	3	8	9	7	9	11	9	6	10	4	86	2.5
North Carolina	1	4	5	6	3	7	8	1	3	4	2	1	45	1.3
North Dakota	0	2	1	1	4	3	4	1	5	0	0	2	23	0.7
Ohio	7	2	3	8	8	11	9	9	8	5	2	2	74	2.1
Oklahoma	6	3	4	12	6	8	8	8	5	7	7	3	77	2.2
Oregon	6	6	6	2	3	6	9	8	10	5	7	6	74	2.1

Table 13 (continued)

State	Month of Occurrence												Accidents	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Percent
Pennsylvania	2	2	8	8	8	7	15	5	10	6	6	5	82	2.3
Rhode Island	0	1	0	0	1	0	2	0	0	0	1	0	5	0.1
South Carolina	1	1	1	2	1	5	4	3	1	2	3	5	29	0.8
South Dakota	1	0	2	3	2	5	4	5	2	0	0	3	27	0.8
Tennessee	4	4	2	6	4	1	7	5	2	4	2	1	42	1.2
Texas	18	26	24	32	44	24	27	44	22	32	31	15	339	9.7
Utah	2	4	1	6	5	9	7	3	2	3	6	1	49	1.4
Vermont	0	0	2	0	0	1	0	0	0	0	0	0	3	0.1
Virginia	2	2	3	2	5	1	2	3	6	4	4	4	38	1.1
Washington	7	6	9	9	13	9	9	12	7	3	7	2	93	2.7
West Virginia	1	3	1	2	3	3	3	0	2	1	1	0	20	0.6
Wisconsin	2	4	6	5	4	7	14	4	7	7	5	2	67	1.9
Wyoming	2	3	3	3	4	3	3	4	5	1	1	0	32	0.9
D.C.	0	0	0	0	1	0	0	0	0	0	0	0	1	0.0
Puerto Rico	0	2	2	0	1	0	1	0	1	3	0	1	11	0.3
Virgin Islands	0	0	0	0	0	1	0	1	0	0	0	0	2	0.1
Samoa	0	0	0	0	0	0	0	0	0	0	1	0	1	0.0
Atl. Ocean N. Lat.	0	1	0	0	1	0	1	0	1	0	0	1	5	0.1
Unk/Not Reported	1	2	0	0	0	0	1	3	1	1	0	1	10	0.3
No. of Accidents	192	211	260	320	363	363	415	391	321	257	250	159	3502	
Percent	5.5	6.0	7.4	9.1	10.8	10.4	11.9	11.2	9.2	7.3	7.1	4.5		

The proximity to the airport and the type of flight plan are presented in Table 14. Approximately 44 percent of the aircraft for which the proximity was reported were on the airport at the time of the accident, while 28.3 percent were more than five miles from the airport. Nearly 85 percent of the aircraft were being operated without a flight plan when they became involved in an accident.

Table 14 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL OPERATIONS
1981

Proximity to Airport	Type of Flight Plan										Aircraft	
	None	VFR	IFR	Controlled VFR	IFR (VFR Condition on Top)	DVFR	VFR Flight Following	Special VFR	Unk/NR	Other	No.	Percent
On Airport	1239	109	65	0	0	0	0	2	16	3	1434	40.6
On Seaplane Base	12	1	0	0	0	0	0	0	0	0	13	0.4
On Heliport	3	1	0	0	0	0	0	0	0	2	6	0.2
On Barge/Ship/Platform	1	0	0	0	0	0	0	0	0	0	1	0.0
In Traffic Pattern	188	19	5	0	0	1	1	0	0	1	215	6.1
Miles from Airport:												
Within 1/4	155	3	7	0	0	0	0	0	2	0	167	4.7
1/4+ to 1/2	99	11	4	0	0	0	0	0	0	0	114	3.2
1/2+ to 3/4	19	0	5	0	0	0	0	0	0	0	24	0.7
3/4+ to 1	81	5	9	0	0	0	0	0	0	0	95	2.7
1+ to 2	102	12	17	1	0	0	1	0	1	1	135	3.8
2+ to 3	60	6	9	0	0	0	0	0	0	0	75	2.1
3+ to 4	33	2	8	0	0	0	0	0	0	0	43	1.2
4+ to 5	24	3	4	0	0	0	0	0	0	0	31	0.9
Beyond 5	766	95	56	0	1	0	3	1	2	6	930	26.3
Unk/Not Reported	217	15	11	0	0	0	1	0	7	0	251	7.1
No. of Aircraft	2999	282	200	1	1	1	6	3	28	13	3534	
Percent	84.9	8.0	5.7	0.0	0.0	0.0	0.2	0.1	0.8	0.4		

An emergency locator transmitter (ELT) was a factor in locating at least 92 accident-involved aircraft in 1981. (See Table 15). More than one-fourth of accident-involved general aviation aircraft reportedly did not have an ELT installed. There were 318 post-crash fires reported - approximately one of every 11 accident-involved aircraft.

Table 15 - AIRCRAFT BY ELT AND FIRE AFTER IMPACT
ALL OPERATIONS
1981

	Fire After Impact			Aircraft	
Emergency Locator Transmitter	No	Yes	Unk/NR	No.	Percent
Operated-Used in Locating Aircraft	84	8	0	92	2.6
Operated-Not Used	581	23	0	604	17.1
Not Used-Not Armed	162	3	0	165	4.7
Not Used-Separation from Antenna	30	3	0	33	0.9
Not Used-Battery Malfunction	13	0	0	13	0.4
Not Used-Other Malfunction	42	0	0	42	1.2
Not Used-Impact/Fire Damage	50	85	0	135	3.8
Not Used-Operation Unknown	299	46	1	346	9.8
Not Installed	855	93	1	949	26.9
Not Applicable/Insufficient Impact	923	27	0	950	26.9
Unknown/Not Reported	173	30	2	205	5.8
No. of Aircraft	3212	318	4	3534	
Percent	90.9	9.0	0.1		

In Table 16, the experience levels of accident-involved pilots (total and in-type) are listed. The median for total hours was in the range 500 - 999, while the median hours in type was between 100 and 499.

Table 16 - PILOTS BY TOTAL TIME AND TIME IN TYPE
ALL OPERATIONS
1981

	Time in Type (Hours)								
Total Time (Hours)	0-49	50-99	100-499	500-999	1000-4999	5000 or More	Not Reported	Total	Percent
0 - 49	230	0	0	0	0	0	6	236	6.7
50 - 99	127	98	0	0	0	0	9	234	6.6
100 - 499	375	167	357	0	0	0	62	961	27.2
500 - 999	109	56	174	70	0	0	30	439	12.4
1000 - 4999	216	109	323	154	163	0	83	1048	29.7
5000 - 9999	45	23	83	36	89	10	23	309	8.7
10000 or More	25	11	38	22	56	29	15	196	5.5
Not Reported	0	0	4	0	0	1	106	111	3.1
Total	1127	464	979	282	308	40	334	3534	
Percent	31.9	13.1	27.7	8.0	8.7	1.1	9.5		

Table 17 shows the age distribution of pilots involved in accidents and fatal accidents, and of pilots for whom conclusive toxicology results were obtained. The median age of all accident-involved pilots was between 35 and 39 years. The median age of pilots involved in fatal accidents was between 40 and 44 years. Toxicology test results were positive for alcohol in 10.8 percent of the cases in which conclusive results were obtained.

Table 17 - PILOTS BY AGE AND RESULTS OF TOXICOLOGY EXAM
ALL OPERATIONS
1981

	Number of Toxicology Tests		Pilots Involved in Fatal Accidents		Pilots Involved in Accidents	
Age Group	Conclusive Results	Positive for Alcohol	Number	Percent	Number	Percent
15 - 19	15	2	18	2.7	82	2.3
20 - 24	41	4	55	8.3	309	8.7
25 - 29	52	7	68	10.3	441	12.5
30 - 34	62	3	93	14.0	555	15.7
35 - 39	66	10	84	12.7	506	14.3
40 - 44	65	6	81	12.2	426	12.1
45 - 49	64	7	87	13.1	375	10.6
50 - 54	53	6	80	12.1	340	9.6
55 - 59	27	3	35	5.3	220	6.2
60 - 64	24	3	30	4.5	128	3.6
65 - 69	13	1	18	2.7	62	1.8
70 or Over	6	0	9	1.4	23	0.7
Not Reported	1	1	5	0.8	67	1.9
Total	489	53	663	100.0	3534	100.0

Table 18 lists the ten detailed causes of general aviation accidents most frequently cited in 1981. Seven of these 10 causes are pilot-related. A complete listing of causes and related factors is contained in Appendix B.

Table 18 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL OPERATIONS
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	360	10.3
Pilot-Failed to Obtain/Maintain Flying Speed	339	9.7
Powerplant-Failure for Undet. Reasons	257	7.3
Pilot-Mismanagement of Fuel	246	7.0
Fuel Exhaustion	197	5.6
Material Failure	184	5.3
Pilot-Selected Unsuitable Terrain	170	4.9
Pilot-Improper Level Off	169	4.8
Pilot-Misjudged Distance and Speed	166	4.7
Pilot-Continued VFR Flight into Adverse Weather Cond.	157	4.5

HISTORICAL COMPARISON

This subsection presents several tables which facilitate the comparison of some characteristics of general aviation accidents in 1981 with those for the period 1976 - 1980. Table 19, which covers the years 1975 through 1981, lists accidents, fatal accidents, fatalities (total and aboard general aviation aircraft), flight hours, 1/ and accident rates (total and fatal). Among the seven years for which data is shown in Table 19, 1981 had the lowest accident total and the lowest total accident rate. However, fatal accidents, the fatal accident rate, total fatalites, and fatalities aboard general aviation aircraft were higher in 1981 than in the previous two years.

Table 19 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL OPERATIONS
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard General Aviation Aircraft
1975	4001	636	1258	1237
1976	4023	662	1226	1213
1977	4083	663	1280	1269
1978	4218	721	1558	1400
1979	3825	638	1237	1218
1980	3597	622	1252	1243
1981	3502	654	1282	1261

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown *	
		Total	Fatal
1975	28,799,000	13.89	2.20
1976	30,476,000	13.19	2.17
1977	31,578,000	12.93	2.10
1978	34,887,000	12.08	2.06
1979	38,641,000	9.90	1.65
1980	36,402,000	9.88	1.71
1981	36,803,000	9.52	1.78

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (2), 1976 (4), 1977 (1), 1978 (2), 1980 (1)
Fatal - 1975 (2), 1976 (1), 1977 (1), 1978 (2), 1980 (1)

1/ Flight hour estimates are based upon Federal Aviation Administration estimates. The Safety Board reduces the FAA estimates of total hours by the number of hours flown in commuter and air taxi operations and by a portion of the total rental hours dedicated to such operations.

The remainder of the tables of this subsection present data for the years 1976 through 1980 in the form of arithmetic means for that five year period. These average frequencies are presented in descending order with the corresponding data for 1981.

Table 20 presents data on the types of accidents which occurred most frequently in the base period (1976-1980) and in 1981. The total number of accidents in 1981 was 11.3 percent below the mean for the prior five years. The numbers of accidents of most types also decreased, many by more than 20 percent. Among the most common accident types listed in Table 20, only controlled collisions with ground or water occurred with increased frequency in 1981 as compared to the base period.

Table 20 - MOST PREVALENT TYPES OF ACCIDENTS
ALL OPERATIONS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	914	26.1	975.4	24.7
Col. with Object	574	16.4	624.0	15.8
Ground-Water Loop-Swerve	369	10.5	467.2	11.8
Hard Landing	205	5.9	258.0	6.5
Col. with Ground/Water-Controlled	219	6.3	204.4	5.2
Overshoot	164	4.7	169.6	4.3
Stall/Mush	124	3.5	166.0	4.2
Col. with Ground/Water-Uncontrolled	137	3.9	145.4	3.7
Nose Over/Down	98	2.8	129.2	3.3
Stall	123	3.5	125.4	3.2
Undershoot	114	3.3	120.4	3.0
Stall/Spin	71	2.0	89.2	2.3
Wheels-up Landing	49	1.4	69.4	1.8
Airframe Failure in Flight	56	1.6	69.0	1.7
Gear Collapsed	48	1.4	48.2	1.2
Gear Retracted	37	1.1	41.2	1.0
(All Other Types)	200	5.7	247.2	6.3
Total	3502	100.0	3949.2	100.0

In contrast to the situation for all accidents, nearly as many of the most prevalent types of fatal accidents increased in frequency (five types) as decreased (seven types). Overall the number of fatal accidents changed little in 1981 from the base period. The 1981 total of 654 is only 1.1 percent below the mean for the prior five years.

Table 21 - MOST PREVALENT TYPES OF FATAL ACCIDENTS
ALL OPERATIONS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Type of Accident	No.	Percent	Mean	Percent
Col. with Ground/Water-Uncontrolled	109	16.7	110.4	16.7
Col. with Object	125	19.1	110.0	16.6
Col. with Ground/Water-Controlled	115	17.6	102.0	15.4
Engine Failure or Malfunction	75	11.5	86.0	13.0
Stall/Spin	58	8.9	66.2	10.0
Airframe Failure in Flight	46	7.0	42.8	6.5
Stall	37	5.7	41.0	6.2
Col. Between Aircraft-Both in Flight	12	1.8	19.2	2.9
Stall/Mush	18	2.8	13.2	2.0
Missing Aircraft Not Recovered	10	1.5	11.8	1.8
Stall/Spiral	4	0.6	7.8	1.2
Undershoot	9	1.4	7.8	1.2
(All Other Types)	36	5.5	43.0	6.5
Total	654	100.0	661.2	100.0

Tables 22 and 23 present the phase of operation for all accidents and fatal accidents respectively. Aircraft involved in fatal landing accidents decreased by 14.9 percent from the base period, comparable to the 14.6 percent decrease for all landing accidents. The number of aircraft in the inflight and takeoff phases of operation increased for fatal accidents but decreased for all accidents.

Table 22 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL OPERATIONS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Phase of Operation	No.	Percent	Mean	Percent
Landing	1415	40.0	1656.6	41.5
In Flight	1267	35.9	1373.6	34.4
Takeoff	727	20.6	774.8	19.4
Taxi	89	2.5	130.2	3.3
Not Reported	25	0.7	28.2	0.7
Static	11	0.3	27.4	0.7
Total	3534	100.0	3990.8	100.0

Table 23 - PHASE OF OPERATION FOR FATAL ACCIDENT-INVOLVED AIRCRAFT
ALL OPERATIONS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Phase of Operation	No.	Percent	Mean	Percent
In Flight	453	68.3	444.2	65.4
Landing	105	15.8	123.4	18.2
Takeoff	86	13.0	84.2	12.4
Not Reported	18	2.7	20.6	3.0
Static	1	0.2	4.8	0.7
Taxi	0	0.0	1.6	0.2
Total	663	100.0	678.8	100.0

The pilot was cited as a cause or factor in 79.0 percent of general aviation accidents in 1981 (See Table 24). While the number of accidents dropped by 11.3 percent from the mean for the five-year period 1976-1980, the number of accidents in which weather was a cause or factor increased by 11.1 percent. The number of accidents in which terrain was a cause or factor dropped by 33.1 percent from the base period.

Table 24 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL OPERATIONS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	2768	79.0	3207.4	81.2
Terrain	619	17.7	925.6	23.4
Weather	947	27.0	852.6	21.6
Powerplant	590	16.8	579.8	14.7
Personnel	311	8.9	366.2	9.3
Airport/Airways and Facilities	299	8.5	293.8	7.4
Miscellaneous	188	5.4	148.2	3.8
Landing Gear	123	3.5	143.6	3.6
Undetermined	79	2.3	86.0	2.2
Systems	57	1.6	55.0	1.4
Airframe	56	1.6	47.0	1.2
Rotorcraft	40	1.1	41.0	1.0
Instrument/Equipment and Accessories	12	0.3	22.0	0.6
No. of Accidents with Cause(s) Assigned	3502		3949.2	

Table 25 lists the number and percentage of fatal accidents in which each broad cause/factor was cited in 1981 and in the base period, 1976 - 1980. The percentages of fatal accidents with pilot and weather cause/factors changed little in 1981 when compared to the prior five-year period. The percentage of fatal accidents with airframe cause/factors increased from 3.2 in the base period to 6.1 in 1981.

Table 25 - BROAD CAUSE/FACTOR ASSIGNMENTS - FATAL ACCIDENTS
ALL OPERATIONS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	568	86.9	575.4	87.0
Weather	267	40.8	257.6	39.0
Terrain	48	7.3	91.8	13.9
Personnel	64	9.8	73.6	11.1
Powerplant	47	7.2	55.2	8.3
Undetermined	50	7.6	50.2	7.6
Airframe	40	6.1	21.2	3.2
Miscellaneous	29	4.4	20.4	3.1
Airport/Airways/Facilities	9	1.4	8.8	1.3
Rotorcraft	7	1.1	8.2	1.2
Systems	10	1.5	7.8	1.2
Instruments/Equipment and Accessories	4	0.6	5.8	0.9
Landing Gear	0	0.0	0.6	0.1
No. of Fatal Accidents with Cause(s) Assigned	654		661.2	

ALL FIXED WING AIRCRAFT

Tables 26 through 37 present tabulations of statistics for fixed wing (powered) aircraft only. In 1981, 90.3 percent of all U.S. general aviation accidents involved fixed wing aircraft. Of the 1,282 persons killed in general aviation accidents, 1,190 (or 92.8 percent) were aboard fixed wing aircraft.

Composing such a large proportion of all accidents, fixed wing aircraft statistics show little difference from those for all aircraft. According to FAA estimates, 92.7 percent of all hours flown in 1981 are attributed to aircraft in this category. Therefore, accident rates for fixed wing aircraft have a great influence on overall general aviation rates.

Table 26 - SUMMARY OF LOSSES
ALL FIXED WING AIRCRAFT
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	610	572	597
Involved Serious Injury	293	334	310
Involved Minor Injury	483	444	513
Involved No Injury	1776	1886	2062
Total	3162	3236	3482
Fatalities			
Passenger	545	576	543
Crew	645	598	613
Other Persons	18	6	13
Total	1208	1180	1169
Aircraft Damaged*			
Destroyed	1017	920	913
Substantial	2159	2324	2568
Minor	14	12	21
None	1	10	13
Total	3191	3266	3515

* Number of Fixed Wing, General Aviation Aircraft

Table 27 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL FIXED WING AIRCRAFT
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	580	259	455	1897	3191
Copilot	41	11	9	40	101
Dual Student	16	10	19	107	152
Check Pilot	2	0	1	5	8
Extra Crew	6	1	2	10	19
Passengers	545	243	371	1515	2674
Total Aboard	1190	524	857	3574	6145
Other Aircraft*	15	0	1	26	42
Other Ground	3	3	9	1	16
Grand Total	1208	527	867	3601	6203
Percent	19.5	8.5	14.0	58.1	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 28 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL FIXED WING AIRCRAFT
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	714	343	599	2326	3982
Business	145	43	59	270	517
Corporate/Executive	90	19	14	99	222
Aerial Application	30	39	40	228	337
Instructional	56	26	76	412	570
Other	155	54	69	239	517
Total	1190	524	857	3574	6145
Percent	19.4	8.5	13.9	58.2	

Table 29 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL FIXED WING AIRCRAFT
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	3	7	32	319*	361*	11.4
Dragged Wingtip Pod or Float	0	0	0	2	2	0.1
Wheels-up Landing	0	1	1	47	49	1.5
Wheels-down Landing in Water	1	0	1	3	5	0.2
Gear Collapsed	0	0	2	46	48	1.5
Gear Retracted	0	0	1	36	37	1.2
Hard Landing	2	5	13	148	168	5.3
Nose Over/Down	0	1	7	87	95	3.0
Overshoot	4	5	28	125+	162+	5.1
Undershoot	9	17	20	62	108	3.4
Col. Between Aircraft-Both in Flight	12	3	2	10	27	0.9
Col. Between Aircraft-One Airborne	0	0	1	0	1	0.0
Col. Between Aircraft-Both on Ground	0	0	1	7*+	8*+	0.3
Col. with Ground/Water-Controlled	112	15	29	25	181	5.7
Col. with Ground/Water-Uncontrolled	102	8	5	5	120	3.8
Col. with Wires/Poles	40	20	15	41	116	3.7
Col. with Trees	58	24	30	44	156	4.9
Col. with Residence/s	2	0	0	0	2	0.1
Col. with Building/s	1	1	0	6	8	0.3
Col. with Fence, Fenceposts	0	0	7	33	40	1.3
Col. with Electronic Towers	7	1	0	0	8	0.3
Col. with Runway or Approach Lights	1	0	0	4	5	0.2
Col. with Airport Hazard	0	0	0	5	5	0.2
Col. with Animals	0	0	0	5	5	0.2
Col. with Crop	1	0	3	10	14	0.4
Col. with Ditches	0	0	3	24	27	0.9
Col. with Snowbank	0	0	0	9	9	0.3
Col. with Parked Aircraft (Unattended)	0	0	0	12	12	0.4
Col. with Automobile	1	0	2	4	7	0.2
Col. with Dirt Bank	0	2	8	22	32	1.0
Col. with Other	4	3	8	51	66	2.1
Bird Strike	1	0	0	1	2	0.1
Stall	37	39	15	30	121	3.8
Stall/Spin	54	7	4	1	66	2.1
Stall/Spiral	4	0	0	0	4	0.1
Stall/Mush	18	18	24	64	124	3.9

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted only as one accident in the totals at the end of the table.

+ In one collision between aircraft, one of the two aircraft involved experienced an overshoot, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted as one accident in the totals at the end of the page.

