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16. Abstract

This report presents a statistical compilation and review of general aviation accidents which occurred in 1988 in the United States, its territories and possessions, and in international waters. The accidents reported are all those involving U.S. registered aircraft not conducting operations under 14 CFR 121, 14 CFR 125, 14 CFR 127, or 14 CFR 135.

This report is divided into five sections: All Accidents; Fatal Accidents; Serious Injury Accidents; Property Damage Accidents and Midair Collision Accidents. Several tables present accident parameters for 1988 accidents only, and each section includes tabulations which present comparative statistics for 1988 and for the five-year period 1983-1987.

17. Key Words	18. Distribution Statement
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UNCLASSIFIED	UNCLASSIFIED	86	

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INTRODUCTION

In 1988, a total of 2,383 U.S. registered general aviation aircraft were involved in accidents in the United States and its territories.[1] This report presents a statistical compilation and review of those accidents, all involving U.S. registered aircraft not conducting air carrier revenue operations under 14 CFR 121, 14 CFR 125, 14 CFR 127, or 14 CFR 135.

The total number of accidents in 1988 decreased 4.5 percent from 1987. While the number of fatal accidents increased by 3.7 percent over the 1987 total, the number of fatalities decreased by 3.7 percent in 1988. The 1988 total accident rate was 6.0 percent lower than the 1987 rate and the fatal accident rate was 2.0 percent higher in 1988 than in 1987.

The lowest accident rates (total and fatal) among aircraft types were recorded for turbojet airplanes. The highest total accident rate was for reciprocating engine powered rotorcraft (20.39 accidents per 100,000 hours flown). Reciprocating engine powered rotorcraft also had the highest fatal accident rate (2.81 fatal accidents per 100,000 hours flown).

Safety Board reports also capture information related to the purpose of the accident flight. The highest accident rates recorded (total and fatal) were for personal/business purposes. During 1988, 70.5 percent of aircraft involved in general aviation accidents and 82.1 percent of aircraft involved in fatal accidents were operating in the personal/business category.

In 1988, 36 percent of the total accidents occurred during the approach or landing. Sixteen percent of fatal accidents occurred during these phases of flight. Takeoff accidents accounted for 20 percent of the year's total and 18 percent of the fatal accidents.

The pilot was cited as causing or contributing to the cause of 92 percent of the fatal general aviations accidents in 1988, while weather conditions were a factor in about 39 percent of fatal accidents. The incidence of pilot error and weather was somewhat lower among all accidents - 85 percent and 28 percent respectively. The reader should consider that multiple

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[1] Since a collision between aircraft is counted as one accident for the purposes of this report, and since there were 17 accidents in which two general aviation aircraft collided in the air and 12 on the ground, the number of accidents in 1988 was 2,354.

causes and related factors may be cited in any given accident. This fact should be taken into account in any interpretation of the tabulations involving accident causes/factors.

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

The review is divided into five sections. The first section presents a wide range of information on all general aviation accidents, including historical comparison data for similar types of aircraft, and aircraft being operated for particular purposes. The four remaining sections contain information on fatal accidents, serious injury accidents, property damage accidents and midair collision accidents, respectively. Tables that list occurrences or phase of operation are based on the first in the accident sequence. Appendix A provides an explanation of terms used in this report. Appendix B contains a tabulation of cause and factor assignments for all 1988 accidents. Appendix C is a copy of NTSB Form 6120.4 (Factual Aviation Accident/Incident Report Form), the source of data upon which this review is based.

Table 1 - SUMMARY OF LOSSES
ALL OPERATIONS
1984 - 1988

	1984	1985	1986	1987	1988
Accidents					
Fatal	543	497	473	431	447
Involved Serious Injury	348	306	317	290	288
Involved Minor Injury	445	411	402	356	389
Involved No Injury	1675	1523	1384	1387	1230
Total	3011	2737	2576	2464	2354
Fatalities					
Passenger	469	432	395	342	307
Crew	549	508	481	449	464
Other Persons	21	11	89	16	6
Total	1039	951	965	807	777
Aircraft Damaged*					
Destroyed	894	795	744	673	668
Substantial	2086	1929	1826	1784	1684
Minor	26	21	17	22	18
None	42	22	22	12	13
Total	3048	2767	2609	2491	2383

* Number of General Aviation Aircraft

Table 2 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES ABOARD, AND RATES BY TYPE OF AIRCRAFT AND BY KIND OF FLYING
ALL OPERATIONS
1988

Type of Aircraft	Accidents	Fatal Accidents	Fatalities Aboard	Accident Rate Per 100,000 Aircraft Hours Flown	
				Total	Fatal
Fixed Wing	2104	414	731	7.77	1.53
Single Recip. Engine	1930	342	588	9.11	1.62
Multiple Recip. Engine	148	60	115	4.93	2.00
Turboprop	23	9	18	1.62	0.64
Turbojet	7	4	10	0.47	0.27
Rotorcraft	180	21	27	9.22	1.08
Recip. Engine(s)	116	16	20	20.39	2.81
Turbine Powered	64	5	7	4.62	0.36
Gliders	42	12	13	N/A	N/A
Balloons	25	0	0	N/A	N/A
Kind of Flying					
Personal	1488	319	566	10.52*	2.33*
Business	171	48	86		
Corporate/Executive	10	2	3	0.27	0.05
Aerial Application	170	12	13	8.55	0.60
Instructional	337	32	48	6.33	0.61
All Aircraft	2354	447	771	7.94	1.51

* 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. The NTSB has previously stated its objections to presenting separate rates until exposure data are available which depict a more credible division of flying hours between the two categories.

Table 3 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL OPERATIONS
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	3818	631	1221	1203	38,641,000	9.88	1.63
1980	3590	618	1239	1230	36,402,000	9.86	1.69
1981	3500	654	1282	1261	36,803,000	9.51	1.78
1982	3233	591	1187	1171	32,095,000	10.06	1.84
1983	3075	555	1064	1057	31,048,000	9.90	1.79
1984	3011	543	1039	1018	31,510,000	9.55	1.72
1985	2737	497	951	940	30,590,000	8.95	1.62
1986	2576	473	965	876	29,317,000	8.80	1.61
1987	2464	431	807	791	29,208,000	8.45	1.48
1988	2354	447	777	771	29,634,000	7.94	1.51

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1980 (1), 1982 (3), 1983 (1), 1984 (3), 1985 (3), 1987 (1), 1988 (1)
Fatal - 1980 (1), 1984 (2), 1985 (2), 1987 (1)