Table 29 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Fire or Explosion in Flight	4	0	4	4	12	0.4
Fire or Explosion on Ground	0	0	1	5	6	0.2
Airframe Failure	1	0	0	0	1	0.0
Airframe Failure in Flight	42	0	2	5	49	1.5
Airframe Failure on Ground	0	0	0	7	7	0.2
Engine Tearaway	0	0	0	1	1	0.0
Engine Failure or Malfunction	70	107	209	443	829	26.2
Propeller Failure	0	2	3	13	18	0.6
Prop/Rotor Accident to Person	1	3	0	0	4	0.1
Turbulence	2	2	2	3	9	0.3
Ditching	1	0	0	3	4	0.1
Missing Aircraft Not Recovered	10	0	0	0	10	0.3
Miscellaneous/Other	1	2	0	2	5	0.2
Undetermined	4	0	0	4	8	0.3
No. of Accidents	610	293	483	1776	3162	
Percent	19.3	9.3	15.3	56.2		

Table 30 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL FIXED WING AIRCRAFT
1981

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Min.	None	No.	Percent
Static:						
Starting Engine/s	0	2	0	0	2	0.1
Idling Engine/s	0	3	2	0	5	0.2
Engine Runup	0	1	0	0	1	0.0
Other	0	0	1	0	1	0.0
Taxi:						
To Takeoff	3	28	1	0	32	1.0
From Landing	3	35	1	0	39	1.2
Other	0	8	0	0	8	0.3
Takeoff:						
Run	17	143	2	0	162	5.1
Initial Climb	170	286	1	0	457	14.3
Aborted (Fixed-Wing)	5	56	0	0	61	1.9
Other	3	0	0	0	3	0.1
Inflight:						
Climb to Cruise	37	44	1	0	82	2.6
Normal Cruise	171	263	1	0	435	13.6
Descending	23	40	0	0	63	2.0
Holding (IFR)	0	1	0	0	1	0.0
Acrobatics	41	10	0	0	51	1.6
Buzzing	23	6	0	0	29	0.9
Uncontrolled Descent	86	2	0	0	88	2.8
Low Pass	33	26	0	0	59	1.8
Other	84	39	0	0	123	3.9
En Route to Treat Crop	3	4	0	0	7	0.2
En Route to Reloading Area	1	3	0	0	4	0.1
Survey Field/Area	3	3	0	0	6	0.2
Starting Swath Run	8	8	0	0	16	0.5
Swath Run	16	21	0	0	37	1.2
Flareout for Swath Run	2	0	0	0	2	0.1
Pullup from Swath Run	13	19	0	0	32	1.0
Procedure Turnaround	29	26	0	0	55	1.7
Cleanup Swath	2	3	0	0	5	0.2
Maneuver to Avoid Obstruction	0	1	0	0	1	0.0
Return to Strip	1	10	0	0	11	0.3
Landing:						
Traffic Pattern-Circling	37	55	1	0	93	2.9
Final Approach (VFR)	55	148	2	0	205	6.4
Initial Approach	5	0	0	0	5	0.2
Final Approach (IFR)	20	5	0	0	25	0.8
Level Off/Touchdown	53	423	1	1	478	15.0
Roll (Fixed Wing)	17	378	0	0	395	12.4
Go-Around (VFR)	24	47	0	0	71	2.2
Missed Approach (IFR)	6	2	0	0	8	0.3
Other	2	7	0	0	9	0.3
Unknown/Not Reported	21	3	0	0	24	0.8
No. of Aircraft	1017	2159	14	1	3191	
Percent	31.9	67.7	0.4	0.0		

Table 31 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL FIXED WING AIRCRAFT
1981

Light Conditions	Type of Weather				Accident	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	25	7	1	0	33	1.0
Daylight	2425	141	7	20	2593	82.0
Dusk	110	17	0	3	130	4.1
Night (Dark)	214	87	12	14	327	10.3
Night (Moonlight-Bright)	48	2	0	0	50	1.6
Unknown/Not Reported	3	2	0	24	29	0.9
No. of Accidents	2825	256	20	61	3162	
Percent	89.3	8.1	0.6	1.9		

Table 32 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL FIXED WING AIRCRAFT
1981

Proximity to Airport	Flight Plan										Aircraft	
	None	VFR	IFR	Controlled VFR	IFR (VFR Condition on Top)	DVFR	VFR Flight Following	Special VFR	Unk/NR	Other	No.	Percent
On Airport	1154	109	65	0	0	0	0	2	15	3	1348	42.2
On Seaplane Base	12	1	0	0	0	0	0	0	0	0	13	0.4
In Traffic Pattern	179	19	5	0	0	1	1	0	0	1	206	6.5
Miles from Airport:												
Within 1/4	149	3	7	0	0	0	0	0	2	0	161	5.0
1/4+ to 1/2	93	11	4	0	0	0	0	0	0	0	108	3.4
1/2+ to 3/4	19	0	5	0	0	0	0	0	0	0	24	0.8
3/4+ to 1	75	5	9	0	0	0	0	0	0	0	89	2.8
1+ to 2	94	12	17	0	1	0	1	0	1	1	127	4.0
2+ to 3	50	6	9	0	0	0	0	0	0	0	65	2.0
3+ to 4	29	2	8	0	0	0	0	0	0	0	39	1.2
4+ to 5	20	3	4	0	0	0	0	0	0	0	27	0.8
Beyond 5	636	90	56	1	0	0	2	0	2	4	791	24.8
Unknown/Not Reported	161	13	11	0	0	0	1	0	7	0	193	6.0
No. of Aircraft	2671	274	200	1	1	1	5	2	27	9	3191	
Percent	83.7	8.6	6.3	0.0	0.0	0.0	0.2	0.1	0.8	0.3		

Table 33 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL FIXED WING AIRCRAFT
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	323	10.2
Pilot-Failed to Obtain/Maintain Flying Speed	329	10.4
Powerplant-Failure for Undetermined Reasons	235	7.4
Pilot-Mismanagement of Fuel	229	7.2
Fuel Exhaustion	180	5.7
Pilot-Misjudged Distance and Speed	164	5.2
Pilot-Improper Level Off	161	5.1
Pilot-Selected Unsuitable Terrain	160	5.1
Material Failure	154	4.9
Pilot-Failed to Maintain Directional Control	153	4.8
Pilot-Continued VFR Flight into Adverse Weather Cond.	152	4.8

Table 34 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL FIXED WING AIRCRAFT
1975 - 1981

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Fixed Wing General Aviation Aircraft
1975	3648	612	1222	1199
1976	3697	626	1174	1160
1977	3748	634	1244	1234
1978	3850	670	1487	1335
1979	3482	597	1169	1156
1980	3236	572	1180	1174
1981	3162	610	1208	1190

		Accident Rate per 100,000 Aircraft Hours Flown*	
Year	Hours Flown	Total	Fatal
1975	28,393,000	12.84	2.15
1976	29,202,000	12.65	2.14
1977	30,166,000	12.42	2.10
1978	33,162,000	11.60	2.01
1979	36,760,000	9.47	1.62
1980	34,145,000	9.47	1.67
1981	34,113,000	9.27	1.79

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (1), 1976 (4), 1977 (1), 1978 (2), 1980 (1)
Fatal - 1975 (1), 1976 (1), 1977 (1), 1978 (2), 1980 (1)

Table 35 - MOST PREVALENT TYPES OF ACCIDENTS
ALL FIXED WING AIRCRAFT
1981 AND 1976 - 1980

	1981		1976 - 1980	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	829	26.2	896.6	24.9
Col. with Object	512	16.2	547.4	15.2
Ground-Water Loop-Swerve	361	11.4	462.8	12.8
Hard Landing	168	5.3	224.6	6.2
Col. with Ground/Water-Controlled	180	5.7	178.4	5.0
Overshoot	162	5.1	165.4	4.6
Stall/Mush	124	3.9	164.2	4.6
Nose Over/Down	95	3.0	127.4	3.5
Col. with Ground/Water-Uncontrolled	120	3.8	125.8	3.5
Stall	121	3.8	120.8	3.4
Undershoot	108	3.4	107.8	3.0
Stall/Spin	66	2.1	83.2	2.3
Wheels-up Landing	49	1.5	69.4	1.9
Airframe Failure in Flight	49	1.5	57.6	1.6
Gear Collapsed	48	1.5	47.6	1.3
Gear Retracted	37	1.2	41.2	1.1
(All Other Types)	133	4.2	182.4	5.1
Total	3162	100.0	3602.6	100.0

Table 36 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL FIXED WING AIRCRAFT
1981 AND 1976 - 1980

	1981		1976 - 1980	
Phase of Operation	No.	Percent	Mean	Percent
Landing	1289	40.4	1543.6	42.4
In Flight	1107	34.7	1211.0	33.2
Takeoff	683	21.4	719.2	19.7
Taxi	79	2.5	120.2	3.3
Not Reported	24	0.8	25.8	0.7
Static	9	0.3	22.6	0.6
Total	3191	100.0	3642.4	100.0

Table 37 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL FIXED WING AIRCRAFT
1981 AND 1976 - 1980

Broad Cause/Factor	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Pilot	2536	80.2	2963.6	82.3
Terrain	559	17.7	837.2	23.2
Weather	876	27.7	795.4	22.1
Powerplant	526	16.6	523.4	14.5
Personnel	258	8.2	323.0	9.0
Airport/Airways/Facilities	293	9.3	291.4	8.1
Landing Gear	121	3.8	142.6	4.0
Miscellaneous	159	5.0	127.8	3.5
Undetermined	66	2.1	74.4	2.1
Systems	49	1.5	51.0	1.4
Airframe	51	1.6	43.4	1.2
Instrument/Equipment and Accessories	10	0.3	17.8	0.5
No. of Accidents with Cause(s) Assigned	3162		3602.6	

FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE

Statistics describing the accident experience of fixed wing aircraft powered by a single reciprocating engine are presented in Tables 38 through 45. While these aircraft flew an estimated 77.2 percent of the hours attributed to fixed wing aircraft, they were involved in 89.2 percent of the fixed wing aircraft accidents and 81.5 percent of the fatal accidents.

Table 38 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	497	462	475
Involved Serious Injury	268	302	281
Involved Minor Injury	456	405	486
Involved No Injury	1601	1688	1832
Total	2822	2857	3074
Fatalities			
Passenger	398	412	391
Crew	509	464	475
Other Persons	12	12	13
Total	919	888	879
Aircraft Damaged*			
Destroyed	861	768	758
Substantial	1970	2096	2311
Minor	13	9	17
None	1	9	12
Total	2845	2882	3098

* Number of Fixed Wing, Single Reciprocating Engine, General Aviation Aircraft

Table 39 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	636	318	572	2143	3669
Business	109	31	51	197	388
Corporate/Executive	10	0	2	9	21
Aerial Application	28	38	39	218	323
Instructional	49	25	72	379	525
Other	75	41	57	160	333
Total	907	453	793	3106	5259
Percent	17.2	8.6	15.1	59.1	

Table 40 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	3	7	32	300*	342*	12.1
Dragged Wingtip Pod or Float	0	0	0	2	2	0.1
Wheels-up Landing	0	0	1	26	27	1.0
Wheels-down Landing in Water	1	0	1	3	5	0.2
Gear Collapsed	0	0	2	36	38	1.3
Gear Retracted	0	0	0	17	17	0.6
Hard Landing	2	4	13	136	155	5.5
Nose Over/Down	0	1	7	86	94	3.3
Overshoot	4	5	27	121+	157+	5.6
Undershoot	8	16	20	55	99	3.5
Col. Between Aircraft-Both in Flight	11	3	2	10	26	0.9
Col. Between Aircraft-One Airborne	0	0	1	0*+	1*+	0.0
Col. Between Aircraft-Both on Ground	0	0	1	5	6	0.2
Col. with Ground/Water-Controlled	89	14	29	22	154	5.5
Col. with Ground/Water-Uncontrolled	77	7	5	5	94	3.3
Col. with Wires/Poles	37	18	13	39	107	3.8
Col. with Trees	50	23	30	39	142	5.0
Col. with Residence/s	1	0	0	0	1	0.0
Col. with Building/s	0	1	0	5	6	0.2
Col. with Fence, Fenceposts	0	0	6	32	38	1.3
Col. with Electronic Towers	4	1	0	0	5	0.2
Col. with Runway or Approach Lights	1	0	0	4	5	0.2
Col. with Airport Hazard	0	0	0	4	4	0.1
Col. with Animals	0	0	0	5	5	0.2
Col. with Crop	1	0	3	10	14	0.5
Col. with Ditches	0	0	2	23	25	0.9
Col. with Snowbank	0	0	0	7	7	0.2
Col. with Parked Aircraft (Unattended)	0	0	0	11	11	0.4
Col. with Automobile	1	0	2	4	7	0.2
Col. with Dirt Bank	0	2	8	22	32	1.1
Col. with Other	3	3	8	49	63	2.2
Bird Strike	0	0	0	1	1	0.0
Stall	32	37	15	29	113	4.0

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted as only one accident in the totals at the end of the table.

+ In one collision between aircraft, one of the two aircraft involved experienced an overshoot, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted as one accident in the totals at the end of the table.

Table 40 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Stall/Spin	51	7	4	1	63	2.2
Stall/Spiral	4	0	0	0	4	0.1
Stall/Mush	14	17	23	64	118	4.2
Fire or Explosion in Flight	3	0	3	3	9	0.3
Fire or Explosion on Ground	0	0	1	2	3	0.1
Airframe Failure	1	0	0	0	1	0.0
Airframe Failure in Flight	36	0	2	5	43	1.5
Airframe Failure on Ground	0	0	0	5	5	0.2
Engine Tearaway	0	0	0	1	1	0.0
Engine Failure or Malfunction	45	94	190	392	721	25.5
Propeller Failure	0	2	3	13	18	0.6
Prop/Rotor Accident to Person	1	3	0	0	4	0.1
Turbulence	2	2	2	3	9	0.3
Ditching	1	0	0	2	3	0.1
Missing Aircraft Not Recovered	10	0	0	0	10	0.4
Miscellaneous/Other	1	1	0	2	4	0.1
Undetermined	3	0	0	2	5	0.2
No. of Accidents	497	268	456	1601	2822	
Percent	17.6	9.5	16.2	56.7		

Table 41 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1981

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Starting Engine/s	0	1	0	0	1	0.0
Idling Engine/s	0	3	2	0	5	0.2
Engine Runup	0	1	0	0	1	0.0
Other	0	0	1	0	1	0.0
Taxi:						
To Takeoff	3	26	1	0	30	1.1
From Landing	3	31	1	0	35	1.2
Other	0	8	0	0	8	0.3
Takeoff:						
Run	17	134	2	0	153	5.4
Initial Climb	133	270	1	0	404	14.2
Aborted (Fixed-Wing)	4	51	0	0	55	1.9
Other	3	0	0	0	3	0.1
Inflight:						
Climb to Cruise	31	38	0	0	69	2.4
Normal Cruise	146	240	1	0	387	13.6
Descending	17	36	0	0	53	1.9
Holding (IFR)	0	1	0	0	1	0.0
Acrobatics	40	10	0	0	50	1.8
Buzzing	23	6	0	0	29	1.0
Uncontrolled Descent	68	2	0	0	70	2.5
Low Pass	32	25	0	0	57	2.0
Other	70	36	0	0	106	3.7
En Route to Treat Crop	2	4	0	0	6	0.2
En Route to Reloading Area	1	3	0	0	4	0.1
Survey Field/Area	3	3	0	0	6	0.2
Starting Swath Run	8	7	0	0	15	0.5
Swath Run	15	21	0	0	36	1.3
Flareout for Swath Run	2	0	0	0	2	0.1
Pullup from Swath Run	13	19	0	0	32	1.1
Procedure Turnaround	28	26	0	0	54	1.9
Cleanup Swath	2	3	0	0	5	0.2
Maneuver to Avoid Obstruction	0	1	0	0	1	0.0
Return to Strip	1	10	0	0	11	0.4
Landing:						
Traffic Pattern-Circling	34	52	1	0	87	3.1
Final Approach (VFR)	45	135	2	0	182	6.4
Initial Approach	3	0	0	0	3	0.1
Final Approach (IFR)	7	4	0	0	11	0.4
Level Off/Touchdown	50	381	1	1	433	15.2
Roll (Fixed Wing)	17	333	0	0	350	12.3
Go-Around (VFR)	20	42	0	0	62	2.2
Missed Approach (IFR)	2	1	0	0	3	0.1
Other	2	4	0	0	6	0.2
Unknown/Not Reported	16	2	0	0	18	0.6
No. of Aircraft	861	1970	13	1	2845	
Percent	30.3	69.2	0.5	0.0		

Table 42 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Failed to Obtain/Maintain Flying Speed	305	10.8
Pilot-Inadequate Preflight Prep. and/or Planning	283	10.0
Powerplant-Failure for Undetermined Reasons	205	7.3
Pilot-Mismanagement of Fuel	199	7.1
Pilot-Misjudged Distance and Speed	158	5.6
Fuel Exhaustion	156	5.5
Pilot-Selected Unsuitable Terrain	153	5.4
Pilot-Improper Level Off	148	5.2
Pilot-Failed to Maintain Directional Control	144	5.1
Pilot-Continued VFR Flight into Adverse Weather Cond.	137	4.9

Table 43 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	3309	517	978	955
1976	3321	512	905	893
1977	3387	544	1000	991
1978	3440	544	1150	997
1979	3074	475	879	866
1980	2857	462	888	876
1981	2822	497	919	907

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown*	
		Total	Fatal
1975	22,881,000	14.46	2.26
1976	23,442,000	14.16	2.18
1977	23,798,000	14.23	2.28
1978	26,556,000	12.95	2.04
1979	29,128,000	10.55	1.63
1980	26,876,000	10.63	1.72
1981	26,347,000	10.71	1.89

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (1), 1976 (2), 1977 (1), 1978 (2), 1980 (1)
Fatal - 1975 (1), 1976 (1), 1977 (1), 1978 (2), 1980 (1)

Table 44 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1981 AND 1976 - 1980

Type of Accident	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Engine Failure or Malfunction	721	25.5	809.0	25.2
Col. with Object	472	16.7	500.4	15.6
Ground-Water Loop-Swerve	342	12.1	432.4	13.4
Hard Landing	155	5.5	209.4	6.5
Stall/Mush	118	4.2	157.2	4.9
Col. with Ground/Water-Controlled	153	5.4	152.6	4.7
Overshoot	157	5.6	151.0	4.7
Nose Over/Down	94	3.3	125.2	3.9
Stall	113	4.0	113.4	3.5
Col. with Ground/Water-Uncontrolled	94	3.3	103.4	3.2
Undershoot	99	3.5	94.8	2.9
Stall/Spin	63	2.2	76.8	2.4
Airframe Failure in Flight	43	1.5	47.0	1.5
Wheels-up Landing	27	1.0	40.4	1.3
Gear Collapsed	38	1.3	34.4	1.1
(All Other Types)	133	4.7	168.4	5.2
Total	2822	100.0	3215.8	100.0

Table 45 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1981 AND 1976 - 1980

Phase of Operation	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Landing	1137	40.0	1352.2	41.6
In Flight	994	34.9	1102.4	33.9
Takeoff	615	21.6	651.4	20.0
Taxi	73	2.6	106.6	3.3
Static	8	0.3	19.0	0.6
Not Reported	18	0.6	18.2	0.6
Total	2845	100.0	3249.8	100.0

FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES

Tables 46 through 53 describe the characteristics of accidents involving fixed wing aircraft with two or more reciprocating engines. These aircraft were involved in 8.3 percent of general aviation accidents in 1981, and 9.1 percent of all fixed wing aircraft accidents. The 1981 accident rate for this category of aircraft was the lowest among the seven years listed in Table 51. The 1981 fatal accident rate, 1.94 per 100,000 hours flown, was the lowest since 1977. Both the number of engine failure/malfunction accidents (98) and the percentage of such accidents among all types (33.9 percent) represented substantial increases from the mean for the prior five year period (See Table 52).

Table 46 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	94	99	109
Involved Serious Injury	20	27	26
Involved Minor Injury	27	31	20
Involved No Injury	148	173	204
Total	289	330	359
Fatalities			
Passenger	108	137	131
Crew	110	119	120
Other Persons	2	6	11
Total	220	262	262
Aircraft Damaged*			
Destroyed	134	137	133
Substantial	156	191	226
Minor	0	2	2
None	0	1	1
Total	290	331	362

* Number of Fixed Wing, Multiple Reciprocating Engine, General Aviation Aircraft

Table 47 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	71	22	27	161	281
Business	36	12	8	63	119
Corporate/Executive	33	8	11	56	108
Aerial Application	0	0	1	5	6
Instructional	7	1	4	25	37
Other	71	9	11	61	152
Total	218	52	62	371	703
Percent	31.0	7.4	8.8	52.8	

Table 48 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	0	12	12	4.2
Wheels-up Landing	0	1	0	17	18	6.2
Gear Collapsed	0	0	0	9	9	3.1
Gear Retracted	0	0	1	16	17	5.9
Hard Landing	0	0	0	9	9	3.1
Nose Over/Down	0	0	0	1	1	0.3
Overshoot	0	0	1	2	3	1.0
Undershoot	1	1	0	6	8	2.8
Col. Between Aircraft-Both in Flight	2	0	0	2	4	1.4
Col. Between Aircraft-Both on Ground	0	0	0	2	2	0.7
Col. with Ground/Water-Controlled	18	1	0	3	22	7.6
Col. with Ground/Water-Uncontrolled	19	1	0	0	20	6.9
Col. with Wires/Poles	1	1	2	1	5	1.7
Col. with Trees	7	1	0	5	13	4.5
Col. With Residence/s	1	0	0	0	1	0.3
Col. with Building/s	1	0	0	1	2	0.7
Col. with Fence, Fenceposts	0	0	1	1	2	0.7
Col. with Electronic Towers	3	0	0	0	3	1.0
Col. with Airport Hazard	0	0	0	1	1	0.3
Col. with Ditches	0	0	1	1	2	0.7
Col. with Snowbank	0	0	0	2	2	0.7
Col. with Parked Aircraft (Unattended)	0	0	0	1	1	0.3
Col. with Other	0	0	0	2	2	0.7
Stall	5	2	0	1	8	2.8
Stall/Spin	2	0	0	0	2	0.7
Stall/Mush	4	1	1	0	6	2.1
Fire or Explosion in Flight	1	0	1	1	3	1.0
Fire or Explosion on Ground	0	0	0	3	3	1.0
Airframe Failure in Flight	5	0	0	0	5	1.7
Airframe Failure on Ground	0	0	0	1	1	0.3
Engine Failure or Malfunction	23	11	19	45	98	33.9
Ditching	0	0	0	1	1	0.3
Undetermined	1	0	0	2	3	1.0
No. of Accidents	94	20	27	148	289	
Percent	32.5	6.9	9.3	51.2		

Table 49 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Static:				
Starting Engine/s	0	1	1	0.3
Taxi:				
To Takeoff	0	2	2	0.7
From Landing	0	4	4	1.4
Takeoff:				
Run	0	6	6	2.1
Initial Climb	34	12	46	15.9
Aborted (Fixed-Wing)	1	5	6	2.1
Inflight:				
Climb to Cruise	5	5	10	3.4
Normal Cruise	23	22	45	15.5
Descending	4	4	8	2.8
Acrobatics	1	0	1	0.3
Uncontrolled Descent	14	0	14	4.8
Low Pass	1	1	2	0.7
Other	11	1	12	4.1
Landing:				
Traffic Pattern-Circling	3	3	6	2.1
Final Approach (VFR)	10	12	22	7.6
Initial Approach	2	0	2	0.7
Final Approach (IFR)	10	1	11	3.8
Level Off/Touchdown	3	32	35	12.1
Roll (Fixed Wing)	0	36	36	12.4
Go-Around (VFR)	3	5	8	2.8
Missed Approach (IFR)	4	1	5	1.7
Other	0	2	2	0.7
Unknown/Not Reported	5	1	6	2.1
No. of Aircraft	134	156	290	
Percent	46.2	53.8		

Table 50 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - MULTIPLE, RECIPROCATING ENGINE
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	36	12.5
Pilot-Mismanagement of Fuel	27	9.3
Powerplant-Failure for Undetermined Reasons	26	9.0
Pilot-Failed to Obtain/Maintain Flying Speed	22	7.6
Material Failure	22	7.6
Fuel Exhaustion	21	7.3
Personnel-Inadequate Maintenance and Inspection	21	7.3
Improper Emergency Procedures	19	6.6
Pilot-Failed to Follow Approved Procedures, Directives	19	6.6
Undetermined	18	6.2

Table 51 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1975 - 1981

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Aircraft in this Category
1975	312	84	208	208
1976	346	103	238	231
1977	324	73	173	166
1978	367	112	295	292
1979	359	109	262	251
1980	330	99	262	256
1981	289	94	220	218

		Accident Rate per 100,000* Aircraft Hours Flown	
Year	Hours Flown	Total	Fatal
1975	3,918,000	7.96	2.14
1976	4,085,000	8.42	2.52
1977	4,320,000	7.50	1.69
1978	4,496,000	8.16	2.49
1979	5,098,000	7.04	2.14
1980	4,491,000	7.35	2.20
1981	4,833,000	5.98	1.94

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1976 (2)
Fatal - none

Table 52 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1981 AND 1976 - 1980

	1981		1976 - 1980	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	98	33.9	81.2	23.5
Col. with Object	34	11.8	41.6	12.1
Ground-Water Loop-Swerve	12	4.2	26.4	7.6
Wheels-up Landing	18	6.2	25.4	7.4
Gear Retracted	17	5.9	24.0	7.0
Col. with Ground/Water-Controlled	22	7.6	21.8	6.3
Col. with Ground/Water-Uncontrolled	20	6.9	19.2	5.6
Overshoot	3	1.0	13.4	3.9
Hard Landing	9	3.1	13.0	3.8
Gear Collapsed	9	3.1	11.8	3.4
Undershoot	8	2.8	10.6	3.1
Airframe Failure in Flight	5	1.7	7.4	2.1
Stall	8	2.8	6.2	1.8
Stall/Spin	2	0.7	6.0	1.7
Fire or Explosion in Flight	3	1.0	5.8	1.7
Stall/Mush	6	2.1	5.6	1.6
Col. Between Aircraft-Both in Flight	4	1.4	4.0	1.2
(All Other Types)	11	3.8	21.8	6.3
Total	289	100.0	345.2	100.0

Table 53 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1981 AND 1976 - 1980

	1981		1976 - 1980	
Phase of Operation	No.	Percent	Mean	Percent
Landing	127	43.8	165.8	47.9
In Flight	92	31.7	97.2	28.1
Takeoff	58	20.0	60.6	17.5
Taxi	6	2.1	12.8	3.7
Not Reported	6	2.1	7.2	2.1
Static	1	0.3	2.4	0.7
Total	290	100.0	346.0	100.0

FIXED WING AIRCRAFT - TURBOPROP

The 1981 accident rate for turboprop airplanes increased by 13.4 percent from 1980, and the fatal accident rate went up by more than 47 percent. Accident statistics for fixed wing, turboprop aircraft are presented in tables 54 through 61. In spite of the substantial increases in accident rates for turboprop airplanes, these rates are well below those for the other (reciprocating engine) propeller equipped airplanes. (Compare Tables 43 and 51 with Table 59). A much higher percentage of accidents involving turboprop airplanes result in fatal injuries than in all general aviation aircraft (34.7 percent compared to 18.7 percent). Similarly, while 31.0 percent of persons aboard accident-involved turboprop airplanes are fatally injured, only 18.8 percent of the occupants of all general aviation aircraft receive fatal injuries. The percentages of occupants receiving no injuries are approximately the same in both groups, however.