Figure 1 - ACCIDENTS PER 100,000 HOURS FLOWN
ALL OPERATIONS

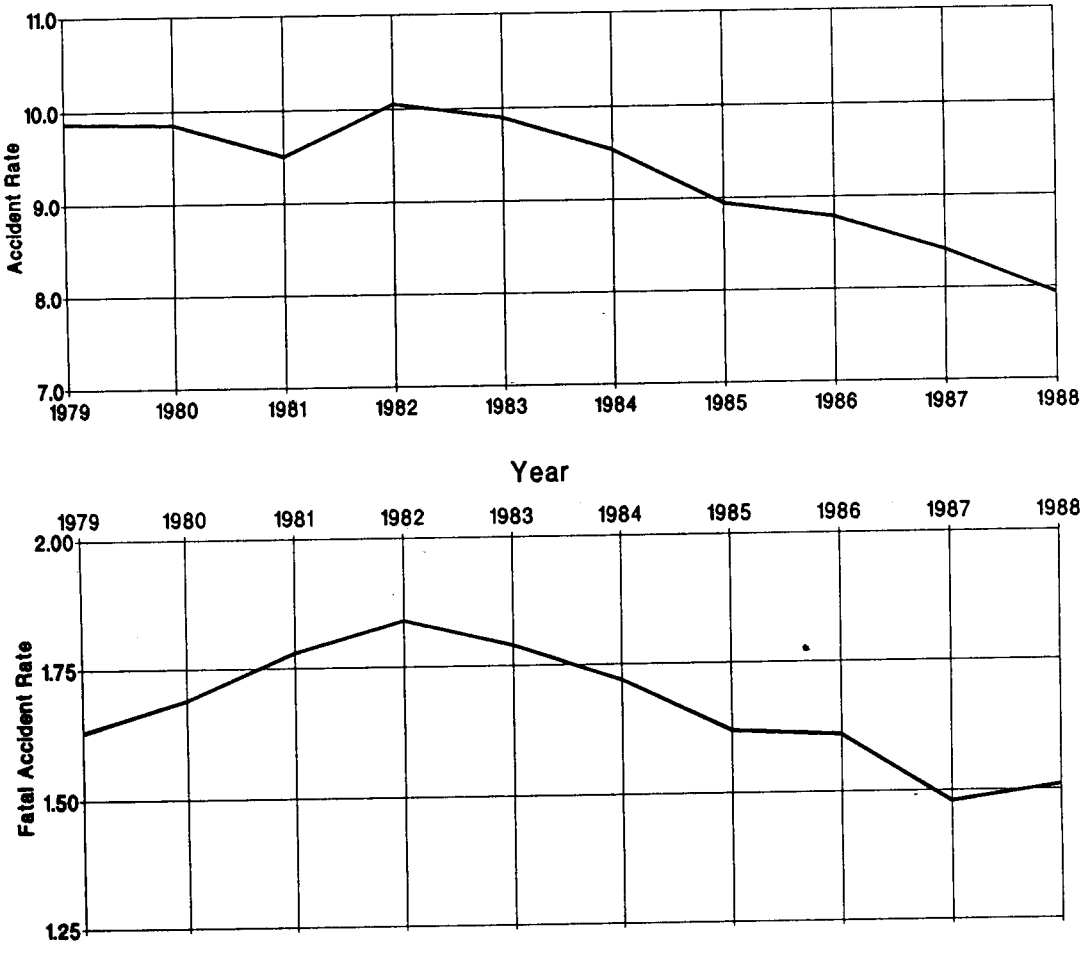

Table 4 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL FIXED WING AIRCRAFT
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	3477	592	1155	1142	36,760,000	9.46	1.61
1980	3233	569	1168	1162	34,145,000	9.47	1.66
1981	3161	610	1208	1190	34,113,000	9.27	1.79
1982	2885	539	1105	1094	30,077,000	9.59	1.79
1983	2729	503	990	985	28,917,000	9.43	1.74
1984	2695	496	969	950	29,555,000	9.11	1.67
1985	2466	454	892	883	28,471,000	8.65	1.59
1986	2298	426	901	805	27,234,000	8.44	1.56
1987	2222	399	763	748	27,404,000	8.10	1.45
1988	2104	414	737	731	27,067,000	7.77	1.53

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1980 (1), 1982 (2), 1983 (1), 1984 (3), 1985 (3), 1987 (1), 1988 (1)
Fatal - 1980 (1), 1984 (2), 1985 (2), 1987 (1)