Table 54 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - TURBOPROP
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	17	11	14
Involved Serious Injury	4	4	2
Involved Minor Injury	0	6	5
Involved No Injury	28	20	21
Total	49	41	42
Fatalities			
Passenger	27	25	17
Crew	21	10	13
Other Persons	13	3	1
Total	61	38	31
Aircraft Damaged*			
Destroyed	19	12	17
Substantial	30	28	23
Minor	0	1	2
Total	49	41	42

* Number of Turboprop General Aviation Airplanes

Table 55 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - TURBOPROP
1981

Kind of Flying	Degree of Injury				Total
	Fatal	Serious	Minor	None	
Personal	7	2	0	22	31
Business	0	0	0	10	10
Corporate/Executive	31	11	1	34	77
Aerial Application	2	1	0	5	8
Instructional	0	0	0	5	5
Other	8	3	1	12	24
Total	48	17	2	88	155
Percent	31.0	11.0	1.3	56.8	

Table 56 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - TURBOPROP
1981

Type of Accident	Degree of Injury			Accidents	
	Fatal	Serious	None	No.	Percent
Ground-Water Loop-Swerve	0	0	7	7	14.3
Wheels-up Landing	0	0	3	3	6.1
Gear Collapsed	0	0	1	1	2.0
Gear Retracted	0	0	3	3	6.1
Hard Landing	0	1	3	4	8.2
Overshoot	0	0	1	1	2.0
Undershoot	0	0	1	1	2.0
Col. Between Aircraft-Both in Flight	1	0	0	1	2.0
Col. Between Aircraft-Both on Ground	0	0	1	1	2.0
Col. with Ground/Water-Controlled	4	0	0	4	8.2
Col. with Ground/Water-Uncontrolled	5	0	0	5	10.2
Col. with Trees	2	1	1	4	8.2
Col. with Other	1	0	0	1	2.0
Stall/Spin	1	0	0	1	2.0
Airframe Failure in Flight	1	0	0	1	2.0
Airframe Failure on Ground	0	0	1	1	2.0
Engine Failure or Malfunction	2	2	6	10	20.4
No. of Accidents	17	4	28	49	
Percent	34.7	8.2	57.1		

Table 57 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - TURBOPROP
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Takeoff:				
Run	0	3	3	6.1
Initial Climb	3	4	7	14.3
Inflight:				
Climb to Cruise	1	1	2	4.1
Normal Cruise	2	1	3	6.1
Descending	2	0	2	4.1
Uncontrolled Descent	3	0	3	6.1
Other	3	1	4	8.2
En Route to Treat Crop	1	0	1	2.0
Starting Swarth Run	0	1	1	2.0
Swath Run	1	0	1	2.0
Procedure Turnaround	1	0	1	2.0
Landing:				
Final Approach (VFR)	0	1	1	2.0
Final Approach (IFR)	2	0	2	4.1
Level Off/Touchdown	0	8	8	16.3
Roll (Fixed Wing)	0	9	9	18.4
Other	0	1	1	2.0
No. of Aircraft	19	30	49	
Percent	38.8	61.2		

Table 58 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - TURBOPROP
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Material Failure	6	12.2
Pilot-Improper IFR Operation	4	8.2
Pilot-Inadequate Preflight Prep. and/or Planning	4	8.2
Powerplant Failure for Undetermined Reasons	4	8.2
Fuel Exhaustion	3	6.1
Pilot-Failed to Follow Approved Procedures, Directives	3	6.1
Pilot-Improper Level Off	3	6.1
Pilot-Improper Inflight Decisions or Planning	3	6.1
Pilot-Mismanagement of Fuel	3	6.1
Undetermined	3	6.1

Table 59 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - TURBOPROP
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	16	10	35	35
1976	22	8	19	18
1977	29	14	61	59
1978	28	11	32	31
1979	42	14	31	30
1980	41	11	38	35
1981	49	17	61	48

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	900,000	1.78	1.11
1976	901,000	2.44	0.89
1977	1,093,000	2.65	1.28
1978	1,056,000	2.65	1.04
1979	1,375,000	3.05	1.02
1980	1,524,000	2.69	0.72
1981	1,606,000	3.05	1.06

Table 60 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - TURBOPROP
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Engine Failure or Malfunction	10	20.4	5.6	17.3
Col. with Object	5	10.2	3.8	11.7
Col. with Ground/Water-Controlled	4	8.2	3.0	9.3
Wheels-up Landing	3	6.1	3.0	9.3
Ground-Water Loop-Swerve	7	14.3	2.2	6.8
Col. with Ground/Water-Uncontrolled	5	10.2	2.2	6.8
Airframe Failure in Flight	1	2.0	2.0	6.2
Gear Retracted	3	6.1	1.4	4.3
Stall/Mush	0	0.0	1.4	4.3
Undershoot	1	2.0	1.2	3.7
Hard Landing	4	8.2	1.2	3.7
Gear Collapsed	1	2.0	1.2	3.7
Prop/Rotor Accident to Person	0	0.0	0.8	2.5
Stall	0	0.0	0.6	1.9
Col. Between Aircraft-Both in Flight	1	2.0	0.6	1.9
(All Other Types)	4	8.2	2.2	6.8
Total	49	100.0	32.4	100.0

Table 61 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - TURBOPROP
1981 AND 1976 - 1980

	1981		1976 - 1980	
Phase of Operation	No.	Percent	Mean	Percent
Landing	21	42.9	17.6	54.3
In Flight	18	36.7	9.0	27.8
Takeoff	10	20.4	4.0	12.3
Static	0	0.0	1.0	3.1
Taxi	0	0.0	0.6	1.9
Not Reported	0	0.0	0.2	0.6
Total	49	100.0	32.4	100.0

FIXED WING AIRCRAFT - TURBOJET

Tables 62 through 69 present data on accidents involving turbojet airplanes. Although the number of accidents dropped to seven in 1981 from 12 in 1980, the number of fatal accidents increased (from three to four), as did the number of fatalities (from seven in 1980 to 17 in 1981). Both the total and fatal accident rates for turbojet airplanes (0.53 and 0.30 per 100,000 hours flown respectively) are the lowest among all the categories presented in this publication. Engine failure or malfunction accidents, which accounted for nearly 26 percent of all general aviation accidents, composed only 5.6 percent of fixed wing turbojet accidents between 1976 and 1981. There were none in 1981.

Table 62 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - TURBOJET
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	4	3	3
Involved Serious Injury	1	1	1
Involved Minor Injury	0	2	2
Involved No Injury	2	6	7
Total	7	12	13
Fatalities			
Passenger	10	2	4
Crew	7	5	5
Other Persons	0	0	0
Total	17	7	9
Aircraft Damaged*			
Destroyed	3	3	5
Substantial	3	9	8
Minor	1	0	0
Total	7	12	13

* Number of Turbojet General Aviation Airplanes

Table 63 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - TURBOJET
1981

Kind of Flying	Degree of Injury			
	Fatal	Serious	None	Total
Personal	0	1	0	1
Corporate/Executive	16	0	0	16
Instructional	0	0	3	3
Other	1	1	6	8
Total	17	2	9	28
Percent	60.7	7.1	32.1	

Table 64 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - TURBOJET
1981

Type of Accident	Degree of Injury			Accidents	
	Fatal	Serious	None	No.	Percent
Wheels-up Landing	0	0	1	1	14.3
Overshoot	0	0	1	1	14.3
Col. with Ground/Water-Controlled	1	0	0	1	14.3
Col. with Ground/Water-Uncontrolled	1	0	0	1	14.3
Col. with Other	1	0	0	1	14.3
Bird Strike	1	0	0	1	14.3
Miscellaneous Other	0	1	0	1	14.3
No. of Accidents	4	1	2	7	
Percent	57.1	14.3	28.6		

Table 65 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - TURBOJET
1981

Phase of Operation	Degree of Damage			Aircraft	
	Des.	Sub.	Minor	No.	Percent
Inflight:					
Climb to Cruise	0	0	1	1	14.3
Uncontrolled Descent	1	0	0	1	14.3
Other	0	1	0	1	14.3
Landing:					
Final Approach (IFR)	1	0	0	1	14.3
Level Off/Touchdown	0	2	0	2	28.6
Go-Around (VFR)	1	0	0	1	14.3
No. of Aircraft	3	3	1	7	
Percent	42.9	42.9	14.3		

Table 66 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - TURBOJET
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Bird Collision	2	28.6
Pilot-Attempted Op'n Beyond Exper/Ability Level	1	14.3
Pilot-Delayed in Initiating Go-Around	1	14.3
Pilot-Diverted Attention from Op'n of Aircraft	1	14.3
Pilot-Failed to Obtain/Maintain Flying Speed	1	14.3
Pilot-Failed to Follow Approved Procedures, Directives	1	14.3
Pilot-Improper In-Flight Decisions or Planning	1	14.3
Pilot-Inadequate Supervision of Flight	1	14.3
Pilot-Misjudged Distance and Speed	1	14.3
Pilot-Failed to Initiate Go-Around	1	14.3
Dual Student-Failed to Extend Landing Gear	1	14.3
Porduction-Design Personnel-Other	1	14.3
Airframe-Landing Gear-Other	1	14.3
Weather-Turbulence in Flight, Clear Air	1	14.3
Foreign Material Affecting Normal Operations	1	14.3

Table 67 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - TURBOJET
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	13	1	1	1
1976	13	5	19	18
1977	13	5	18	18
1978	20	5	17	15
1979	13	3	9	9
1980	12	3	7	7
1981	7	4	17	17

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	687,000	1.89	0.15
1976	752,000	1.73	0.66
1977	943,000	1.38	0.53
1978	1,061,000	1.89	0.47
1979	1,120,000	1.16	0.27
1980	1,244,000	0.96	0.24
1981	1,318,000	0.53	0.30

Table 68 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - TURBOJET
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Ground-Water Loop-Swerve	0	0.0	1.8	12.7
Col. with Object	1	14.3	1.6	11.3
Undershoot	0	0.0	1.2	8.5
Airframe Failure in Flight	0	0.0	1.2	8.5
Col. with Ground/Water-Controlled	1	14.3	1.0	7.0
Col. with Ground/Water-Uncontrolled	1	14.3	1.0	7.0
Hard Landing	0	0.0	1.0	7.0
Overshoot	1	14.3	1.0	7.0
Engine Failure or Malfunction	0	0.0	0.8	5.6
Wheels-up Landing	1	14.3	0.6	4.2
Stall	0	0.0	0.6	4.2
Fire or Explosion in Flight	0	0.0	0.6	4.2
Bird Strike	0	0.0	0.4	2.8
(All Other Types)	2	28.6	1.4	9.9
Total	7	100.0	14.2	100.0

Table 69 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - TURBOJET
1981 AND 1976 - 1980

Phase of Operation	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Landing	4	57.1	8.0	56.3
Takeoff	0	0.0	3.2	22.5
In Flight	3	42.9	2.4	16.9
Taxi	0	0.0	0.2	1.4
Static	0	0.0	0.2	1.4
Not Reported	0	0.0	0.2	1.4
Total	7	100.0	14.2	100.0

ALL ROTORCRAFT

Tables 70 through 81 present statistics for all accidents involving rotorcraft. The annual number of rotorcraft accidents has remained fairly constant over the seven years between 1975 and 1981 (See Table 78). Over this period, estimated flight hours have increased each year, resulting in overall accident rates which show steady and substantial improvement. 1981 was the third consecutive year in which the fatal accident rate decreased. The 1.30 fatal accidents per 100,000 rotorcraft flight hours in 1981 is a 29.7 percent improvement over the previously best rate of 1975. Rotorcraft accidents in 1981 tended to occur more frequently during in flight phases of operation than did airplane accidents. More than 56 percent of rotorcraft accidents and approximately 35 percent of fixed wing accidents happened in flight (Compare Tables 36 and 80).

Table 70 - SUMMARY OF LOSSES
ALL ROTORCRAFT
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	30	40	35
Involved Serious Injury	36	34	32
Involved Minor Injury	56	54	49
Involved No Injury	135	135	151
Total	257	263	267
Fatalities			
Passenger	21	20	20
Crew	31	37	32
Other Persons	3	3	6
Total	55	60	58
Aircraft Damaged*			
Destroyed	85	80	68
Substantial	172	182	196
Minor	0	0	2
None	0	1	1
Total	257	263	267

* Number of General Aviation Rotorcraft

Table 71 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL ROTORCRAFT
1981

Role of Person	Degree of Injury: Fatal	Serious	Minor	None	Total
Pilot	28	32	49	148	257
Copilot	0	0	0	1	1
Dual Student	2	3	5	19	29
Check Pilot	0	0	1	1	2
Extra Crew	1	0	0	2	3
Passengers	21	8	28	71	128
Total Aboard	52	43	83	242	420
Other Aircraft*	0	0	1	0	1
Other Ground	3	1	3	0	7
Grand Total	55	44	87	242	428
Percent	12.9	10.3	20.3	56.5	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 72 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL ROTORCRAFT
1981

Kind of Flying	Degree of Injury: Fatal	Serious	Minor	None	Total
Personal	13	14	24	52	103
Business	0	1	3	9	13
Corporate/Executive	9	6	4	11	30
Aerial Application	4	7	10	34	55
Instructional	7	4	13	49	73
Other	19	11	29	87	146
Total	52	43	83	242	420
Percent	12.4	10.2	19.8	57.6	

Table 73 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL ROTORCRAFT
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Hard Landing	1	4	5	18	28	10.9
Nose Over/Down	0	0	1	2	3	1.2
Roll Over	1	1	8	8	18	7.0
Col. Between Aircraft-Both in Flight	0	0	1	0	1	0.4
Col. with Ground/Water-Controlled	3	1	6	19	29	11.3
Col. with Ground/Water-Uncontrolled	4	6	1	3	14	5.4
Col. with Wires/Poles	6	4	6	7	23	8.9
Col. with Trees	2	0	0	1	3	1.2
Col. with Building/s	0	0	0	1	1	0.4
Col. with Runway or Approach Lights	0	0	0	1	1	0.4
Col. with Crop	0	0	1	0	1	0.4
Col. with Ditches	0	0	0	1	1	0.4
Col. with Automobile	0	0	0	1	1	0.4
Col. with Dirt Bank	0	0	0	1	1	0.4
Col. with Other	0	0	2	2	4	1.6
Bird Strike	1	0	0	0	1	0.4
Fire or Explosion in Flight	1	0	0	0	1	0.4
Airframe Failure	0	0	0	1	1	0.4
Airframe Failure in Flight	2	0	1	1	4	1.6
Airframe Failure on Ground	0	0	1	0	1	0.4
Engine Failure or Malfunction	5	12	17	50	84	32.7
Propeller/Rotor Failure	0	0	0	1	1	0.4
Propeller	0	0	0	1	1	0.4
Tail Rotor Failure	1	5	3	7	16	6.2
Main Rotor Failure	2	0	1	8	11	4.3
Prop/Rotor Accident to Person	0	1	0	0	1	0.4
Turbulence	0	0	1	0	1	0.4
Miscellaneous/Other	0	2	1	1	4	1.6
Undetermined	1	0	0	0	1	0.4
No. of Accidents	30	36	56	135	257	
Percent	11.7	14.0	21.8	52.5		

Table 74 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL ROTORCRAFT
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Static:				
Starting Engine/s	1	0	1	0.4
Idling Rotors	0	1	1	0.4
Taxi:				
Other	0	1	1	0.4
Ground Taxi, Other	0	1	1	0.4
Aerial Taxi to Takeoff	0	3	3	1.2
Aerial Taxi, Other	2	3	5	1.9
Takeoff:				
Initial Climb	1	10	11	4.3
Vertical	5	13	18	7.0
Running (Rotorcraft/VTOL-STOL)	0	2	2	0.8
Aborted (Rotorcraft/VTOL)	0	1	1	0.4
Aborted (Rotorcraft/STOL)	0	2	2	0.8
Other	1	0	1	0.4
Inflight:				
Climb to Cruise	2	6	8	3.1
Normal Cruise	20	24	44	17.1
Descending	1	2	3	1.2
Hovering	5	14	19	7.4
Autorotative Descent	1	2	3	1.2
Buzzing	0	1	1	0.4
Uncontrolled Descent	2	1	3	1.2
Low Pass	4	3	7	2.7
Other	8	8	16	6.2
En Route to Treat Crop	1	0	1	0.4
En Route to Reloading Area	1	1	2	0.8
Starting Swath Run	4	3	7	2.7
Swath Run	6	10	16	6.2
Pullup from Swath Run	2	1	3	1.2
Procedure Turnaround	1	9	10	3.9
Cleanup Swath	1	0	1	0.4
Maneuver to Avoid Obstruction	1	0	1	0.4
Landing:				
Traffic Pattern-Circling	3	2	5	1.9
Final Approach (VFR)	3	5	8	3.1
Level Off/Touchdown	1	7	8	3.1
Roll-On/Run-On (Rotorcraft)	1	1	2	0.8
Power-On Landing (Rotorcraft)	3	13	16	6.2
Power-Off Autorotative Ldg	4	20	24	9.3
Other	0	2	2	0.8
No. of Aircraft	85	172	257	
Percent	33.1	66.9		

Table 75 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL ROTORCRAFT
1981

Light Conditions	Type of Weather		Accident	
	VFR	IFR	No.	Percent
Dawn	6	0	6	2.3
Daylight	216	9	225	87.5
Dusk	12	1	13	5.1
Night (Dark)	9	2	11	4.3
Night (Moonlight-Bright)	2	0	2	0.8
No. of Accidents	245	12	257	
Percent	95.3	4.7		

Table 76 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL ROTORCRAFT
1981

Proximity to Airport	Flight Plan						Aircraft	
	None	VFR	VFR Flight Following	Special VFR	Unk/NR	Other	No.	Percent
On Airport	55	0	0	0	1	0	56	21.8
On Heliport	3	1	0	0	0	2	6	2.3
On Barge/Ship/Platform	1	0	0	0	0	0	1	0.4
In Traffic Pattern	4	0	0	0	0	0	4	1.6
Miles from Airport:								
Within 1/4	4	0	0	0	0	0	4	1.6
1/4+ to 1/2	3	0	0	0	0	0	3	1.2
3/4+ to 1	3	0	0	0	0	0	3	1.2
1+ to 2	5	0	0	0	0	0	5	1.9
2+ to 3	6	0	0	0	0	0	6	2.3
3+ to 4	2	0	0	0	0	0	2	0.8
4+ to 5	2	0	0	0	0	0	2	0.8
Beyond 5	115	5	1	1	0	2	124	48.2
Unknown/Not Reported	40	1	0	0	0	0	41	16.0
No. of Aircraft	243	7	1	1	1	4	257	
Percent	94.6	2.7	0.4	0.4	0.4	1.6		

Table 77 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL ROTORCRAFT
1981

Detailed Cause	Number of Citations	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	30	11.7
Material Failure	28	10.9
Powerplant-Failure for Undetermined Reasons	22	8.6
Pilot-Failed to Maintain Adequate Rotor RPM	22	8.6
Pilot-Failed to See and Avoid Objects or Obstructions	20	7.8
Pilot-Improper Operation of Flight Controls	17	6.6
Pilot-Mismanagement of Fuel	17	6.6
Fuel Exhaustion	17	6.6
Personnel-Inadequate Maintenance and Inspection	14	5.4
Pilot-Inadequate Supervision of Flight	14	5.4

Table 78 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL ROTORCRAFT
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard General Aviation Rotorcraft
1975	266	18	30	28
1976	249	26	39	39
1977	247	22	28	25
1978	285	41	58	50
1979	267	35	58	52
1980	263	40	60	57
1981	257	30	55	52

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	974,000	27.31	1.85
1976	1,103,000	22.57	2.36
1977	1,170,000	21.11	1.88
1978	1,397,000	20.40	2.93
1979	1,522,000	17.54	2.30
1980	1,891,000	13.91	2.12
1981	2,303,000	11.16	1.30

Table 79 - MOST PREVALENT TYPES OF ACCIDENTS
ALL ROTORCRAFT
1981 AND 1976 - 1980

Type of Accident	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Engine Failure or Malfunction	84	32.7	78.4	29.9
Col. with Object	36	14.0	48.0	18.3
Hard Landing	28	10.9	25.0	9.5
Col. with Ground/Water-Controlled	29	11.3	21.4	8.2
Col. with Ground/Water-Uncontrolled	14	5.4	17.2	6.6
Tail Rotor Failure	16	6.2	17.2	6.6
Roll Over	18	7.0	16.8	6.4
Main Rotor Failure	11	4.3	11.4	4.3
Airframe Failure in Flight	4	1.6	8.8	3.4
Miscellaneous/Other	4	1.6	4.0	1.5
(All Other Types)	13	5.1	14.0	5.3
Total	257	100.0	262.2	100.0

Table 80 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL ROTORCRAFT
1981 AND 1976 - 1980

Phase of Operation	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
In Flight	145	56.4	150.4	57.4
Landing	65	25.3	52.6	20.1
Takeoff	35	13.6	43.8	16.7
Taxi	10	3.9	9.6	3.7
Static	2	0.8	4.2	1.6
Not Reported	0	0.0	1.6	0.6
Total	257	100.0	262.2	100.0

Table 81 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL ROTORCRAFT
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	163	63.4	170.8	65.1
Terrain	48	18.7	68.6	26.2
Powerplant	63	24.5	56.2	21.4
Rotorcraft	40	15.6	40.8	15.6
Personnel	40	15.6	34.6	13.2
Weather	37	14.4	30.4	11.6
Miscellaneous	21	8.2	16.2	6.2
Undetermined	9	3.5	9.6	3.7
Instruments/Equipment and Accessories	1	0.4	2.2	0.8
Systems	4	1.6	1.6	0.6
Airport/Airways/Facilities	3	1.2	1.4	0.5
Airframe	0	0.0	1.2	0.5
Landing Gear	2	0.8	1.0	0.4
No. of Accidents with Cause(s) Assigned	257		262.2	

ROTORCRAFT - RECIPROCATING ENGINE(S)

The characteristics of accidents involving reciprocating engine powered rotorcraft are tabulated in Tables 82 through 89. In 1981, accidents in this category accounted for approximately 70.0 percent of all rotorcraft accidents and fatal accidents, and 58 percent of the resulting fatal injuries. While the numbers of accidents and fatal accidents in 1981 were only slightly lower than in 1980, the flight hour estimate was 22 percent higher, producing total and fatal accident rates that were reduced from 1980 by 19.9 percent and 21.9 percent respectively.

Table 82 - SUMMARY OF LOSSES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	21	22	21
Involved Serious Injury	19	24	24
Involved Minor Injury	35	35	33
Involved No Injury	104	102	109
Total	179	183	187
Fatalities			
Passenger	7	1	6
Crew	22	23	20
Other Persons	3	1	6
Total	32	25	32
Aircraft Damaged*			
Destroyed	57	54	45
Substantial	122	129	140
Minor	0	0	1
None	0	0	1
Total	179	183	187

* Number of Reciprocating Engine, General Aviation Rotorcraft

Table 83 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ROTORCRAFT - RECIPROCATING ENGINE(S)
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	13	8	14	41	76
Business	0	0	1	5	6
Corporate/Executive	0	0	0	7	7
Aerial Application	3	7	10	33	53
Instructional	6	2	10	39	57
Other	7	5	9	42	63
Total	29	22	44	167	262
Percent	11.1	8.4	16.8	63.7	

Table 84 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ROTORCRAFT - RECIPROCATING ENGINE(S)
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Hard Landing	1	2	4	15	22	12.3
Nose Over/Down	0	0	1	2	3	1.7
Roll Over	1	0	5	7	13	7.3
Col. with Ground/Water-Controlled	0	0	4	17	21	11.7
Col. with Ground/Water-Uncontrolled	4	3	1	2	10	5.6
Col. with Wires/Poles	3	3	4	5	15	8.4
Col. with Trees	2	0	0	1	3	1.7
Col. with Runway or Approach Lights	0	0	0	1	1	0.6
Col. with Crop	0	0	1	0	1	0.6
Col. with Ditches	0	0	0	1	1	0.6
Col. with Automobiles	0	0	0	1	1	0.6
Col. with Other	0	0	1	2	3	1.7
Bird Strike	1	0	0	0	1	0.6
Fire or Explosion in Flight	1	0	0	0	1	0.6
Airframe Failure	0	0	0	1	1	0.6
Airframe Failure in Flight	2	0	1	1	4	2.2
Airframe Failure on Ground	0	0	1	0	1	0.6
Engine Failure or Malfunction	3	5	8	35	51	28.5
Propeller	0	0	0	1	1	0.6
Tail Rotor Failure	0	4	1	4	9	5.0
Main Rotor Failure	2	0	1	8	11	6.1
Turbulence	0	0	1	0	1	0.6
Miscellaneous/Other	0	2	1	0	3	1.7
Undetermined	1	0	0	0	1	0.6
No. of Accidents	21	19	35	104	179	
Percent	11.7	10.6	19.6	58.1		

Table 85 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ROTORCRAFT - RECIPROCATING ENGINE(S)
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Taxi:				
Other	0	1	1	0.6
Ground Taxi, Other	0	1	1	0.6
Aerial Taxi to Takeoff	0	3	3	1.7
Aerial Taxi, Other	2	1	3	1.7
Takeoff:				
Initial Climb	1	8	9	5.0
Vertical	3	10	13	7.3
Running (Rotorcraft/VTOL-STOL)	0	2	2	1.1
Aborted (Rotorcraft/VTOL)	0	1	1	0.6
Aborted (Rotorcraft/STOL)	0	2	2	1.1
Inflight:				
Climb to Cruise	1	6	7	3.9
Normal Cruise	11	7	18	10.1
Descending	1	1	2	1.1
Hovering	3	10	13	7.3
Autorotative Descent	0	1	1	0.6
Buzzing	0	1	1	0.6
Uncontrolled Descent	2	0	2	1.1
Low Pass	3	2	5	2.8
Other	4	7	11	6.1
En Route to Treat Crop	1	0	1	0.6
En Route to Reloading Area	1	1	2	1.1
Starting Swath Run	4	3	7	3.9
Swath Run	5	9	14	7.8
Pullup from Swath Run	2	1	3	1.7
Procedure Turnaround	1	9	10	5.6
Cleanup Swath	1	0	1	0.6
Maneuver to Avoid Obstruction	1	0	1	0.6
Landing:				
Traffic Pattern-Circling	3	1	4	2.2
Final Approach (VFR)	1	1	2	1.1
Level Off/Touchdown	0	7	7	3.9
Roll-On/Run-On (Rotorcraft)	1	1	2	1.1
Power-On Landing (Rotorcraft)	1	8	9	5.0
Power-Off Autorotative Ldg	4	16	20	11.2
Other	0	1	1	0.6
No. of Aircraft	57	122	179	
Percent	31.8	68.2		

Table 86 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Material Failure	20	11.2
Pilot-Failed to Maintain Adequate Rotor RPM	18	10.1
Pilot-Inadequate Preflight Prep. and/or Planning	16	8.9
Powerplant Failure for Undetermined Reasons	16	8.9
Pilot-Failed to See and Avoid Objects or Obstructions	14	7.8
Pilot-Improper Operation of Flight Controls	14	7.8
Pilot-Inadequate Supervision of Flight	14	7.8
Personnel-Inadequate Maintenance and Inspection	10	5.6
Fatigue Fracture	10	5.6
Pilot-Mismanagement of Fuel	9	5.0
Fuel Exhaustion	9	5.0

Table 87 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1975 - 1981

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Aircraft in this Category
1975	219	12	16	16
1976	210	18	25	25
1977	191	14	17	17
1978	225	30	42	35
1979	187	21	32	26
1980	183	22	25	24
1981	179	21	32	29

		Accident Rate per 100,000 Aircraft Hours Flown	
Year	Hours Flown	Total	Fatal
1975	623,000	35.15	1.93
1976	680,000	30.88	2.65
1977	571,000	33.45	2.45
1978	766,000	29.37	3.92
1979	859,000	21.77	2.44
1980	719,000	25.45	3.06
1981	878,000	20.39	2.39

Table 88 - MOST PREVALENT TYPES OF ACCIDENTS
ROTORCRAFT - RECIPROCATING ENGINES(S)
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Engine Failure or Malfunction	51	28.5	60.0	30.1
Col. with Object	25	14.0	36.8	18.5
Hard Landing	22	12.3	19.2	9.6
Col. with Ground/Water-Controlled	21	11.7	17.6	8.8
Tail Rotor Failure	9	5.0	14.0	7.0
Col. with Ground/Water-Uncontrolled	10	5.6	12.8	6.4
Roll Over	13	7.3	12.2	6.1
Main Rotor Failure	11	6.1	8.6	4.3
Airframe Failure in Flight	4	2.2	6.4	3.2
(All Other Types)	13	7.3	11.6	5.8
Total	179	100.0	199.2	100.0

Table 89 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ROTORCRAFT - RECIPROCATING ENGINE(S)
1981 AND 1976 - 1980

Phase of Operation	1981		1976 - 1980	
	No.	Percent	Mean	Percent
In Flight	99	55.3	114.4	57.4
Landing	45	25.1	39.4	19.8
Takeoff	27	15.1	34.8	17.5
Taxi	8	4.5	7.2	3.6
Static	0	0.0	2.2	1.1
Not Reported	0	0.0	1.2	0.6
Total	179	100.0	199.2	100.0

ROTORCRAFT - TURBINE POWERED

Tables 90 through 97 present data for accidents involving turbine powered rotorcraft. The number of such accidents decreased slightly in 1981 while the number of fatal accidents dropped to one half the 1980 figure. These decreases, coupled with a 21.5 percent increase in estimated hours flown, resulted in accident rate decreases of 19.8 percent (total) and 59.1 percent (fatal). The percentage of engine failure/malfunction accidents among all accidents involving turbine powered rotorcraft increased from 29.2 percent in the base period (1976-1980) to 42.3 percent in 1981.

Table 90 - SUMMARY OF LOSSES
ROTORCRAFT - TURBINE POWERED
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	9	18	13
Involved Serious Injury	17	10	9
Involved Minor Injury	21	19	16
Involved No Injury	31	33	42
Total	78	80	80
Fatalities			
Passenger	14	19	14
Crew	9	14	12
Other Persons	0	2	0
Total	23	35	26
Aircraft Damaged*			
Destroyed	28	26	23
Substantial	50	53	56
Minor	0	0	1
None	0	1	0
Total	78	80	80

* Number of Turbine Powered, General Aviation Rotorcraft

Table 91 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ROTORCRAFT - TURBINE POWERED
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	0	6	10	11	27
Business	0	1	2	4	7
Corporate/Executive	9	6	4	4	23
Aerial Application	1	0	0	1	2
Instructional	1	2	3	10	16
Other	12	6	20	45	83
Total	23	21	39	75	158
Percent	14.6	13.3	24.7	47.5	

Table 92 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ROTORCRAFT - TURBINE POWERED
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Hard Landing	0	2	1	3	6	7.7
Roll Over	0	1	3	1	5	6.4
Col. Between Aircraft-Both in Flight	0	0	1	0	1	1.3
Col. with Ground/Water-Controlled	3	1	2	2	8	10.3
Col. with Ground/Water-Uncontrolled	0	3	0	1	4	5.1
Col. with Wires/Poles	3	1	2	2	8	10.3
Col. with Building/s	0	0	0	1	1	1.3
Col. with Dirt Bank	0	0	0	1	1	1.3
Col. with Other	0	0	1	0	1	1.3
Engine Failure or Malfunction	2	7	9	15	33	42.3
Propeller/Rotor Failure	0	0	0	1	1	1.3
Tail Rotor Failure	1	1	2	3	7	9.0
Prop/Rotor Accident to Person	0	1	0	0	1	1.3
Miscellaneous/Other	0	0	0	1	1	1.3
No. of Accidents	9	17	21	31	78	
Percent	11.5	21.8	26.9	39.7		

Table 93 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ROTORCRAFT - TURBINE POWERED
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Static:				
Starting Engine(s)	1	0	1	1.3
Idling Rotors	0	1	1	1.3
Taxi:				
Aerial Taxi to Takeoff	0	2	2	2.6
Takeoff:				
Initial Climb	0	2	2	2.6
Vertical	2	3	5	6.4
Other	1	0	1	1.3
Inflight:				
Climb to Cruise	1	0	1	1.3
Normal Cruise	9	17	26	33.3
Descending	0	1	1	1.3
Hovering	2	4	6	7.7
Autorotative Descent	1	1	2	2.6
Uncontrolled Descent	0	1	1	1.3
Low Pass	1	1	2	2.6
Other	4	1	5	6.4
Swath Run	1	1	2	2.6
Landing:				
Traffic Pattern-Circling	0	1	1	1.3
Final Approach (VFR)	2	4	6	7.7
Level Off/Touchdown	1	0	1	1.3
Power-On Landing (Rotorcraft)	2	5	7	9.0
Power-Off Autorotative Ldg	0	4	4	5.1
Other	0	1	1	1.3
No. of Aircraft	28	50	78	
Percent	35.9	64.1		

Table 94 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ROTORCRAFT - TURBINE POWERED
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	14	17.9
Pilot-Mismanagement of Fuel	8	10.3
Fuel Exhaustion	8	10.3
Material Failure	8	10.3
Pilot-Failed to See and Avoid Objects or Obstructions	6	7.7
Powerplant-Failure for Undetermined Reasons	6	7.7
Tail Rotor Drive Shaft Assembly	5	6.4
Pilot-Failed to Maintain Adequate Rotor RPM	4	5.1
Personnel-Inadequate Maintenance and Inspection	4	5.1
Foreign Material Affecting Normal Operations	4	5.1

Table 95 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ROTORCRAFT - TURBINE POWERED
1975 - 1981

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Aircraft in this Category
1975	47	6	14	12
1976	39	8	14	14
1977	56	8	11	8
1978	60	11	16	15
1979	80	13	26	26
1980	80	18	35	33
1981	78	9	23	23

		Accident Rate per 100,000 Aircraft Hours Flown	
Year	Hours Flown	Total	Fatal
1975	351,000	13.39	1.71
1976	423,000	9.22	1.89
1977	599,000	9.35	1.34
1978	631,000	9.51	1.74
1979	663,000	12.07	1.96
1980	1,172,000	6.83	1.54
1981	1,424,000	5.48	0.63

Table 96 - MOST PREVALENT TYPES OF ACCIDENTS
ROTORCRAFT - TURBINE POWERED
1981 AND 1976 - 1980

Type of Accident	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Engine Failure or Malfunction	33	42.3	18.4	29.2
Col. with Object	11	14.1	11.2	17.8
Hard Landing	6	7.7	5.8	9.2
Roll Over	5	6.4	4.6	7.3
Col. with Ground/Water-Uncontrolled	4	5.1	4.4	7.0
Col. with Ground/Water-Controlled	8	10.3	3.8	6.0
Tail Rotor Failure	7	9.0	3.2	5.1
Main Rotor Failure	0	0.0	2.8	4.4
Misc/Other	1	1.3	2.6	4.1
Airframe Failure in Flight	0	0.0	2.4	3.8
Col. Between Aircraft-Both in Flight	1	1.3	0.8	1.3
Prop/Rotor Accident to Person	1	1.3	0.8	1.3
Fire or Explosion in Flight	0	0.0	0.6	1.0
(All Other Types)	1	1.3	1.6	2.5
Total	78	100.0	63.0	100.0

Table 97 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ROTORCRAFT - TURBINE POWERED
1981 AND 1976 - 1980

Phase of Operation	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
In Flight	46	59.0	36.0	57.1
Landing	20	25.6	13.2	21.0
Takeoff	8	10.3	9.0	14.3
Taxi	2	2.6	2.4	3.8
Static	2	2.6	2.0	3.2
Not Reported	0	0.0	0.4	0.6
Total	78	100.0	63.0	100.0

ALL GLIDERS

Tables 98 through 109 contain statistics on accidents involving gliders. Although the total number of accidents in 1981 dropped slightly from 1980, the number of fatal accidents involving gliders increased from 7 to twelve. The 13 fatalities which resulted from these accidents was the second highest number of fatal injuries among the years 1975 through 1981 (See Table 106). Since the Federal Aviation Administration does not publish separate flight hour estimates for gliders, the extent to which changes in the number of accidents reflect changes in exposure cannot be determined.

Table 98 - SUMMARY OF LOSSES
ALL GLIDERS
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	12	7	3
Involved Serious Injury	10	17	17
Involved Minor Injury	11	8	9
Involved No Injury	26	30	26
Total	59	62	55
Fatalities			
Passengers	1	0	0
Crew	12	7	3
Total	13	7	3
Aircraft Damaged*			
Destroyed	15	13	11
Substantial	45	49	43
Minor	0	0	1
Total	60	62	55

* Number of General Aviation Gliders

Table 99 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL GLIDERS
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	12	9	11	28	60
Copilot	0	1	0	0	1
Dual Student	0	0	0	2	2
Passengers	1	1	2	5	9
Grand Total	13	11	13	35	72
Percent	18.1	15.3	18.1	48.6	

Table 100 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL GLIDERS
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	11	6	10	25	52
Instructional	0	3	2	7	12
Other	2	2	1	3	8
Total	13	11	13	35	72
Percent	18.1	15.3	18.1	48.6	

Table 101 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL GLIDERS
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground Loop-Swerve	0	0	1	7	8	13.6
Hard Landing	0	2	1	4	7	11.9
Overshoot	0	0	1	0	1	1.7
Undershoot	0	0	1	5	6	10.2
Col. Between Aircraft Both Inflight	0	0	0	1	1	1.7
Col. with Ground/Water-Controlled	1	4	2	3	10	16.9
Col. with Ground/Water-Uncontrolled	3	0	0	0	3	5.1
Col. with Wires/Poles	0	1	1	0	2	3.4
Col. with Trees	0	1	1	0	2	3.4
Col. with Fence, Fenceposts	0	0	1	3	4	6.8
Col. with Other	0	0	1	2	3	5.1
Stall	0	2	0	0	2	3.4
Stall/Spin	4	0	1	0	5	8.5
Airframe Failure in Flight	2	0	0	1	3	5.1
Miscellaneous/Other	1	0	0	0	1	1.7
Undetermined	1	0	0	0	1	1.7
No. of Accidents	12	10	11	26	59	
Percent	20.3	16.9	18.6	44.1		

Table 102 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL GLIDERS
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Takeoff:				
Run	0	1	1	1.7
Initial Climb	2	0	2	3.3
Aborted (Fixed-Wing)	0	1	1	1.7
Other	1	0	1	1.7
Inflight:				
Climb to Cruise	1	0	1	1.7
Normal Cruise	0	3	3	5.0
Uncontrolled Descent	1	0	1	1.7
Low Pass	1	0	1	1.7
Other	3	3	6	10.0
Landing:				
Traffic Pattern-Circling	2	2	4	6.7
Final Approach (VFR)	0	10	10	16.7
Level Off/Touchdown	1	15	16	26.7
Roll (Fixed Wing)	0	9	9	15.0
Other	2	1	3	5.0
Unknown/Not Reported	1	0	1	1.7
No. of Aircraft	15	45	60	
Percent	25.0	75.0		

Table 103 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL GLIDERS
1981

Light Conditions	Weather	Accidents	
	VFR	No.	Percent
Daylight	59	59	100.00
No. of Accidents	59	59	
Percent	100.0		

Table 104 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL GLIDERS
1981

Proximity to Airport	Flight Plan		Aircraft	
	None	VFR	No.	Percent
On Airport	27	0	27	45.8
In Traffic Pattern	4	0	4	6.8
Miles from Airport:				
Within 1/4	2	0	2	3.4
1/4+ to 1/2	3	0	3	5.1
3/4+ to 1	2	0	2	3.4
1+ to 2	2	0	2	3.4
2+ to 3	4	0	4	6.8
3+ to 4	2	0	2	3.4
Within 5 Miles	2	0	2	3.4
Beyond 5	5	0	5	8.5
Unknown/Not Reported	5	1	6	10.2
No. of Aircraft	58	1	59	
Percent	98.3	1.7		

Table 105 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL GLIDERS
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Improper In-Flight Decision or Planning	10	16.9
Pilot-Failed to Obtain/Maintain Flying Speed	8	13.6
Pilot-Improper Compensation for Wind Conditions	7	11.9
Pilot-Improper Operation of Flight Controls	5	8.5
Pilot-Misjudged Clearance	5	8.5
Pilot-Improper Level Off	4	6.8
Pilot-Selected Unsuitable Terrain	4	6.8
Pilot-Misjudged Distance and Altitude	4	6.8
Undetermined	4	6.8

Table 106 - ACCIDENTS, FATAL ACCIDENTS, AND FATALITIES
ALL GLIDERS
1975 - 1981

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard General Aviation Gliders
1975	82	7	11	9
1976	65	8	9	8
1977	78	7	8	8
1978	66	10	14	10
1979	55	3	3	3
1980	62	7	7	7
1981	59	12	13	13

* The yearly accident counts include suicide and sabotage accidents as follows:
Total - 1975 (1)
Fatal - 1975 (1)

Table 107 - MOST PREVALENT TYPES OF ACCIDENTS
ALL GLIDERS
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Col. with Object	11	18.6	17.8	27.3
Undershoot	6	10.2	12.0	18.4
Stall/Spin	5	8.5	6.0	9.2
Hard Landing	7	11.9	4.4	6.7
Overshoot	1	1.7	4.0	6.1
Stall	2	3.4	4.0	6.1
Col. with Ground/Water-Controlled	10	16.9	3.8	5.8
Ground Loop-Swerve	8	13.6	3.2	4.9
Airframe Failure in Flight	3	5.1	2.4	3.7
Col. with Ground/Water-Uncontrolled	3	5.1	2.2	3.4
Misc/Other	1	1.7	1.6	2.5
Col. Between Aircraft-Both in Flight	1	1.7	1.2	1.8
Stall/Mush	0	0.0	0.8	1.2
Stall/Spiral	0	0.0	0.6	0.9
(All Other Types)	1	1.7	1.2	1.8
Total	59	100.0	65.2	100.0

Table 108 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL GLIDERS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Phase of Operation	No.	Percent	Mean	Percent
Landing	42	70.0	46.4	70.7
Takeoff	5	8.3	10.0	15.2
In Flight	12	20.0	8.4	12.8
Not Reported	1	1.7	0.6	0.9
Taxi	0	0.0	0.2	0.3
Total	60	100.0	65.6	100.0

Table 109 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL GLIDERS
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	50	84.7	57.8	88.7
Weather	21	35.6	17.6	27.0
Terrain	8	13.6	14.4	22.1
Personnel	7	11.9	5.8	8.9
Miscellaneous	6	10.2	3.4	5.2
Instruments/Equipment and Accessories	1	1.7	1.8	2.8
Airframe	4	6.8	1.8	2.8
Undetermined	4	6.8	1.8	2.8
Systems	1	1.7	1.4	2.1
Airport/Airways/Facilities	3	5.1	1.0	1.5
No. of Accidents with Cause(s) Assigned	59		65.2	

PERSONAL FLYING

Data relative to personal flying accidents are presented in Tables 110 through 120. The number of accidents (1959), fatal accidents (383), and fatalities (749) in the personal flying category were lower in 1981 than in any of the previous six years (See Table 117). The proportion of persons aboard accident-involved personal flying aircraft who received minor or no injuries was 73.4 percent.

Accident rates have not been computed separately for personal flying. The Safety Board has determined that accurate accident rates cannot be computed separately for the personal and business flying categories because no reliable breakdown of exposure data (flying hours) is available for each category. Accident rates have been computed for personal and business flying combined and may be found in the next section of this report.

Table 110 - SUMMARY OF LOSSES
PERSONAL FLYING
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	383	393	418
Involved Serious Injury	206	231	221
Involved Minor Injury	337	302	352
Involved No Injury	1033	1120	1219
Total	1959	2046	2210
Fatalities			
Passenger	360	427	413
Crew	378	385	406
Other Persons	11	9	13
Total	749	821	832
Aircraft Damaged*			
Destroyed	608	561	568
Substantial	1348	1477	1618
Minor	8	8	16
None	4	11	18
Total	1968	2057	2220

* Number of General Aviation Aircraft in Personal Operations

Table 111 - PERSONS BY ROLE AND DEGREE OF INJURY
PERSONAL FLYING
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	359	169	311	1129	1968
Copilot	18	8	7	19	52
Dual Student	0	0	0	3	3
Extra Crew	1	0	0	2	3
Passengers	360	191	320	1266	2137
Total Aboard	738	368	638	2419	4163
Other Aircraft*	7	0	0	30	37
Other Ground	4	2	5	0	11
Grand Total	749	370	643	2449	4211
Percent	17.8	8.8	15.3	58.2	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 112 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
PERSONAL FLYING
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	1	6	24	188	219	11.2
Dragged Wingtip Pod or Float	0	0	0	2	2	0.1
Wheels-up Landing	0	0	1	23	24	1.2
Wheels-down Landing in Water	1	0	0	0	1	0.1
Gear Collapsed	0	0	2	34	36	1.8
Gear Retracted	0	0	1	19	20	1.0
Hard Landing	2	10	11	81	104	5.3
Nose Over/Down	0	1	4	51	56	2.9
Roll Over	0	0	1	3	4	0.2
Overshoot	1	5	23	90	119	6.1
Undershoot	8	11	20	41	80	4.1
Col. Between Aircraft-Both in Flight	8	1	1	9	19	1.0
Col. Between Aircraft-One Airborne	0	0	1	0	1	0.1
Col. Between Aircraft-Both on Ground	0	0	1	3	4	0.2
Col. with Ground/Water-Controlled	67	10	25	18	120	6.1
Col. with Ground/Water-Uncontrolled	70	7	5	2	84	4.3
Col. with Wires/Poles	22	7	7	24	60	3.1
Col. with Trees	38	18	22	20	98	5.0
Col. with Residence	1	0	0	0	1	0.1
Col. with Building/s	0	1	0	1	2	0.1
Col. with Fence, Fenceposts	0	0	6	19	25	1.3
Col. with Electronic Towers	3	1	0	0	4	0.2
Col. with Runway or Approach Lights	1	0	0	1	2	0.1
Col. with Airport Hazard	0	0	0	2	2	0.1
Col. with Animals	0	0	0	4	4	0.2
Col. with Crop	1	0	2	5	8	0.4
Col. with Ditches	0	1	2	14	17	0.9
Col. with Snowbank	0	0	0	6	6	0.3
Col. with Parked Aircraft (Unattended)	0	0	0	8	8	0.4
Col. with Automobile	1	0	1	2	4	0.2
Col. with Dirt Bank	0	3	6	13	22	1.1
Col. with Other	1	3	5	34	43	2.2
Bird Strike	1	0	0	0	1	0.1
Stall	22	18	8	21	69	3.5
Stall/Spin	35	3	3	1	42	2.1
Stall/Spiral	3	0	0	0	3	0.2
Stall/Mush	9	11	14	25	59	3.0
Fire or Explosion in Flight	2	0	1	2	5	0.3
Fire or Explosion on Ground	0	0	2	4	6	0.3
Airframe Failure in Flight	31	0	2	6	39	2.0
Airframe Failure on Ground	0	0	1	3	4	0.2

Table 112 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Engine Failure or Malfunction	39	84	131	239	493	25.2
Propeller Failure	0	2	2	7	11	0.6
Tail Rotor Failure	0	0	1	1	2	0.1
Main Rotor Failure	1	0	0	1	2	0.1
Prop/Rotor Accident to Person	1	2	0	0	3	0.2
Turbulence	2	0	1	3	6	0.3
Ditching	0	0	0	2	2	0.1
Missing Aircraft Not Recovered	7	0	0	0	7	0.4
Miscellaneous/Other	1	1	0	1	3	0.2
Undetermined	3	0	0	0	3	0.2
No. of Accidents	383	206	337	1033	1959	
Percent	19.6	10.5	17.2	52.7		

Table 113 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
PERSONAL FLYING
1981

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Starting Engine/s	0	1	0	0	1	0.1
Idling Engine/s	0	1	2	0	3	0.2
Other	0	0	1	0	1	0.1
Taxi:						
To Takeoff	2	18	0	0	20	1.0
From Landing	1	17	0	0	18	0.9
Other	0	6	0	0	6	0.3
Ground Taxi, Other	0	1	0	0	1	0.1
Aerial Taxi to Takeoff	0	1	0	0	1	0.1
Takeoff:						
Run	9	72	2	0	83	4.2
Initial Climb	101	173	0	0	274	13.9
Vertical	1	3	0	0	4	0.2
Running (Rotorcraft/VTOL-STOL)	0	1	0	0	1	0.1
Aborted (Fixed-Wing)	4	36	0	0	40	2.0
Other	1	1	0	0	2	0.1
Inflight:						
Climb to Cruise	30	24	0	0	54	2.7
Normal Cruise	115	173	0	0	288	14.6
Descending	16	27	0	0	43	2.2
Holding (IFR)	0	1	0	0	1	0.1
Hovering	0	2	0	0	2	0.1
Autorotative Descent	1	0	0	0	1	0.1
Acrobatics	33	8	0	0	41	2.1
Buzzing	20	6	0	0	26	1.3
Uncontrolled Descent	62	2	0	0	64	3.3
Low Pass	26	23	0	0	49	2.5
Other	42	28	0	0	70	3.6
Landing:						
Traffic Pattern-Circling	20	41	0	0	61	3.1
Final Approach (VFR)	38	109	2	0	149	7.6
Initial Approach	3	0	0	0	3	0.2
Final Approach (IFR)	8	2	0	0	10	0.5
Level Off/Touchdown	29	279	1	4	313	15.9
Roll (Fixed Wing)	12	245	0	0	257	13.1
Roll-On/Run-On (Rotorcraft)	1	0	0	0	1	0.1
Power-On Landing (Rotorcraft)	2	3	0	0	5	0.3
Power-Off Auto Rotative Ldg.	1	7	0	0	8	0.4
Go-Around (VFR)	13	30	0	0	43	2.2
Missed Approach (IFR)	3	0	0	0	3	0.2
Other	3	6	0	0	9	0.5
Unknown/Not Reported	11	1	0	0	12	0.6
No. of Aircraft	608	1348	8	4	1968	
Percent	30.9	68.5	0.4	0.2		

Table 114 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
PERSONAL FLYING
1981

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	18	4	0	0	22	1.1
Daylight	1484	86	3	15	1588	81.1
Dusk	73	14	0	3	90	4.6
Night (Dark)	148	61	4	8	221	11.3
Night (Moonlight-Bright)	30	1	0	0	31	1.6
Unknown/Not Reported	1	1	0	5	7	0.4
No. of Accidents	1754	167	7	31	1959	
Percent	89.5	8.5	0.4	1.6		

Table 115 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
PERSONAL FLYING
1981

Proximity to Airport	Flight Plan									Aircraft	
	None	VFR	IFR	Controlled VFR	IFR (VFR Condition On Top)	VFR Flight Following	Special VFR	Unk/NR	Other	No.	Percent
On Airport	741	68	27	0	0	0	2	10	1	849	43.1
On Seaplane Base	7	1	0	0	0	0	0	0	0	8	0.4
In Traffic Pattern	119	15	1	0	0	0	0	0	1	136	6.9
Miles from Airport:											
Within 1/4	93	2	4	0	0	0	0	2	0	101	5.1
1/4+ to 1/2	68	5	2	0	0	0	0	0	0	75	3.8
1/2+ to 3/4	11	0	1	0	0	0	0	0	0	12	0.6
3/4+ to 1	41	4	5	0	0	0	0	0	0	50	2.5
1+ to 2	55	5	8	0	1	1	0	0	0	70	3.6
2+ to 3	35	3	4	0	0	0	0	0	0	42	2.1
3+ to 4	19	0	4	0	0	0	0	0	0	23	1.2
4+ to 5	13	1	2	0	0	0	0	0	0	16	0.8
Beyond 5	398	60	25	1	0	1	0	0	1	486	24.7
Unknown/Not Reported	85	7	7	0	0	0	0	1	0	100	5.1
No. of Aircraft	1685	171	90	1	1	2	2	13	3	1968	
Percent	85.6	8.7	4.6	0.1	0.1	0.1	0.1	0.7	0.2		

Table 116 - MOST PREVALENT DETAILED ACCIDENT CAUSES
PERSONAL FLYING
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	218	11.1
Pilot-Failed to Obtain/Maintain Flying Speed	191	9.7
Pilot-Mismanagement of Fuel	144	7.4
Powerplant-Failure for Undetermined Reasons	137	7.0
Pilot-Misjudged Distance and Speed	120	6.1
Pilot-Selected Unsuitable Terrain	119	6.1
Fuel Exhaustion	116	5.9
Pilot-Continued VFR Flight into Adverse Weather Cond.	111	5.7
Pilot-Improper Level Off	95	4.8
Pilot-Failed to Maintain Directional Control	89	4.5

Table 117 - ACCIDENTS, FATAL ACCIDENTS, AND FATALITIES
PERSONAL FLYING
1975 - 1981

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft in this Category
1975	2231	416	880	866
1976	2338	432	854	839
1977	2282	439	893	878
1978	2377	461	958	947
1979	2210	418	832	819
1980	2046	393	821	812
1981	1959	383	749	738

* The yearly accident counts include suicide and sabotage accidents as follows:
Total - 1975 (2), 1976 (1), 1978 (2), 1980 (1)
Fatal - 1975 (2), 1978 (2), 1980 (1)

Table 118 - MOST PREVALENT TYPES OF ACCIDENTS
PERSONAL FLYING
1981 AND 1976 - 1980

Type of Accident	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Engine Failure or Malfunction	493	25.2	528.4	23.5
Col. with Object	306	15.6	340.0	15.1
Ground-Water Loop-Swerve	219	11.2	279.2	12.4
Hard Landing	104	5.3	139.4	6.2
Col. with Ground/Water-Controlled	119	6.1	122.2	5.4
Overshoot	119	6.1	120.0	5.3
Col. with Ground/Water-Uncontrolled	84	4.3	90.2	4.0
Stall/Mush	59	3.0	89.4	4.0
Stall	69	3.5	79.4	3.5
Undershoot	80	4.1	78.2	3.5
Nose Over/Down	56	2.9	76.8	3.4
Stall/Spin	42	2.1	56.4	2.5
Wheels-up Landing	24	1.2	41.4	1.8
Airframe Failure in Flight	39	2.0	39.0	1.7
Gear Collapsed	36	1.8	27.4	1.2
Gear Retracted	0	0.0	22.8	1.0
(All Other Types)	110	5.6	120.4	5.3
Total	1959	100.0	2250.6	100.0

Table 119 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
PERSONAL FLYING
1981 AND 1976 - 1980

Phase of Operation	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Landing	862	43.8	1002.4	44.3
In Flight	639	32.5	701.8	31.0
Takeoff	404	20.5	450.0	19.9
Taxi	46	2.3	80.8	3.6
Not Reported	12	0.6	15.0	0.7
Static	5	0.3	14.2	0.6
Total	1968	100.0	2264.2	100.0

Table 120 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
PERSONAL FLYING
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	1610	82.2	1890.8	84.0
Weather	598	30.5	558.4	24.8
Terrain	329	16.8	519.0	23.1
Powerplant	302	15.4	293.6	13.0
Personnel	138	7.0	181.6	8.1
Airport/Airways/Facilities	189	9.6	181.4	8.1
Landing Gear	62	3.2	78.0	3.5
Miscellaneous	99	5.1	77.8	3.5
Undetermined	37	1.9	42.6	1.9
Systems	24	1.2	30.4	1.4
Airframe	36	1.8	28.0	1.2
Instruments/Equipment and Accessories	8	0.4	10.2	0.5
Rotorcraft	6	0.3	6.8	0.3
No. of Accidents with Cause(s) Assigned	1959		2250.6	

PERSONAL AND BUSINESS FLYING, COMBINED DATA

This section contains only one table and presents accidents, fatal accidents, fatalities, and accident rates for personal flying and business flying combined (see Table 121). In years prior to 1980, accident rates were reported for each of these categories separately. The Board suspects that overreporting of business flying hours (and the consequential underreporting of personal flying hours) distorted the rates computed separately for personal and business flyers. Accordingly the Board has determined that it will report a combined accident rate until such time as it determines that an accurate breakdown of personal and business flying hours is available.

Table 121 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
PERSONAL AND BUSINESS FLYING COMBINED
1975 - 1981

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Aircraft in this Category
1975	2548	480	1000	986
1976	2633	494	960	943
1977	2581	489	977	967
1978	2657	523	1067	1056
1979	2465	474	944	929
1980	2292	454	937	928
1981	2221	456	892	883

		Accident Rate per 100,000* Aircraft Hours Flown	
Year	Hours Flown	Total	Fatal
1975	15,832,000	16.08	3.02
1976	16,850,000	15.61	2.93
1977	16,727,000	15.43	2.92
1978	19,322,000	13.74	2.70
1979	20,638,000	11.94	2.30
1980	19,374,000	11.83	2.34
1981	18,323,000	12.12	2.49

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (2), 1976 (3), 1978 (2), 1980 (1)
Fatal - 1975 (2), 1976 (1), 1978 (2), 1980 (1)

BUSINESS FLYING

Tables 122 through 132 present data for accidents involving aircraft being operated for business purposes. Although the number of accidents in this category in 1981 is well below the mean for the prior six years (264 compared to 283.5), the numbers of both fatal accidents and fatalities were the highest among the seven years for which statistics are provided in Table 129. Controlled collisions with ground or water showed the most dramatically increased frequency in 1981. The number of such accidents increased by nearly 60 percent from the base period 1976 through 1980. While there were an average of six "gear collapsed" type accidents per year in the base period, there were no such accidents in 1981(See Table 130).

Accident rates have not been computed separately for business flying. The Safety Board has determined that accurate accident rates cannot be computed separately for the personal and business flying categories because no reliable breakdown of exposure data (flying hours) is available for each category. Combined personal and business flying accident rates may be found in the previous section of this report (See Table 121).

Table 122 - SUMMARY OF LOSSES
BUSINESS FLYING
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	74	62	56
Involved Serious Injury	23	24	23
Involved Minor Injury	33	30	25
Involved No Injury	134	131	151
Total	264	247	255
Fatalities			
Passenger	67	55	53
Crew	78	61	57
Other Persons	0	10	2
Total	145	126	112
Aircraft Damaged*			
Destroyed	99	79	74
Substantial	165	167	180
Minor	3	0	2
None	0	1	0
Total	267	247	256

* Number of General Aviation Aircraft in Business Operations

Table 123 - PERSONS BY ROLE AND DEGREE OF INJURY
BUSINESS FLYING
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	74	22	30	141	267
Copilot	4	1	1	1	7
Passengers	67	21	31	137	256
Total Aboard	145	44	62	279	530
Other Aircraft*	0	0	0	25	25
Grand Total	145	44	62	304	555
Percent	26.1	7.9	11.2	54.8	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 124 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
BUSINESS FLYING
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	1	0	1	16	18	6.8
Wheels-up Landing	0	0	0	9	9	3.4
Wheel-Down Landing in Water	0	0	1	2	3	1.1
Gear Retracted	0	0	0	7	7	2.7
Hard Landing	0	0	1	8	9	3.4
Nose Over/Down	0	0	1	8	9	3.4
Roll Over	0	0	0	1	1	0.4
Overshoot	1	0	4	12	17	6.4
Undershoot	0	3	0	5	8	3.0
Col. Between Aircraft-Both in Flight	3	0	0	2	5	1.9
Col. Between Aircraft-Both on Ground	0	0	0	2	2	0.8
Col. with Ground/Water-Controlled	17	3	1	2	23	8.7
Col. with Ground/Water-Uncontrolled	16	1	0	0	17	6.4
Col. with Wires/Poles	5	0	2	1	8	3.0
Col. with Trees	5	3	2	1	11	4.2
Col. with Buildings	0	0	0	2	2	0.8
Col. with Fence, Fenceposts	0	0	0	4	4	1.5
Col. with Electronic Towers	1	0	0	0	1	0.4
Col. with Airport Hazard	0	0	0	1	1	0.4
Col. with Crop	0	0	0	1	1	0.4
Col. with Ditches	0	0	0	1	1	0.4
Col. with Snowbank	0	0	0	1	1	0.4
Col. with Parked Aircraft (Unattended)	0	0	0	2	2	0.8
Col. with Other	2	0	0	2	4	1.5
Stall	1	3	0	1	5	1.9
Stall/Spin	1	0	0	0	1	0.4
Stall/Mush	2	0	3	2	7	2.7
Fire or Explosion Inflight	1	0	2	1	4	1.5
Fire or Explosion on Ground	0	0	0	1	1	0.4
Airframe Failure	1	0	0	0	1	0.4
Airframe Failure in Flight	6	0	0	0	6	2.3
Engine Failure or Malfunction	8	9	15	39	71	26.9
Prop/Rotor Accident to Person	0	1	0	0	1	0.4
Missing Aircraft Not Recovered	2	0	0	0	2	0.8
Miscellaneous Other	1	0	0	0	1	0.4
No. of Accidents	74	23	33	134	264	
Percent	28.0	8.7	12.5	50.8		

Table 125 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
BUSINESS FLYING
1981

Phase of Operation	Degree of Damage			Aircraft	
	Des.	Sub.	None	No.	Percent
Static:					
Starting Engine/s	0	1	0	1	0.4
Engine Run-Up	0	1	0	1	0.4
Taxi:					
To Takeoff	1	2	0	3	1.1
From Landing	0	5	1	6	2.2
Takeoff:					
Run	2	6	0	8	3.0
Initial Climb	14	16	1	31	11.6
Aborted (Fixed-Wing)	0	6	0	6	2.2
Aborted (Rotorcraft/VTOL)	0	1	0	1	0.4
Other	1	0	0	1	0.4
Inflight:					
Climb to Cruise	2	6	0	8	3.0
Normal Cruise	24	28	1	53	19.9
Descending	3	5	0	8	3.0
Acrobatics	1	0	0	1	0.4
Buzzing	0	1	0	1	0.4
Uncontrolled Descent	15	0	0	15	5.6
Low Pass	3	0	0	3	1.1
Other	6	2	0	8	3.0
Landing:					
Traffic Pattern-Circling	6	4	0	10	3.7
Final Approach (VFR)	6	9	0	15	5.6
Final Approach (IFR)	5	2	0	7	2.6
Level Off/Touchdown	4	37	0	41	15.4
Roll (Fixed Wing)	2	26	0	28	10.5
Roll-On/Run-On (Rotorcraft)	0	1	0	1	0.4
Power-On Landing (Rotorcraft)	0	1	0	1	0.4
Go-Around (VFR)	1	3	0	4	1.5
Missed Approach (IFR)	1	1	0	2	0.7
Other	0	1	0	1	0.4
Unknown/Not Reported	2	0	0	2	0.7
No. of Aircraft	99	165	3	267	
Percent	37.1	61.8	1.1		

Table 126 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
BUSINESS FLYING
1981

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	3	1	1	0	5	1.9
Daylight	163	29	1	1	194	73.5
Dusk	6	3	0	0	9	3.4
Night (Dark)	26	14	6	2	48	18.2
Night (Moonlight-Bright)	4	1	0	0	5	1.9
Unknown/Not Reported	0	1	0	2	3	1.1
No. of Accidents	202	49	8	5	264	
Percent	76.5	18.6	3.0	1.9		

Table 127 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
BUSINESS FLYING
1981

Proximity to Airport	Flight Plan				Aircraft	
	None	VFR	IFR	Unk/ NR	No.	Percent
On Airport	73	6	16	3	98	36.7
On Seaplane Base	2	0	0	0	2	0.7
In Traffic Pattern	14	2	2	0	18	6.7
Miles from Airport:						
Within 1/4	10	0	1	0	11	4.1
1/4+ to 1/2	2	2	1	0	5	1.9
1/2+ to 3/4	3	0	2	0	5	1.9
3/4+ to 1	3	0	2	0	5	1.9
1+ to 2	10	3	3	0	16	6.0
2+ to 3	8	1	2	0	11	4.1
3+ to 4	2	1	0	0	3	1.1
4+ to 5	2	2	1	0	5	1.9
Beyond 5	55	5	14	0	74	27.7
Unknown/Not Reported	9	2	2	1	14	5.2
No. of Aircraft	193	24	46	4	267	
Percent	72.3	9.0	17.2	1.5		

Table 128 - MOST PREVALENT DETAILED ACCIDENT CAUSES
BUSINESS FLYING
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Continued VFR Flight into Adverse Weather Cond.	26	9.8
Pilot-Inadequate Preflight Prep. and/or Planning	25	9.5
Pilot-Mismanagement of Fuel	22	8.3
Powerplant-Failure for Undetermined Reasons	20	7.6
Pilot-Misjuded Distance and Speed	18	6.8
Fuel Starvation	18	6.8
Pilot-Failed to Obtain/Maintain Flying Speed	16	6.1
Pilot-Spatial Disorientation	16	6.1
Material Failure	13	4.9
Pilot-Improper Level Off	11	4.2

Table 129 - ACCIDENTS, FATAL ACCIDENTS, AND FATALITIES
BUSINESS FLYING
1975 - 1981

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft in this Category
1975	318	64	120	120
1976	298	62	106	104
1977	302	53	95	89
1978	281	62	109	109
1979	255	56	112	110
1980	247	62	126	116
1981	264	74	145	145

* The yearly accident counts include suicide and sabotage accidents as follows:
Total - 1976 (2)
Fatal - 1976 (1)

Table 130 - MOST PREVALENT TYPES OF ACCIDENTS
BUSINESS FLYING
1981 AND 1976 - 1980

Type of Accident	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Engine Failure or Malfunction	71	26.9	68.2	24.7
Col. with Object	36	13.6	40.8	14.8
Ground-Water Loop-Swerve	18	6.8	27.6	10.0
Overshoot	17	6.4	18.2	6.6
Col. with Ground/Water-Uncontrolled	17	6.4	16.0	5.8
Col. with Ground/Water-Controlled	23	8.7	14.4	5.2
Wheels-up Landing	9	3.4	12.0	4.3
Hard Landing	9	3.4	10.4	3.8
Undershoot	8	3.0	8.0	2.9
Nose Over/Down	9	3.4	7.4	2.7
Gear Retracted	7	2.7	6.4	2.3
Stall/Mush	7	2.7	6.2	2.2
Gear Collapsed	0	0.0	6.0	2.2
Stall	5	1.9	5.4	2.0
Airframe Failure in Flight	6	2.3	4.8	1.7
Col. Between Aircraft-Both in Flight	5	1.9	3.4	1.2
Stall/Spin	0	0.0	2.6	0.9
(All Other Types)	17	6.4	18.8	6.8
Total	264	100.0	276.6	100.0

Table 131 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
BUSINESS FLYING
1981 AND 1976 - 1980

Phase of Operation	1981 No.	1981 Percent	1976 - 1980 Mean	1976 - 1980 Percent
Landing	110	41.2	131.4	47.5
In Flight	97	36.3	86.4	31.2
Takeoff	47	17.6	43.2	15.6
Taxi	9	3.4	12.6	4.6
Static	2	0.7	1.8	0.7
Not Reported	2	0.7	1.4	0.5
Total	267	100.0	276.8	100.0

Table 132 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
BUSINESS FLYING
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	204	77.3	223.4	80.8
Weather	92	34.8	79.2	28.6
Terrain	38	14.4	62.6	22.6
Powerplant	51	19.3	41.8	15.1
Personnel	29	11.0	27.0	9.8
Airport/Airways/Facilities	20	7.6	25.6	9.3
Landing Gear	14	5.3	16.4	5.9
Miscellaneous	8	3.0	8.8	3.2
Undetermined	9	3.4	6.2	2.2
Systems	8	3.0	5.6	2.0
Rotorcraft	0	0.0	2.8	1.0
Airframe	6	2.3	2.2	0.8
Instruments/Equipment and Accessories	1	0.4	1.2	0.4
No. of Accidents with Cause(s) Assigned	264		276.6	

CORPORATE/EXECUTIVE FLYING

This section presents in Tables 133 through 143 statistics describing corporate/executive flying accidents. Although the number of accidents in 1981 dropped by 12.5 percent from 1980, the numbers of fatal accidents and fatalities both increased substantially (See Table 140). Controlled collisions with ground or water accounted for 15.5 percent of accidents in 1981, compared to 7.4 percent of accidents in the base period. All 13 accidents of this type in 1981 produced fatal injuries.

Table 133 - SUMMARY OF LOSSES
CORPORATE/EXECUTIVE FLYING
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	30	21	15
Involved Serious Injury	10	11	4
Involved Minor Injury	6	10	10
Involved No Injury	38	54	49
Total	84	96	78
Fatalities			
Passenger	61	42	33
Crew	38	21	18
Other Persons	0	3	6
Total	99	66	57
Aircraft Damaged*			
Destroyed	39	32	20
Substantial	44	61	58
Minor	1	2	0
None	0	1	0
Total	84	96	78

* Number of General Aviation Aircraft in Corporate/Executive Operations

Table 134 - PERSONS BY ROLE AND DEGREE OF INJURY
CORPORATE/EXECUTIVE FLYING
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	30	8	5	41	84
Copilot	8	0	0	8	16
Passengers	61	18	13	61	153
Total Aboard	99	26	18	110	253
Other Aircraft*	0	0	0	4	4
Other Ground	0	1	3	0	4
Grand Total	99	27	21	114	261
Percent	37.9	10.3	8.0	43.7	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 135 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
CORPORATE/EXECUTIVE FLYING
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	0	3	3	3.6
Wheels-up Landing	0	0	0	3	3	3.6
Gear Collapsed	0	0	0	2	2	2.4
Gear Retracted	0	0	0	5	5	6.0
Hard Landing	0	0	0	3	3	3.6
Roll Over	0	1	0	1	2	2.4
Overshoot	1	0	0	1	2	2.4
Undershoot	0	0	0	4	4	4.8
Col. Between Aircraft-Both on Ground	0	0	0	2	2	2.4
Col. with Ground/Water-Controlled	13	0	0	0	13	15.5
Col. with Ground/Water-Uncontrolled	4	0	0	1	5	6.0
Col. with Wires/Poles	2	0	2	1	5	6.0
Col. with Trees	2	0	0	1	3	3.6
Col. with Fence, Fenceposts	0	0	0	1	1	1.2
Col. with Other	1	0	0	2	3	3.6
Stall	0	1	0	0	1	1.2
Stall/Spin	1	0	0	0	1	1.2
Airframe Failure in Flight	2	0	0	0	2	2.4
Airframe Failure on Ground	0	0	0	1	1	1.2
Engine Failure or Malfunction	4	7	4	7	22	26.2
Tail Rotor	0	1	0	0	1	1.2
No. of Accidents	30	10	6	38	84	
Percent	35.7	11.9	7.1	45.2		

Table 136 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
CORPORATE/EXECUTIVE FLYING
1981

Phase of Operation	Degree of Damage			Aircraft	
	Des.	Sub.	Minor	No.	Percent
Static:					
Starting Engine/s	1	0	0	1	1.2
Taxi:					
To Takeoff	0	1	1	2	2.4
Aerial Taxi to Takeoff	0	1	0	1	1.2
Takeoff:					
Run	0	4	0	4	4.8
Initial Climb	8	5	0	13	15.5
Vertical	1	0	0	1	1.2
Aborted (Fixed Wing)	0	1	0	1	1.2
Inflight:					
Climb to Cruise	0	3	0	3	3.6
Normal Cruise	9	5	0	14	16.7
Descending	2	0	0	2	2.4
Uncontrolled Descent	3	0	0	3	3.6
Low Pass	1	0	0	1	1.2
Other	3	0	0	3	3.6
Landing:					
Final Approach (VFR)	1	7	0	8	9.5
Final Approach (IFR)	6	0	0	6	7.1
Level Off/Touchdown	1	7	0	8	9.5
Roll (Fixed Wing)	0	8	0	8	9.5
Power-On Landing (Rotorcraft)	0	1	0	1	1.2
Go-Around (VFR)	1	0	0	1	1.2
Missed Approach (IFR)	2	1	0	3	3.6
No. of Aircraft	39	44	1	84	
Percent	46.4	52.4	1.2		

Table 137 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
CORPORATE/EXECUTIVE FLYING
1981

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimum	Unk/ NR	No.	Percent
Dawn	0	2	0	0	2	2.4
Daylight	48	9	2	2	61	72.6
Dusk	5	1	0	0	6	7.1
Night (Dark)	3	9	2	1	15	17.9
No. of Accidents	56	21	4	3	84	
Percent	66.7	25.0	4.8	3.6		

Table 138 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
CORPORATE/EXECUTIVE FLYING
1981

Proximity to Airport	Flight Plan				Aircraft	
	None	VFR	IFR	Special VFR	No.	Percent
On Airport	17	4	14	0	35	41.7
On Heliport	1	0	0	0	1	1.2
In Traffic Pattern	0	0	1	0	1	1.2
Miles from Airport:						
Within 1/4	3	0	2	0	5	6.0
1/4+ to 1/2	0	0	1	0	1	1.2
1/2 to 3/4	0	0	1	0	1	1.2
3/4+ to 1	1	0	2	0	3	3.6
1+ to 2	0	1	5	0	6	7.1
2+ to 3	0	0	2	0	2	2.4
3+ to 4	1	0	2	0	3	3.6
4+ to 5	1	0	0	0	1	1.2
Beyond 5	13	2	6	1	22	26.2
Unknown/Not Reported	1	0	2	0	3	3.6
No. of Aircraft	38	7	38	1	84	
Percent	45.2	8.3	45.2	1.2		

Table 139 - MOST PREVALENT DETAILED ACCIDENT CAUSES
CORPORATE/EXECUTIVE FLYING
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Improper IFR Operations	10	11.9
Pilot-Inadequate Preflight Prep. and/or Planning	8	9.5
Material Failure	8	9.5
Pilot-Failed to Follow Approved Procedures, Directives	6	7.1
Improper Emergency Procedures	6	7.1
Powerplant-Failure for Undetermined Reasons	5	6.0
Undetermined	5	6.0

Table 140 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
CORPORATE/EXECUTIVE FLYING
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	63	17	44	44
1976	56	14	42	38
1977	59	18	51	49
1978	88	24	70	67
1979	78	15	57	51
1980	96	21	66	63
1981	84	30	99	99

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	3,262,000	1.93	0.52
1976	3,396,000	1.65	0.41
1977	3,501,000	1.69	0.51
1978	4,898,000	1.80	0.49
1979	5,022,000	1.55	0.30
1980	5,351,000	1.79	0.39
1981	6,209,000	1.35	0.48

Table 141- MOST PREVALENT TYPES OF ACCIDENTS
CORPORATE/EXECUTIVE FLYING
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Engine Failure or Malfunction	22	26.2	14.6	19.4
Col. with Object	12	14.3	13.0	17.2
Col. with Ground/Water-Controlled	13	15.5	5.6	7.4
Ground-Water Loop-Swerve	3	3.6	5.4	7.2
Wheels-up Landing	3	3.6	5.0	6.6
Hard Landing	3	3.6	3.6	4.8
Undershoot	4	4.8	2.8	3.7
Airframe Failure in Flight	2	2.4	2.8	3.7
Overshoot	2	2.4	2.6	3.4
Gear Retracted	5	6.0	2.4	3.2
Col. with Ground/Water-Uncontrolled	5	6.0	2.2	2.9
Stall/Mush	0	0.0	2.2	2.9
Fire or Explosion in Flight	0	0.0	1.6	2.1
Col. Between Aircraft-Both in Flight	0	0.0	1.6	2.1
Gear Collapsed	2	2.4	1.4	1.9
Prop/Rotor Accident to Person	0	0.0	1.0	1.3
Roll Over	2	2.4	0.8	1.1
Stall	1	1.2	0.8	1.1
(All Other Types)	5	6.0	6.0	8.0
Total	84	100.0	75.4	100.0

Table 142 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
CORPORATE/EXECUTIVE FLYING
1981 AND 1976 - 1980

Phase of Operation	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Landing	35	41.7	35.6	47.2
In Flight	26	31.0	21.2	28.1
Takeoff	19	22.6	13.2	17.5
Taxi	3	3.6	3.0	4.0
Static	1	1.2	2.2	2.9
Not Reported	0	0.0	0.2	0.3
Total	84	100.0	75.4	100.0

Table 143 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
CORPORATE/EXECUTIVE FLYING
1981 AND 1976 - 1980

Broad Cause/Factor	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Pilot	62	73.8	50.2	66.6
Weather	32	38.1	20.8	27.6
Powerplant	13	15.5	13.6	18.0
Personnel	16	19.0	12.0	15.9
Airport/Airways/Facilities	9	10.7	9.0	11.9
Terrain	16	19.0	8.6	11.4
Landing Gear	7	8.3	6.8	9.0
Undetermined	5	6.0	3.4	4.5
Miscellaneous	6	7.1	3.0	4.0
Systems	6	7.1	2.6	3.4
Airframe	2	2.4	2.0	2.7
Rotorcraft	3	3.6	1.2	1.6
Instruments/Equipment and Accessories	1	1.2	0.8	1.1
No. of Accidents with Cause(s) Assigned	84		75.4	

AERIAL APPLICATION FLYING

Tables 144 through 154 concern accidents involving aircraft being flown for aerial application purposes. The accident rate for this flying category is 61.0 percent higher than the overall general aviation rate for 1981. The fatal accident rate for aerial application flying is 31.5 percent lower than for all of general aviation. Engine failure or malfunction was the most frequent type of accident involving aerial application aircraft in 1981, as it was for all aircraft. Accidents of this type accounted for 26.1 percent of all accidents and 29.6 percent of those involving aircraft used for aerial application. Fatal or serious injury resulted from only 5.4 percent of engine failure or malfunction accidents to aerial application aircraft. The corresponding percentage for all aircraft was 21.3 percent in 1981.

Table 144 - SUMMARY OF LOSSES
AERIAL APPLICATION FLYING
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	30	25	27
Involved Serious Injury	44	30	53
Involved Minor Injury	50	65	75
Involved No Injury	254	243	240
Total	378	363	395
Fatalities			
Passenger	6	3	0
Crew	28	25	25
Other Persons	2	4	2
Total	36	32	27
Aircraft Damaged*			
Destroyed	125	114	120
Substantial	255	249	273
Minor	0	0	2
None	0	1	0
Total	380	364	395

* Number of General Aviation Aircraft in Aerial Application Operations

Table 145 - PERSONS BY ROLE AND DEGREE OF INJURY
AERIAL APPLICATION FLYING
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	28	45	49	258	380
Copilot	0	0	0	1	1
Extra Crew	0	0	1	3	4
Passengers	6	1	0	0	7
Aboard Total	34	46	50	262	392
Other Ground	2	0	2	0	4
Grand Total	36	46	52	262	396
Percent	9.1	11.6	13.1	66.2	

Table 146 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
AERIAL APPLICATION FLYING
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	3	30	33	8.7
Gear Collapsed	0	0	0	1	1	0.3
Nose Over/Down	0	0	0	6	6	1.6
Roll Over	1	0	2	0	3	0.8
Overshoot	1	0	0	3	4	1.1
Col. Between Aircraft-Both in Flight	0	2	0	0	2	0.5
Col. with Ground/Water-Controlled	1	2	2	7	12	3.2
Col. with Ground/Water-Uncontrolled	1	1	0	0	2	0.5
Col. with Wires/Poles	9	15	7	20	51	13.5
Col. with Trees	5	2	6	16	29	7.7
Col. with Buildings	0	0	0	1	1	0.3
Col. with Fence, Fenceposts	0	0	0	8	8	2.1
Col. with Electronic Towers	1	0	0	0	1	0.3
Col. with Crop	0	0	1	4	5	1.3
Col. with Ditches	0	0	1	4	5	1.3
Col. with Automobile	0	0	1	2	3	0.8
Col. with Dirt Bank	0	0	0	6	6	1.6
Col. with Other	0	0	1	7	8	2.1
Stall	5	8	4	3	20	5.3
Stall/Spin	1	2	1	0	4	1.1
Stall/Mush	1	3	2	32	38	10.1
Fire or Explosion in Flight	0	0	0	1	1	0.3
Airframe Failure in Flight	1	0	1	1	3	0.8
Airframe Failure on Ground	0	0	0	2	2	0.5
Engine Tearaway	0	0	0	1	1	0.3
Engine Failure or Malfunction	2	4	15	91	112	29.6
Propeller Failure	0	0	0	2	2	0.5
Tail Rotor Failure	1	3	1	2	7	1.9
Main Rotor Failure	0	0	1	4	5	1.3
Turbulence	0	1	0	0	1	0.3
Miscellaneous/Other	0	1	1	0	2	0.5
No. of Accidents	30	44	50	254	378	
Percent	7.9	11.6	13.2	67.2		

Table 147 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
AERIAL APPLICATION FLYING
1981

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Taxi:				
From Landing	1	1	2	0.5
Takeoff:				
Run	4	25	29	7.6
Initial Climb	13	50	63	16.6
Vertical	2	4	6	1.6
Running (Rotorcraft/VTOL-STOL)	0	1	1	0.3
Aborted (Fixed-Wing)	0	2	2	0.5
Aborted (Rotorcraft/STOL)	0	1	1	0.3
Other	1	0	1	0.3
Inflight:				
Climb to Cruise	0	4	4	1.1
Normal Cruise	2	8	10	2.6
Hovering	2	1	3	0.8
Low Pass	0	1	1	0.3
Other	2	1	3	0.8
En Route to Treat Crop	4	4	8	2.1
En Route to Reloading Area	2	4	6	1.6
Survey Field/Area	2	3	5	1.3
Starting Swath Run	11	11	22	5.8
Swath Run	22	31	53	13.9
Flareout for Swath Run	2	0	2	0.5
Pullup from Swath Run	15	20	35	9.2
Procedure Turnaround	30	35	65	17.1
Cleanup Swath	3	3	6	1.6
Maneuver to Avoid Obstruction	1	1	2	0.5
Return to Strip	1	10	11	2.9
Landing:				
Traffic Pattern-Circling	0	2	2	0.5
Final Approach (VFR)	0	3	3	0.8
Level Off/Touchdown	3	3	6	1.6
Roll (Fixed Wing)	1	26	27	7.1
Go-Around (VFR)	1	0	1	0.3
No. of Aircraft	125	255	380	
Percent	32.9	67.1		

Table 148 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
AERIAL APPLICATION FLYING
1981

Condition of Light	Type of Weather		Accidents	
	VFR	IFR	No.	Percent
Dawn	3	0	3	0.8
Daylight	351	3	354	93.7
Dusk	8	0	8	2.1
Night (Dark)	9	0	9	2.4
Night (Moonlight-Bright)	4	0	4	1.1
No. of Accidents	375	3	378	
Percent	99.2	0.8		

Table 149 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
AERIAL APPLICATION FLYING
1981

Proximity to Airport	Flight Plan None	VFR	VFR Flt. Following	Unk/ NR	Other	Aircraft No.	Percent
On Airport	73	0	0	0	0	73	19.2
On Barge/Ship/Platform	1	0	0	0	0	1	0.3
In Traffic Pattern	14	0	1	0	0	15	3.9
Miles from Airport:							
Within 1/4	20	0	0	0	0	20	5.3
1/4+ to 1/2	10	0	0	0	0	10	2.6
1/2+ to 3/4	3	0	0	0	0	3	0.8
3/4+ to 1	12	0	0	0	0	12	3.2
1+ to 2	9	0	0	0	0	9	2.4
2+ to 3	9	0	0	0	0	9	2.4
3+ to 4	3	0	0	0	0	3	0.8
4+ to 5	3	0	0	0	0	3	0.8
Beyond 5	144	1	0	1	1	147	38.7
Unknown/Not Reported	75	0	0	0	0	75	19.7
No. of Aircraft	376	1	1	1	1	380	
Percent	98.9	0.3	0.3	0.3	0.3		

Table 150 - MOST PREVALENT DETAILED ACCIDENT CAUSES
AERIAL APPLICATION FLYING
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Failed to Obtain/Maintain Flying Speed	59	15.6
Material Failure	46	12.2
Pilot-Inadequate Preflight Prep. and/or Planning	43	11.4
Pilot-Misjudged Clearance	42	11.1
Pilot-Failed to See and Avoid Objects or Obstructions	37	9.8
Powerplant-Failure for Undetemined Reasons	35	9.3
Pilot-Failed to Maintain Directional Control	17	4.5
Pilot-Mismanagement of Fuel	16	4.2
Fuel Exhaustion	16	4.2
Pilot-Selected Unsuitable Terrain	14	3.7
Personnel-Inadequate Maintenance and Inspection	13	3.4

Table 151 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
AERIAL APPLICATION FLYING
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	432	34	35	35
1976	434	40	44	42
1977	455	31	35	34
1978	457	28	28	27
1979	395	27	27	25
1980	363	25	32	28
1981	378	30	36	34

Year	Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
		Total	Fatal
1975	1,876,000	23.03	1.81
1976	2,136,000	20.27	1.87
1977	2,072,000	21.96	1.50
1978	2,082,000	21.95	1.34
1979	2,393,000	16.51	1.13
1980	2,063,000	17.60	1.21
1981	2,466,000	15.33	1.22

* Suicide and sabotage accident excluded from rates as follows:
Total - 1976 (1)
Fatal - none

Table 152 - MOST PREVALENT TYPES OF ACCIDENTS
AERIAL APPLICATION FLYING
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Engine Failure or Malfunction	112	29.6	133.8	31.8
Col. with Object	117	31.0	118.4	28.1
Stall/Mush	38	10.1	42.0	10.0
Ground-Water Loop-Swerve	33	8.7	22.2	5.3
Col. with Ground/Water-Controlled	12	3.2	22.2	5.3
Stall	20	5.3	16.0	3.8
Nose Over/Down	6	1.6	10.4	2.5
Col. with Ground/Water-Uncontrolled	2	0.5	8.2	1.9
Stall/Spin	4	1.1	5.6	1.3
Airframe Failure in Flight	3	0.8	5.4	1.3
Tail Rotor Failure	7	1.9	4.6	1.1
(All Other Types)	24	6.3	32.0	7.6
Total	378	100.0	420.8	100.0

Table 153 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
AERIAL APPLICATION FLYING
1981 AND 1976 - 1980

Phase of Operation	1981		1976 - 1980	
	No.	Percent	Mean	Percent
In Flight	236	62.1	280.2	66.3
Takeoff	103	27.1	90.6	21.4
Landing	39	10.3	47.8	11.3
Taxi	2	0.5	2.8	0.7
Static	0	0.0	1.2	0.3
Total	380	100.0	422.6	100.0

Table 154 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
AERIAL APPLICATION FLYING
1981 AND 1976 - 1980

Broad Cause/Factor	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Pilot	258	68.3	294.4	70.0
Terrain	105	27.8	142.4	33.8
Powerplant	91	24.1	98.2	23.3
Weather	54	14.3	42.2	10.0
Personnel	30	7.9	38.4	9.1
Miscellaneous	17	4.5	19.8	4.7
Airport/Airways/Facilities	30	7.9	15.8	3.8
Landing Gear	11	2.9	13.6	3.2
Rotorcraft	15	4.0	12.8	3.0
Instruments/Equipment and Accessories	1	0.3	5.8	1.4
Undetermined	4	1.1	5.8	1.4
Airframe	3	0.8	3.2	0.8
Systems	4	1.1	3.2	0.8
No. of Accidents with Cause(s) Assigned	378		420.8	

INSTRUCTIONAL FLYING

Tables 155 through 166 present data describing instructional flying accidents. In 1981, the number of such accidents declined for the third consecutive year. Both the total and fatal accident rates for this category were substantially lower than the rates for all general aviation operations. Ten of the 38 mid-air collision accidents in general aviation involved at least one aircraft being flown for instructional purposes. More than 60 percent of all instructional flying accidents in 1981 occurred during the landing phase of operation.

Table 155 - SUMMARY OF LOSSES
INSTRUCTIONAL FLYING
1979 - 1981

	1981	1980	1979
Accidents			
Fatal	40	41	40
Involved Serious Injury	21	38	41
Involved Minor Injury	61	54	63
Involved No Injury	306	328	373
Total	428	461	517
Fatalities			
Passenger	6	12	4
Crew	57	58	48
Other Persons	7	3	8
Total	70	73	60
Aircraft Damaged*			
Destroyed	87	78	84
Substantial	342	382	430
Minor	1	1	4
None	1	5	3
Total	431	466	521

* Number of General Aviation Aircraft in Instructional Operations

Table 156 - PERSONS BY ROLE AND DEGREE OF INJURY
INSTRUCTIONAL FLYING
1981

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	38	18	60	315	431
Copilot	0	1	0	3	4
Dual Student	17	13	24	126	180
Check Pilot	2	0	2	6	10
Extra Crew	0	0	0	4	4
Passengers	6	1	5	19	31
Total Aboard	63	33	91	473	660
Other Aircraft*	7	0	1	7	15
Grand Total	70	33	92	480	675
Percent	10.4	4.9	13.2	71.1	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are included in this tabulation.

Table 157 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
INSTRUCTIONAL FLYING
1981

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Dual	38	27	53	273	391
Solo (Supervised)	13	5	21	104	143
Check	6	0	3	11	20
Training	6	1	14	85	106
Total	63	33	91	473	660
Percent	9.5	5.0	13.8	71.7	

Table 158 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
INSTRUCTIONAL FLYING
1981

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	4	73*	77*	18.0
Wheels-up Landing	0	0	0	5	5	1.2
Gear Collapsed	0	0	0	4	4	0.9
Gear Retracted	0	0	0	3	3	0.7
Hard Landing	1	2	7	72	82	19.2
Nose Over/Down	0	0	1	16	17	4.0
Roll Over	0	0	0	2	2	0.5
Overshoot	0	1	1	15	17	4.0
Undershoot	0	3	0	14	17	4.0
Col. Between Aircraft-Both in Flight	3	0	1	5*	9*	2.1
Col. Between Aircraft-Both on Ground	0	0	0	1*	1*	0.2
Col. with Ground/Water-Controlled	3	1	3	12	19	4.4
Col. with Ground/Water-Uncontrolled	6	0	0	0	6	1.4
Col. with Wires/Poles	0	0	1	5	6	1.4
Col. with Trees	3	1	0	2	6	1.4
Col. with Building/s	0	0	0	2	2	0.5
Col. with Fence, Fenceposts	0	0	1	0	1	0.2
Col. with Runway or Approach Lights	0	0	0	3	3	0.7
Col. with Airport Hazard	0	0	0	2	2	0.5
Col. with Animals	0	0	0	1	1	0.2
Col. with Crop	0	0	1	0	1	0.2
Col. with Ditches	0	0	0	2	2	0.5
Col. with Snowbank	0	0	0	2	2	0.5
Col. with Parked Aircraft (Unattended)	0	0	0	1	1	0.2
Col. with Dirt Bank	0	0	2	3	5	1.2
Col. with Other	0	0	3	4	7	1.6
Stall	2	3	2	5	12	2.8
Stall/Spin	10	2	1	0	13	3.0
Stall/Mush	1	1	3	2	7	1.6
Fire or Explosion in Flight	1	0	1	0	2	0.5
Fire or Explosion on Ground	0	0	0	1	1	0.2
Airframe Failure	0	0	0	1	1	0.2
Airframe Failure Inflight	2	0	0	0	2	0.5
Airframe Failure on Ground	0	0	0	1	1	0.2
Engine Failure or Malfunction	7	6	29	47	89	20.8
Main Rotor Failure	0	0	0	1	1	0.2
Turbulence	0	1	0	0	1	0.2
Undetermined	1	0	0	0	1	0.2
No. of Accidents	40	21	61	306	428	
Percent	9.3	4.9	14.3	71.5		

* In one collision between aircraft, one of the two aircraft involved experienced a ground-water loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted as one accident in the totals at the end of the table.

Table 159 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
INSTRUCTIONAL FLYING
1981

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Idling Engine/s	0	1	0	0	1	0.2
Taxi:						
To Takeoff	0	4	0	0	4	0.9
From Landing	1	7	0	0	8	1.9
Other	0	1	0	0	1	0.2
Aerial Taxi, Other	0	2	0	0	2	0.5
Takeoff:						
Run	0	25	0	0	25	5.8
Initial Climb	13	22	0	0	35	8.1
Vertical	0	1	0	0	1	0.2
Aborted (Fixed-Wing)	0	9	0	0	9	2.1
Inflight:						
Climb to Cruise	2	4	0	0	6	1.4
Normal Cruise	11	25	0	0	36	8.4
Descending	0	4	0	0	4	0.9
Hovering	0	4	0	0	4	0.9
Autorotative Descent	0	1	0	0	1	0.2
Acrobatics	1	0	0	0	1	0.2
Buzzing	2	0	0	0	2	0.5
Uncontrolled Descent	2	1	0	0	3	0.7
Low Pass	0	2	0	0	2	0.5
Other	14	10	0	0	24	5.6
Starting Swath Run	1	0	0	0	1	0.2
Landing:						
Traffic Pattern-Circling	9	8	1	0	18	4.2
Final Approach (VFR)	6	24	0	0	30	7.0
Initial Approach	2	0	0	0	2	0.5
Final Approach (IFR)	0	1	0	0	1	0.2
Level Off/Touchdown	12	94	0	1	107	24.8
Roll (Fixed Wing)	2	59	0	0	61	14.2
Power-On Landing (Rotorcraft)	0	2	0	0	2	0.5
Power-Off Autorotative Ldg	3	12	0	0	15	3.5
Go-Around (VFR)	5	15	0	0	20	4.6
Other	1	4	0	0	5	1.2
No. of Aircraft	87	342	1	1	431	
Percent	20.2	79.4	0.2	0.2		

Table 160 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
INSTRUCTIONAL FLYING
1981

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	4	0	0	0	4	0.9
Daylight	377	5	1	0	383	89.5
Dusk	19	0	0	0	19	4.4
Night (Dark)	16	0	0	1	17	4.0
Night (Moonlight-Bright)	4	0	0	0	4	0.9
Unknown/Not Reported	1	0	0	0	1	0.2
No. of Accidents	421	5	1	1	428	
Percent	98.4	1.2	0.2	0.2		

Table 161 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
INSTRUCTIONAL FLYING
1981

Proximity to Airport	Flight Plan					Aircraft	
	None	VFR	IFR	Unk/NR	Other	No.	Percent
On Airport	240	27	2	0	1	270	62.6
On Seaplane Base	1	0	0	0	0	1	0.2
In Traffic Pattern	27	2	1	0	0	30	7.0
Miles from Airport:							
Within 1/4	12	1	0	0	0	13	3.0
1/4+ to 1/2	11	2	0	0	0	13	3.0
1/2+ to 3/4	1	0	0	0	0	1	0.2
3/4+ to 1	9	1	0	0	0	10	2.3
1+ to 2	10	3	0	0	1	14	3.2
2+ to 3	2	2	1	0	0	5	1.2
3+ to 4	3	0	0	0	0	3	0.7
4+ to 5	1	0	0	0	0	1	0.2
Beyond 5	41	12	2	0	1	56	13.0
Unknown/Not Reported	11	2	0	1	0	14	3.2
No. of Aircraft	369	52	6	1	3	431	
Percent	85.6	12.1	1.4	0.2	0.7		

Table 162 - MOST PREVALENT DETAILED ACCIDENT CAUSES
INSTRUCTIONAL FLYING
1981

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Supervision of Flight	84	19.6
Pilot-Improper Level Off	55	12.9
Pilot-Improper Recovery from Bounced Landing	39	9.1
Pilot-Failed to Maintain Directional Control	33	7.7
Pilot-Mismanagement of Fuel	27	6.3
Pilot-Improper Op'n of Brakes and/or Flight Controls	26	6.1
Pilot-Failed to Obtain/Maintain Flying Speed	24	5.6
Powerplant-Failure for Undetermined Reasons	24	5.6
Fuel Exhaustion	22	5.1
Pilot-Improper Compensation for Wind Conditions	21	4.9

Table 163 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
INSTRUCTIONAL FLYING
1975 - 1981

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	587	43	77	60
1976	541	55	97	87
1977	572	48	68	64
1978	604	62	243	92
1979	517	40	60	52
1980	461	41	73	70
1981	428	40	70	63

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	5,882,000	9.98	0.73
1976	6,102,000	8.87	0.90
1977	7,646,000	7.48	0.63
1978	6,322,000	9.55	0.98
1979	8,144,000	6.35	0.49
1980	7,315,000	6.30	0.56
1981	7,104,000	6.02	0.56

Table 164 - MOST PREVALENT TYPES OF ACCIDENTS
INSTRUCTIONAL FLYING
1981 AND 1976 - 1980

Type of Accident	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Engine Failure or Malfunction	89	20.8	110.6	20.5
Ground-Water Loop-Swerve	77	18.0	103.8	19.3
Hard Landing	82	19.2	87.2	16.2
Col. with Object	39	9.1	55.2	10.2
Undershoot	17	4.0	22.6	4.2
Nose Over/Down	17	4.0	21.0	3.9
Overshoot	17	4.0	19.4	3.6
Stall/Mush	7	1.6	17.0	3.2
Col. with Ground/Water-Controlled	19	4.4	16.6	3.1
Stall	12	2.8	12.2	2.3
Stall/Spin	13	3.0	11.6	2.2
Col. Between Aircraft-Both in Flight	9	2.1	11.4	2.1
Col. with Ground/Water-Uncontrolled	6	1.4	6.4	1.2
Wheels-up Landing	5	1.2	6.0	1.1
(All Other Types)	19	4.4	38.0	7.1
Total	428	100.0	539.0	100.0

Table 165 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
INSTRUCTIONAL FLYING
1981 AND 1976 - 1980

Phase of Operation	1981		1976 - 1980	
	No.	Percent	Mean	Percent
Landing	261	60.6	320.4	58.9
In Flight	84	19.5	104.6	19.2
Takeoff	70	16.2	95.4	17.5
Taxi	15	3.5	17.0	3.1
Static	1	0.2	4.8	0.9
Not Reported	0	0.0	1.6	0.3
Total	431	100.0	543.8	100.0

Table 166 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
INSTRUCTIONAL FLYING
1981 AND 1976 - 1980

	1981		1976 - 1980	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	370	86.4	467.2	86.7
Terrain	52	12.1	94.8	17.6
Weather	96	22.4	82.2	15.3
Powerplant	43	10.0	61.6	11.4
Personnel	41	9.6	58.0	10.8
Airport/Airways/Facilities	38	8.9	47.2	8.8
Miscellaneous	21	4.9	12.8	2.4
Landing Gear	15	3.5	12.4	2.3
Systems	5	1.2	6.2	1.2
Undetermined	2	0.5	5.2	1.0
Rotorcraft	3	0.7	3.0	0.6
Airframe	4	0.9	3.0	0.6
Instruments/Equipment and Accessories	1	0.2	1.4	0.3
No. of Accidents with Cause(s) Assigned	428		539.0	

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ _____
Chairman

/s/ _____
Member

/s/ _____
Member

/s/ _____
Member

Patricia A. Goldman, Member, submitted a concurring and dissenting statement:

> I support all the facts and conclusions in this Review except those drawn from the combination of "business" and "personal" flying accident statistics (see pages 92 and 102). Further, I do not support the decision for calculating an accident rate for the combined categories of "business" and "personal" flying (see page 101). While recognizing that the exposure data may not be entirely accurate as it is now reported, I am not convinced that combining the figures will result in a higher degree of reliability. I continue to believe there remains a need to give identity to both the business and personal accident statistics.

June 18, 1984

APPENDIX A -- EXPLANATORY NOTES

AIRCRAFT ACCIDENT: The accidents included in this report are the occurrences incident to flight in which, "as a result of the operation of an aircraft, any person (occupant or nonoccupant) receives fatal or serious injury or any aircraft receives substantial damage." The Board's definition of substantial damage as stated in 49 CFR 830.2 is:

(1) Except as provided in subparagraph (2) of this paragraph, substantial damage means damage or structural failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component.

(2) Engine failure, damage limited to an engine, bent fairings or cowling, dented skin, small punctured holes in the skin of fabric, ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps engine accessories, brakes, or wingtips are not considered "substantial damage".

CAUSES AND RELATED FACTORS: In determining probable causes(s) of an accident, all facts, conditions, and circumstances are considered. The objective is to ascertain those cause and effect relationships in the accident sequence about which something can be done to prevent recurrence of the type of accident under consideration. Accordingly, for statistical purposes, where two or more causes exist in an accident, each is recorded and no attempt is made to establish a primary cause. Therefore, in the cause and related factor table, the figures shown in the columns dealing with cause will exceed the total number of accidents. The term "factor" is used, in general, to denote those elements of an accident that further explain or supplement the probable cause(s); this provides a means for collecting essential items of information that could not be readily categorized elsewhere in the system.

COLLISION BETWEEN AIRCRAFT: Collisions between aircraft are so classified only when both aircraft are occupied. This includes collisions wherein both aircraft are airborne (midair); one is airborne, the other on the ground; and both are on the ground. A collision with a parked unoccupied aircraft is classified under the broad category of collision with objects.

FATAL INJURY: Any injury which results in death within 30 days of the accident.

INJURY INDEX: Injury index refers to the highest degree of personal injury sustained as a result of the accident.

KIND OF FLYING: The purpose for which the aircraft was being operated at the time of the accident. In this report, accident statistics are presented for five kinds of flying which are defined as follows:

Personal - Flying by individuals in their own or rented aircraft for pleasure, or personal transportation not in furtherance of their occupation or company business. This category includes practice flying (for the purpose of increasing or maintaining proficiency) not performed under supervision of an accredited instructor, and not part of an approved flight training program.

Business - The use of aircraft by pilots (not receiving direct salary or compensation for piloting) in connection with their occupation or in the furtherance of a private business.

Corporate/Executive - The use of aircraft owned or leased, and operated by a corporate or business firm for the transportation of personnel or cargo in furtherance of the corporation's or firm's business, and which are flown by professional pilots receiving a direct salary or compensation for piloting.

Aerial Application - The operation of aircraft for the purpose of dispensing any substance for plant nourishment, soil treatment, propagation of plant life, pest control, or fire control, including flying to and from the application site.

Instructional - Flying accomplished in supervised training under the direction of an accredited instructor.

PHASE OF OPERATION: The phase of the flight or operation is the particular phase of flight in which the first accident type or circumstance occurred. In the event that both the first and second type of accident occur in one operational phase, the same phase is recorded twice.

SERIOUS INJURY: Any injury which 1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; 2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); 3) involves lacerations which cause severe hemorrhages, nerve, muscle, or tendon damage; 4) involves injury to any internal organ; or 5) involves second- or third-degree burns, or any burns affecting more than 5 percent of body surface. (49 CFR 830.2)

TYPE OF ACCIDENT: The type of accident relates to the circumstances involved in the accident; it indicates what happended. Two separate types may be recorded for one accident. The selection of first and second type is made according to the sequence in which the circumstances occurred.

TYPES OF WEATHER CONDITIONS: The types of weather conditions (VFR/IFR) are determined in accordance with the prescribed minima in Part 91 of the Federal Aviation Regulations. These minima pertain to the ceiling and visibility, in conjunction with the type of airspace, at the accident site. Type of weather conditions is based on surface weather as determined from officially recognized sources. Weather conditions encountered in flight are not necessarily representative of the classifications VFR/IFR as carried under Type of Weather Conditions.

Appendix B -- CAUSE/FACTOR TABLE
ALL OPERATIONS
1981

INVOLVES 3502 TOTAL ACCIDENTS
INVOLVES 654 FATAL ACCIDENTS

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FACTOR	TOTAL	ALL ACCIDENTS CAUSE	FACTOR	TOTAL
** PILOT **						
PILOT IN COMMAND						
ATTEMPTED OPERATION W/KNOWN DEFICIENCIES IN EQUIPMENT	12	5	17	31	11	42
ATTEMPTED OPERATION BEYOND EXPERIENCE/ABILITY LEVEL	18	7	25	28	10	38
BECAME LOST/DISORIENTED	11		11	33	6	39
CONTINUED VFR FLIGHT INTO ADVERSE WEATHER CONDITIONS	109	5	114	157	10	167
CONTINUED INTO KNOWN AREA OF SEVERE TURBULENCE	5		5	5		5
DELAYED ACTION IN ABORTING TAKEOFF	1		1	55	1	56
DELAYED IN INITIATING GO-AROUND	7		7	97	1	98
DIVERTED ATTENTION FROM OPERATION OF AIRCRAFT	18	2	20	60	7	67
EXCEEDED DESIGN STRESS LIMITS OF AIRCRAFT	30		30	34		34
FAILED TO EXTEND LANDING GEAR				16		16
FAILED TO RETRACT LANDING GEAR	2	1	3	7	3	10
RETRACTED GEAR PREMATURELY	1		1	3		3
INADVERTENTLY RETRACTED GEAR				12		12
FAILED TO SEE AND AVOID OTHER AIRCRAFT	17		17	52		52
FAILED TO SEE AND AVOID OBJECTS OR OBSTRUCTIONS	36		36	114		114
FAILED TO OBTAIN/MAINTAIN FLYING SPEED	133		133	339		339
MISJUDGED, SPEED, ALTITUDE OR CLEARANCE	9		9	15		15
FAILED TO MAINTAIN ADEQUATE ROTOR RPM	3		3	22	1	23
FAILED TO USE OR INCORRECTLY USED MISC EQUIPMENT	1	1	2	3	2	5
FAILED TO FOLLOW APPROVED PROCEDURES, DIRECTIVES ETC	15	7	22	56	16	72
IMPROPER OPERATION OF POWERPLANT & POWERPLANT CONTROLS	3	1	4	63	5	68
IMPROPER OPERATION OF BRAKES AND/OR FLIGHT CONTROLS				106	2	108
IMPROPER OPERATION OF FLIGHT CONTROLS	11	1	12	52	1	53
PREMATURE LIFT OFF	1		1	22	1	23
IMPROPER LEVEL OFF	1		1	169		169
IMPROPER IFR OPERATION	23	1	24	30	2	32
IMPROPER IN-FLIGHT DECISIONS OR PLANNING	32		32	102	3	105
IMPROPER COMPENSATION FOR WIND CONDITIONS	2		2	115		115
INADEQUATE PREFLIGHT PREPARATION AND/OR PLANNING	57	27	84	360	52	412
INADEQUATE SUPERVISION OF FLIGHT	10		10	97		97
LACK OF FAMILIARITY WITH AIRCRAFT		18	18	6	99	105
MISMANAGEMENT OF FUEL	22		22	246	1	247
EXERCISED POOR JUDGMENT	27	12	39	69	14	83
OPERATED CARELESSLY		1	1	1	1	2
SELECTED UNSUITABLE TERRAIN	4		4	170	2	172

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

PILOT IN COMMAND (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FATAL ACCIDENTS FACTOR	FATAL ACCIDENTS TOTAL	ALL ACCIDENTS CAUSE	ALL ACCIDENTS FACTOR	ALL ACCIDENTS TOTAL
STARTED ENGINE WITHOUT PROPER ASSISTANCE/EQUIPMENT				5		5
TAXIED/PARKED WITHOUT PROPER ASSISTANCE				6		6
FAILED TO ASSURE THE GEAR WAS DOWN AND LOCKED				17		17
INITIATED FLIGHT IN ADVERSE WEATHER CONDITIONS	28	1	29	46	5	51
SPONTANEOUS-IMPROPER ACTION	1	1	2	3	1	4
MISJUDGED DISTANCE, SPEED, AND ALTITUDE	8		8	37		37
MISJUDGED DISTANCE AND SPEED	5	1	6	166	1	167
MISJUDGED DISTANCE				1		1
MISJUDGED DISTANCE AND ALTITUDE	11		11	97		97
MISJUDGED SPEED AND ALTITUDE	1		1	11		11
MISJUDGED SPEED				3	1	4
MISJUDGED SPEED AND CLEARANCE				2		2
MISJUDGED ALTITUDE AND CLEARANCE	24		24	42		42
MISJUDGED ALTITUDE	19	1	20	25	1	26
MISJUDGED CLEARANCE	9		9	96	1	97
INADEQUATE TRAINING OF STUDENT				1		1
MISUNDERSTANDING OF ORDERS OR INSTRUCTIONS	1		1	2		2
IMPROPER RECOVERY FROM BOUNCED LANDING	1		1	86	1	87
INCAPACITATION	8	1	9	8	2	10
PHYSICAL IMPAIRMENT	27	15	42	32	21	53
SPATIAL DISORIENTATION	84		84	94		94
PSYCHOLOGICAL CONDITION		3	3		3	3
MISUSED OR FAILED TO USE FLAPS	3	7	10	17	28	45
LEFT AIRCRAFT UNATTENDED ENGINE RUNNING				1		1
FAILED TO MAINTAIN DIRECTIONAL CONTROL	1	1	2	155	3	158
SELECTED WRONG RUNWAY RELATIVE TO EXISTING WIND	6	2	8	56	17	73
FAILED TO ABORT TAKEOFF	7		7	62	1	63
FAILED TO INITIATE GO-AROUND				75	1	76
DIRECT ENTRIES	1		1	1		1
SUBTOTAL	866	122	988	3894	338	4232
COPILOT						
FAILED TO EXTEND LANDING GEAR				1		1
IMPROPER OPERATION OF BRAKES AND/OR FLIGHT CONTROLS				1		1
IMPROPER LEVEL OFF				1		1
IMPROPER IFR OPERATION				1		1
INADEQUATE SUPERVISION OF FLIGHT				2		2
LACK OF FAMILIARITY WITH AIRCRAFT					2	2
MISJUDGED DISTANCE AND SPEED				1		1
MISJUDGED DISTANCE AND ALTITUDE				1		1
MISUNDERSTANDING OF ORDERS OR INSTRUCTIONS				1		1
PHYSICAL IMPAIRMENT		1	1		1	1
SPATIAL DISORIENTATION	3		3	3		3

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

COPILOT (CONTINUED)	FATAL ACCIDENTS			ALL ACCIDENTS		
DETAILED CAUSE/FACTOR	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
FAILED TO MAINTAIN DIRECTIONAL CONTROL				1		1
SUBTOTAL	3	1	4	13	3	16
DUAL STUDENT						
ATTEMPTED OPERATION BEYOND EXPERIENCE/ABILITY LEVEL				1		1
DELAYED IN INITIATING GO-AROUND				1		1
FAILED TO EXTEND LANDING GEAR				4		4
FAILED TO SEE AND AVOID OBJECTS OR OBSTRUCTIONS				1		1
FAILED TO OBTAIN/MAINTAIN FLYING SPEED	5		5	7		7
FAILED TO MAINTAIN ADEQUATE ROTOR RPM				5		5
FAILED TO FOLLOW APPROVED PROCEDURES, DIRECTIVES, ETC				1		1
IMPROPER OPERATION OF POWERPLANT + POWERPLANT CONTROLS				4		4
IMPROPER OPERATION OF BRAKES AND/OR FLIGHT CONTROLS				10		10
IMPROPER OPERATION OF FLIGHT CONTROLS	1		1	6		6
PREMATURE LIFT-OFF				1		1
IMPROPER LEVEL OFF				13		13
IMPROPER COMPENSATION FOR WIND CONDITIONS				1		1
INADEQUATE PREFLIGHT PREPARATION AND/OR PLANNING				1		1
MISMANAGEMENT OF FUEL				2		2
SELECTED UNSUITABLE TERRAIN				1		1
FAILURE TO RELINQUISH CONTROL				3		3
CONTROL INTERFERENCE					1	1
SPONTANEOUS-IMPROPER ACTION				2		2
MISJUDGED DISTANCE, SPEED, AND ALTITUDE				1		1
MISJUDGED DISTANCE AND SPEED				4		4
MISJUDGED DISTANCE AND ALTITUDE				10		10
MISJUDGED SPEED AND ALTITUDE				1		1
MISJUDGED SPEED				1		1
MISJUDGED ALTITUDE AND CLEARANCE				2		2
MISJUDGED ALTITUDE				1		1
MISJUDGED CLEARANCE				1		1
IMPROPER RECOVERY FROM BOUNCED LANDING				1		1
SPATIAL DISORIENTATION	3		3	3		3
FAILED TO MAINTAIN DIRECTIONAL CONTROL				7		7
SUBTOTAL	9		9	96	1	97
CHECK PILOT						
INADEQUATE SUPERVISION OF FLIGHT	2		2	5		5
SUBTOTAL	2		2	5		5

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
** PERSONNEL **						
RULES, REGULATIONS, STANDARDS PERSONNEL	1	1	2	1	3	4
FLIGHT INSTRUCTOR						
INADEQUATE SUPERVISION OF FLIGHT	1	2	3	3	5	8
INADEQUATE TRAINING OF STUDENT		1	1		2	2
MAINTENANCE, SERVICING, INSPECTION						
IMPROPER MAINTENANCE(MAINTENANCE PERSONNEL)	1		1	13		13
IMPROPER MAINTENANCE(OWNER PERSONNEL)	2		2	6	1	7
IMPROPERLY SERVICED AIRCRAFT(GROUND CREW)	3		3	7		7
INADEQUATE INSPECTION OF AIRCRAFT(MAINTENANCE PERSONNEL				2	1	3
INADEQUATE INSPECTION OF ACFT(OWNER-PILOT PERSONNEL)				2	1	3
INADEQUATE MAINTENANCE AND INSPECTION	11	6	17	98	22	120
OTHER	1		1	23		23
OPERATIONAL SUPERVISORY PERSONNEL						
INADEQUATE FLIGHT TRAINING-PROCEDURES		1	1		2	2
INADEQUATE GROUND TRAINING-PROCEDURES	1		1	1		1
INADEQUATE SUPERVISION OF FLIGHT CREW		2	2		2	2
INADEQUATE SUPERVISION/TRAINING OF RAMP CREWS		1	1	1	1	2
FAILURE TO PROVIDE ADEQ DIRECTIVES, MANUALS, EQUIPMENT	1	1	2	1	1	2
DEFICIENCY, COMPANY MAINTAINED EQMT, SERV, REGULATIONS	1	1	2	2	1	3
WEATHER PERSONNEL						
INCORRECT WEATHER FORECAST	1		1	1		1
INADEQUATE/INCORRECT WEATHER BRIEFING		2	2		2	2
TRAFFIC CONTROL PERSONNEL						
FAILURE TO ADVISE OF UNSAFE WEATHER CONDITION		3	3		3	3
FAILURE TO ADVISE OF OTHER TRAFFIC	1	2	3	1	2	3
ISSUED IMPROPER OR CONFLICTING INSTRUCTIONS	3		3	3		3
INADEQUATE SPACING OF AIRCRAFT	4		4	4		4
OTHER	1	2	3	1	2	3
AIRPORT SUPERVISORY PERSONNEL						
IMPROPER MAINTENANCE-AIRPORT FACILITIES				1	1	2
FAILURE TO NOTIFY OF UNSAFE COND/AND OR FAILURE TO MARK				4	1	5
IMPROPER/INADEQUATE SNOW REMOVAL				1		1
AIRWAYS FACILITIES PERSONNEL						
OTHER					1	1
PRODUCTION-DESIGN-PERSONNEL						
SUBSTANDARD QUALITY CONTROL	2		2	9		9
INCORRECT FACTORY INSTALLATION	1		1	3		3
POOR/INADEQUATE DESIGN	5	1	6	8	3	11
OTHER	3	1	4	10	2	12
MISCELLANEOUS-PERSONNEL						
PILOT OF OTHER AIRCRAFT	16		16	55	2	57
GROUND SIGNALMAN					1	1
SPECTATOR	1		1	2		2
GROUND CREWMAN	1		1	3	1	4

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
PERSONNEL (CONTINUED)						
PASSENGER				11	5	16
DRIVER OF VEHICLE				5	1	6
OTHER		1	1	3	5	8
THIRD PILOT						
FLIGHT ENGINEER						
FLIGHT PERSONNEL						
DISPATCHING (AIR CARRIER ONLY)						
SUBTOTAL	62	28	90	285	74	359
** AIRFRAME **						
WINGS	6	26	32	6	26	32
SPARS		1	1		1	1
RIBS, STRINGERS, CAP STRIPS	2		2	2		2
WING ATTACHMENT FITTINGS, BOLTS		2	2		2	2
WINGTIPS				1		1
OTHER						
FUSELAGE					1	1
BULKHEADS					1	1
FLOOR STRUCTURE					1	1
SKIN AND ATTACHMENTS	1		1	1	1	2
DOORS, DOOR FRAMES				2	4	6
WINDSHIELDS, WINDOWS, CANOPIES	1		1	1		1
SEATS				1		1
WHEEL WELL DOORS		1	1	1	1	2
OTHER						
LANDING GEAR				17	1	18
MAIN GEAR-SHOCK ABSORBING ASSY, STRUTS, ATTACHMENTS, ETC				12	2	14
NORMAL RETRACTION/EXTENSION ASSEMBLY				1		1
EMERGENCY/EXTENSION ASSEMBLY				5	3	8
TAILWHEEL ASSEMBLIES				8	1	9
NOSEWHEEL ASSEMBLIES				14	3	17
WHEELS, TIRES, AXLES				1		1
FLOAT ASSEMBLIES				1		1
SKID ASSEMBLY				24	8	32
BRAKING SYSTEM (NORMAL)				1	4	5
LANDING GEAR WARNING AND INDICATING COMPONENTS				10	1	11
GEAR LOCKING MECHANISM				2		2
SWITCHES, LEVERS, CRANKING MECHANISM, ETC				4		4
NOSEWHEEL STEERING				5	3	8
OTHER						
FLIGHT CONTROL SURFACES						
ELEVATOR, ASSEMBLY ATTACHMENTS	2		2	3		3

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

AIRFRAME (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
AILERON, SURFACES ATTACHMENTS	1	1	2	2	1	3
HORIZONTAL STABILIZER, ATTACHMENTS	2	12	14	2	12	14
SPOILERS AND SLOTS-LEADING EDGE FLAPS, SPEED BRAKES				1		1
SUBTOTAL	15	43	58	128	77	205
** POWERPLANT **						
ENGINE STRUCTURE						
CRANKCASE		1	1	1	1	2
CRANKSHAFT	1		1	8	1	9
MASTER AND CONNECTING RODS	1		1	23		23
CYLINDER ASSEMBLY	2	1	3	27	1	28
PISTON, PISTON RINGS		1	1	7	2	9
VALVE ASSEMBLIES	1	1	2	20	4	24
BLOWER, IMPELLER ASSEMBLY				7		7
MOUNT AND VIBRATION ISOLATORS				1		1
OTHER	1		1	9	1	10
IGNITION SYSTEM						
MAGNETOES	1	2	3	12	4	16
SPARK PLUG	1	1	2	7	5	12
LOW TENSION WIRING				1	1	2
HIGH TENSION WIRING				2	1	3
IGNITION HARNESS, SHIELDING					1	1
SWITCHES				2		2
LEADS				2	1	3
FUEL SYSTEM						
TANKS				2	1	3
LINES AND FITTINGS				14	4	18
SELECTOR VALVES				5	2	7
FILTERS, STRAINERS, SCREENS				3	2	5
CARBURETOR	1	1	2	10	3	13
PUMPS	1		1	11	1	12
FUEL INJECTION SYSTEM				6		6
VENTS, DRAINS, TANK CAPS	1		1	11	4	15
RAM AIR ASSEMBLY	1	1	2	7		7
OTHER				6	1	7
LUBRICATING SYSTEM	1		1			
LINES, HOSES, FITTINGS				12	1	13
FILTERS, SCREENS	2		2	4		4
PUMP-PRESSURE	1		1	5		5
OIL COOLERS	1		1	2		2
MAGNETIC PLUGS				1		1
SEALS AND GASKETS				1		1

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

POWERPLANT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FATAL ACCIDENTS FACTOR	FATAL ACCIDENTS TOTAL	ALL ACCIDENTS CAUSE	ALL ACCIDENTS FACTOR	ALL ACCIDENTS TOTAL
OTHER				1		1
COOLING SYSTEM						
JACKETS				1		1
OTHER	1		1	4		4
PROPELLER AND ACCESSORIES						
BLADES		1	1	9	2	11
HUBS	1		1	3		3
ELECTRIC PITCH CONTROL MECHANISM					1	1
SPINNERS, DOMES				1		1
GOVERNORS				2	1	3
BLADE RETENTION MECHANISM				1		1
OTHER	1		1	4	2	6
EXHAUST SYSTEM						
MUFFLERS	1		1	2		2
STACKS	1		1	2		2
EXTERNAL SUPERCHARGER				1	1	2
ENGINE ACCESSORIES						
VACUUM PUMPS	1		1	1		1
GENERATORS				1	1	2
STARTERS				4	2	6
ENGINE CONTROLS						
THROTTLE-POWER LEVER ASSEMBLIES	1		1	18		18
MIXTURE CONTROL ASSEMBLIES				3	1	4
PROPELLER GOVERNOR CONTROLS				1		1
POWERPLANT-INSTRUMENTS						
POWER INDICATORS				1		1
FUEL QUANTITY GAUGE					30	30
OTHER					1	1
MISCELLANEOUS						
POWERPLANT FAILURE FOR UNDETERMINED REASONS	20		20	257		257
FOREIGN OBJECT DAMAGE	1		1	3	1	4
DETONATION				4	1	5
DIRECT ENTRIES				1		1
REDUCTION GEAR ASSEMBLY						
GEARS, ACCESSORY DRIVE				1		1
COMPRESSOR ASSEMBLY						
BLADE, COMPRESSOR ROTOR				1		1
BEARING, ROTOR SHAFT				1		1
SEALS, AIR-OIL				2		2
COMBUSTION ASSEMBLY						
TURBINE ASSEMBLY						
BLADE, TURBINE WHEEL	1		1	1		1
BEARING, SHAFT				1		1
ACCESSORY DRIVE ASSEMBLY						

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

POWERPLANT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
LUBRICATING SYSTEM						
FILTER, OIL				1		1
FUEL SYSTEM						
PUMP, FUEL				3		3
FILTER, FUEL				1		1
NOZZLE, FUEL	1		1	2		2
FUEL CONTROL				3		3
SAFETY SYSTEM						
IGNITION SYSTEM						
TORQUEMETER						
AIR BLEED						
OTHER						
EXHAUST SYSTEM				1		1
THRUST REVERSER						
PROPELLER SYSTEM						
OTHER						
CONSTANT SPEED DRIVE				1		1
POWER LEVER						
PROPELLER LEVER						
REVERSE THRUST LEVER						
ENGINE INDICATING EQUIPMENT						
ENGINE INSTALLATION						
SUBTOTAL	47	10	57	573	86	659
** SYSTEMS **						
ELECTRICAL SYSTEM						
BATTERIES						
GENERATORS/ALTERNATORS	1		1	2	1	3
REGULATOR				2	6	8
RELAYS AND WIRING					2	2
PROTECTIVE DEVICES	1		1	3	3	6
OTHER				1	1	2
HYDRAULIC SYSTEM	1	1	2	6	4	10
RESERVOIR, LINES, FITTINGS						
FILTERS				3		3
BY-PASS VALVE				1		1
OTHER				1		1
FLIGHT CONTROL SYSTEMS				2		2
AILERON AND AILERON TAB CONTROL SYSTEM	1		1	2		2
ELEVATOR AND ELEVATOR TAB CONTROL SYSTEM	2		2	4		4
RUDDER AND RUDDER TAB CONTROL SYSTEM				4	1	5
WING FLAP CONTROL SYSTEM (ELECTRICAL)					1	1

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

SYSTEMS (CONTINUED)	FATAL ACCIDENTS			ALL ACCIDENTS		
DETAILED CAUSE/FACTOR	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
FLIGHT CONTROL BOOST SYSTEM (HYDRAULIC)				1		1
OTHER				3		3
ANTI-ICING, DE-ICING SYSTEMS						
AIR CONDITION, HEATING AND PRESSURIZATION						
OTHER	1		1	2		2
AUTO PILOT						
FIRE WARNING SYSTEM						
FIRE EXTINGUISHER SYSTEM						
OXYGEN SYSTEM						
OTHER SYSTEMS						
PITOT SYSTEM					1	1
VACUUM SYSTEM	1	1	2	1	1	2
OTHER				1	2	3
SUBTOTAL	8	2	10	39	23	62
** INSTRUMENTS/EQUIPMENT AND ACCESSORIES **						
FLIGHT AND NAVIGATION INSTRUMENTS						
AIRSPEED					2	2
DIRECTIONAL GYRO		1	1		1	1
COMPASS		1	1		2	2
COMMUNICATIONS AND NAVIGATION EQUIPMENT						
TRANSMITTERS AND/OR RECEIVERS		1	1		5	5
VOR RECEIVERS					1	1
OTHER					1	1
MISCELLANEOUS EQUIPMENT						
SPRAY, DUSTING EQUIPMENT				1		1
GLIDER LAUNCH/TOW EQUIPMENT		1	1		1	1
SUBTOTAL		4	4	1	13	14
** ROTORCRAFT **						
ROTOR ASSEMBLIES						
MAIN ROTOR BLADES	1		1	2		2
TAIL ROTOR BLADES	1		1	4		4
BEARINGS				1		1
TRANSMISSION ROTOR DRIVE SYSTEM						
ENGINE DRIVE SHAFT	1		1	2		2
MAIN ROTOR GEAR BOX	1		1	1		1
TAIL ROTOR DRIVE SHAFT ASSEMBLY	1		1	9		9
TAIL ROTOR GEAR BOX				3		3
CLUTCH ASSEMBLY				6		6

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

ROTORCRAFT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
SPRAG SYSTEM				2		2
OTHER				1		1
FLIGHT CONTROL SYSTEMS						
CYCLIC PITCH CONTROL SYSTEM	2		2	4		4
COLLECTIVE PITCH CONTROL SYSTEM				2		2
TAIL ROTOR PITCH CONTROL SYSTEM				2		2
STABILIZING SURFACES-DAMPERS				1		1
MISCELLANEOUS UNITS AND ASSEMBLIES						
TAIL BOOMS/PYLONS/CONES				1	1	2
SUBTOTAL	7		7	41	1	42
** AIRPORTS/AIRWAYS/FACILITIES **						
AIRPORT FACILITIES						
APPROACH LIGHTING					1	1
RUNWAY LIGHTING					4	4
OTHER					6	6
AIRPORT CONDITIONS						
WET RUNWAY				3	57	60
ICE/SLUSH ON RUNWAY		2	2		15	15
SNOW ON RUNWAY		1	1	3	24	27
SNOW WINDROWS					16	16
UNMARKED OBSTRUCTIONS		1	1	5	7	12
SOFT SHOULDERS (RUNWAY)					18	18
ROUGH WATER					2	2
HIGH VEGETATION		1	1	1	37	38
HIDDEN HAZARD				1	3	4
POORLY MAINTAINED RUNWAY SURFACE		1	1	2	33	35
SOFT RUNWAY				1	24	25
WET RAMP/TAXIWAY					1	1
SOFT TAXIWAY				1		1
OTHER		3	3	3	80	83
AIRWAYS FACILITIES						
VORTAC	1		1	1		1
SUBTOTAL	1	9	10	21	328	349
** WEATHER **						
LOW CEILING		149	149		215	215
RAIN		63	63		94	94
FOG		106	106		173	173
SNOW		23	23		44	44

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

.WEATHER (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FATAL ACCIDENTS FACTOR	FATAL ACCIDENTS TOTAL	ALL ACCIDENTS CAUSE	ALL ACCIDENTS FACTOR	ALL ACCIDENTS TOTAL
HAIL		2	2		2	2
ICING CONDITIONS-INCLUDES SLEET, FREEZING RAIN, ETC		17	17		29	29
CONDITIONS CONDUCIVE TO CARB/INDUCTION SYSTEM ICING		4	4		49	49
UNFAVORABLE WIND CONDITIONS		27	27	10	344	354
WIND SHEAR		1	1	4	15	19
SUDDEN WINDSHIFT		3	3	5	29	34
TURBULENCE IN FLIGHT, CLEAR AIR	1	1	2	2	24	26
TURBULENCE ASSOCIATED WITH CLOUDS AND/OR THUNDERSTORMS		26	26	1	33	34
DOWNDRAFTS, UPDRAFTS		11	11	7	70	77
LOCAL WHIRLWIND				3	3	6
SQUALL LINE					2	2
ADVERSE WINDS ALOFT					1	1
HIGH TEMPERATURE		2	2		12	12
OBSTRUCTIONS TO VISION		11	11		19	19
HIGH DENSITY ALTITUDE		28	28		152	152
THUNDERSTORM ACTIVITY		43	43		68	68
OTHER		3	3		10	10
SUBTOTAL	1	520	521	32	1388	1420
** TERRAIN **						
WET, SOFT GROUND		1	1	3	132	135
SNOW-COVERED		1	1	1	10	11
ICY					5	5
HIGH VEGETATION		4	4		80	80
HIDDEN OBSTRUCTIONS				3	12	15
ROUGH/UNEVEN		7	7	6	180	186
ROUGH WATER					4	4
GLASSY WATER					2	2
HIGH OBSTRUCTIONS		32	32	1	185	186
LOOSE GRAVEL					6	6
SANDY		1	1		12	12
OTHER		4	4		39	39
SUBTOTAL		50	50	14	667	681
** MISCELLANEOUS **						
BIRD COLLISION	5		5	17		17
VORTEX TURBULENCE	2		2	7	1	8
PROP/JET/ROTOR BLAST				1		1
ANIMAL(S) ON RUNWAY/TAXIWAY/RAMP				11	2	13
EVASIVE MANEUVER TO AVOID COLLISION	3	2	5	41	44	85

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

MISCELLANEOUS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
UNQUALIFIED PERSON OPERATED AIRCRAFT	8	6	14	14	15	29
FOREIGN OBJECT DAMAGE	1		1	5		5
SMOKE IN COCKPIT		2	2	1	14	15
FOREIGN MATERIAL AFFECTING NORMAL OPERATIONS	2		2	20	4	24
UNDETERMINED	50		50	79		79
SUBTOTAL	71	10	81	196	80	276
GRAND TOTAL	1092	799	1891	5338	3079	8417

** MISCELLANEOUS ACTS, CONDITIONS **

ALTIMETER SETTING-INCORRECT		3	3	1	4	5
ANTI-ICING/DEICING EQUIP-IMPROPER OPER. OF/FAILED TO USE	2		2	45		45
CHECKLIST-FAILED TO USE		1	1		2	2
CREW COORDINATION-POOR				1		1
DISREGARD OF GOOD OPERATING PRACTICE		2	2		4	4
IMPROPER EMERGENCY PROCEDURES	9	2	11	35	6	41
GUST LOCKS ENGAGED				1		1
INSTRUMENTS-MISREAD OR FAILED TO READ	1		1	1	1	2
SEAT BELT NOT FASTENED	1	2	3	1	3	4
NOT ALLIGNED WITH RUNWAY/INTENDED LANDING AREA				15	5	20
UNWARRANTED LOW FLYING	26	41	67	40	63	103
FAILED TO USE ALL AVAILABLE RUNWAY				2	6	8
LANDED AT WRONG AIRPORT				1		1
INATTENTIVE TO FUEL SUPPLY				53		53
FLEW INTO BLIND CANYON	4	3	7	12	4	16
POORLY PLANNED APPROACH				1	8	9
MISCALCULATED FUEL CONSUMPTION	2		2	32	4	36
JETTISONED LOAD		2	2		41	41
STOLEN OR UNAUTHORIZED USE OF AIRCRAFT		12	12		24	24
LANDED ON FOAMED RUNWAY					2	2
CORRECTING LENSES-NOT USED					1	1
IMPROPERLY SECURED	1		1	10	4	14
BOGUS PART				1		1
COMMUNICATIONS FAILURE					3	3
ELECTRICAL FAILURE	1	1	2	6	17	23
ENGINE LOADED UP				4		4
FATIGUE FRACTURE	14	1	15	48	1	49
FUEL GRADE-IMPROPER	2	1	3	5	1	6
HYDRAULIC FAILURE				1		1
RPM-UNCONTROLLABLE-OVERSPEED	1		1	1	1	2
THRUST REVERSAL-ASYMETRICAL				1		1

THRUST REVERSAL-ASYMETRICAL

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

MISCELLANEOUS ACTS, CONDITIONS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
WINDSHIELD, DIRTY, FOGGY, ETC-RESTRICTED VISION				2	10	12
WRONG PART	2	1	3	9	2	11
IMPROPER ALIGNMENT/ADJUSTMENT				17	5	22
FAILURE OF TWO OR MORE ENGINES		5	5		23	23
SEPARATION IN FLIGHT	1	44	45	1	60	61
FIRE IN CABIN/ COCKPIT/ BAGGAGE COMPARTMENT	1		1	4	1	5
FIRE IN ENGINE	1	2	3	5	9	14
ASYMETRICAL FLAPS				1		1
LATERAL IMBALANCE					1	1
CORRODED/CORROSION	3		3	10	2	12
INCORRECT TRIM SETTING	1		1	4	2	6
CARGO SHIFTED				1		1
CONGESTED TRAFFIC-PATTERN		3	3		5	5
PILOT FATIGUE		4	4		6	6
FUEL EXHAUSTION	15		15	197		197
FUEL CONTAMINATION-EXCLUSIVE OF WATER IN FUEL	3		3	23	1	24
PILOT SUFFERED HEART ATTACK	4	1	5	4	1	5
ALCOHOLIC IMPAIRMENT OF EFFICIENCY AND JUDGMENT	26	11	37	30	15	45
HYPOXIA	1		1	1		1
CARBON MONOXIDE POISONING	1		1	1		1
ICE-IN FUEL				2		2
ICE-CARBURETOR	2		2	43		43
AIRFRAME ICE	6	2	8	12	7	19
ICE-WINDSHIELD					2	2
IMPROPERLY LOADED AIRCRAFT-WEIGHT-AND/OR CG	3	16	19	10	26	36
INTERFERENCE WITH FLIGHT CONTROLS	1		1	8	3	11
WHITEOUT		2	2		6	6
SUNGLARE		3	3		20	20
LACK OF LUBRICATION-SPECIFIC PART, NOT SYSTEM	1		1	8		8
OIL EXHAUSTION-ENGINE LUBRICATION SYSTEM				11		11
SIMULATED CONDITIONS		2	2		26	26
FUEL SIPHONING				3	1	4
WATER IN FUEL	4		4	43		43
AIRCRAFT CAME TO REST IN WATER		34	34		140	140
FROZEN, MOISTURE					1	1
MISSING	1		1	16	1	17
TOUCH AND GO LANDING		11	11		85	85
HYDROPLANING ON WET RUNWAY				1	7	8
OVERLOAD FAILURE	5	24	29	14	254	268
MATERIAL FAILURE	12	3	15	184	18	202
FUEL STARVATION	16	1	17	128	2	130
OIL STARVATION	2		2	7	1	8
IMPROPER CLEARANCE-TOLERANCE				1	1	2
FUEL SELECTOR POSITIONED BETWEEN TANKS	2		2	4		4

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

MISCELLANEOUS ACTS, CONDITIONS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
TIEDOWN LINES SNAPPED					1	1
FIRE OF UNDETERMINED ORIGIN				2	4	6
UNAPPROVED MODIFICATION		1	1		1	1
IMPROPER/INADEQUATE VENTING				1		1
POOR WELD	2		2	6	1	7
PREVIOUS DAMAGE	1		1	8	6	14
LEAK/LEAKAGE	1	2	3	25	11	36
LOW FLUID LEVEL				4	2	6
CIRCUIT BREAKER POPPED					3	3
ARCING		1	1	3	2	5
LOW COMPRESSION					1	1
RUNWAY CLOSED		1	1	1	8	9
DOWNWIND		14	14		134	134
CARBON DEPOSITS				5	2	7
OVER TORQUED		1	1		1	1
UNDER TORQUED		1	1	2	1	3
LOOSE, PART/FITTING	2	1	3	20	3	23
GROUND RESONANCE				2		2
BENT	1	2	3	4	3	7
BINDING				15		15
BUCKLED	1		1	1		1
BURST	1		1	1		1
BURNED	1		1	2	1	3
CHAFFED	1		1	5	1	6
COLLAPSED					1	1
DETERIORATED		1	1	4	4	8
DISCONNECTED	1		1	26	2	28
EXCESSIVE-WEAR/PLAY	1	1	2	12	9	21
ERRATIC		1	1	1	34	35
FLUTTER	3		3	3		3
FRAYED					2	2
FUNGUS, EFFECT	1		1	1		1
GROUNDED	2		2	8		8
EXCESSIVE VOLTAGE					1	1
IMPROPERLY INSTALLED	3		3	23	2	25
JAMMED	1		1	10	2	12
NICKED				1		1
OBSTRUCTED	7		7	37	2	39
OPEN				2	1	3
OVERHEATED	1		1	5		5
PINCHED				3		3
EXCESSIVE PRESSURE				2		2
PRESSURE TOO LOW				1		1
PRESSURE, NONE					1	1

Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1981

MISCELLANEOUS ACTS, CONDITIONS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
SCORED				1		1
SHEARED				4	1	5
STICKING				5	1	6
STRIPPED		1	1	1	1	2
TEMPERATURE TOO LOW				2		2
VIBRATION, EXCESSIVE				8	10	18
WARPED					2	2
ICE-INDUCTION	1		1	2		2
FIRE IN WING		1	1	2	1	3
LOAD NOT JETTISONED				1	17	18
INTENTIONAL GROUND-WATER LOOP-SWERVE				9	7	16
INTENTIONAL WHEELS UP				14	5	19
RAN OFF END OF RUNWAY		3	3		137	137

DIRECT ENTRY CAUSES

PILOT-FAILED TO MAINTAIN POSITIVE RATE OF CLIMB
MISC-OTHER AIRCRAFT
MISC-FUEL EXHAUSTION FOR UNDETERMINED REASON
MISC-OIL EXHAUSTION FOR UNDETERMINED REASON
MISC-OIL EXHAUSTION FOR UNDETERMINED REASON
MISC-FUEL SIPHONED FOR UNKNOWN REASON
MISC-EMERG TKOF,CRITICALLY INJ PAX,HVY WT,DRY LAKE
MISC-FUEL STARVATION FOR UNKNOWN REASON
MISC-BURNER IGNITED AFTER TOUCHDOWN FOR UNK REASON
MISC-PREMATURE CHUTE OPENING
MISC-TOW LINE BCM WRAPPED ARND TAIL WHL/RUD SFG.
PWR PLT-OIL PRESS LOSS FOR UNDETERMINED REASON
MISC-FUEL STARVATION FOR UNDETERMINED REASON
MISC-NUMEROUS WASPS IN CABIN,WNG,ENG AREAS OF ACFT
MISC-LOSS OF CONTROL
MISC-FUEL STARVATION FOR UNDETERMINED REASON

DIRECT ENTRY CAUSES ARE CARRIED UNDER THEIR APPROPRIATE
CAUSAL CATEGORIES AND ARE INCLUDED IN THE TOTALS