Figure 2 - ACCIDENTS PER 100,000 HOURS FLOWN
ALL FIXED WING AIRCRAFT

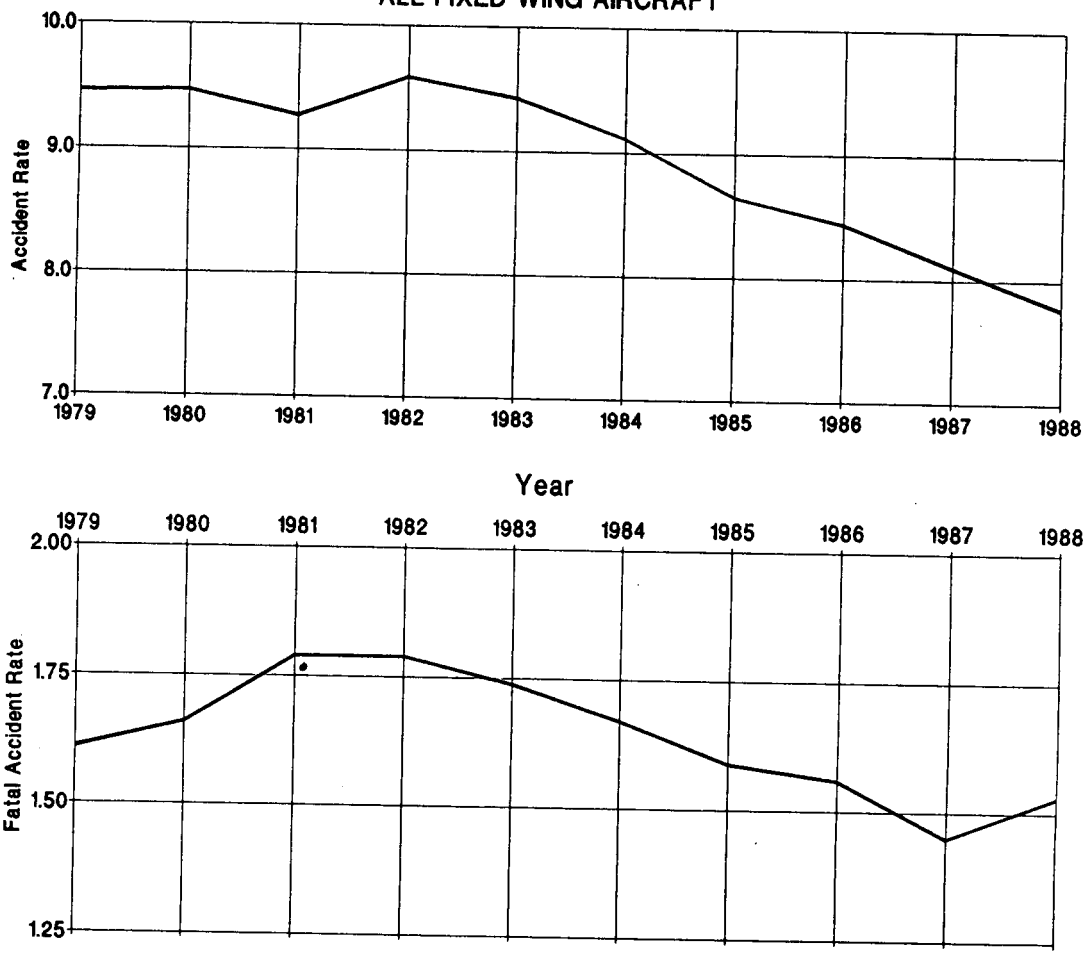

Table 5 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	3071	471	869	856	29,128,000	10.54	1.62
1980	2854	459	876	864	26,876,000	10.62	1.70
1981	2819	496	918	906	26,347,000	10.70	1.88
1982	2547	455	862	846	23,165,000	10.99	1.96
1983	2439	419	779	771	22,152,000	11.01	1.89
1984	2381	405	765	748	22,710,000	10.47	1.77
1985	2178	367	672	662	21,926,000	9.92	1.67
1986	2061	358	713	623	20,935,000	9.84	1.71
1987	2001	341	618	600	21,262,000	9.41	1.60
1988	1930	342	593	588	21,169,000	9.11	1.62

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1980 (1), 1982 (1), 1983 (1), 1984 (3), 1985 (2), 1987 (1), 1988 (1)
Fatal - 1980 (1), 1984 (2), 1985 (1), 1987 (1)

Figure 3 - ACCIDENTS PER 100,000 HOURS FLOWN
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE

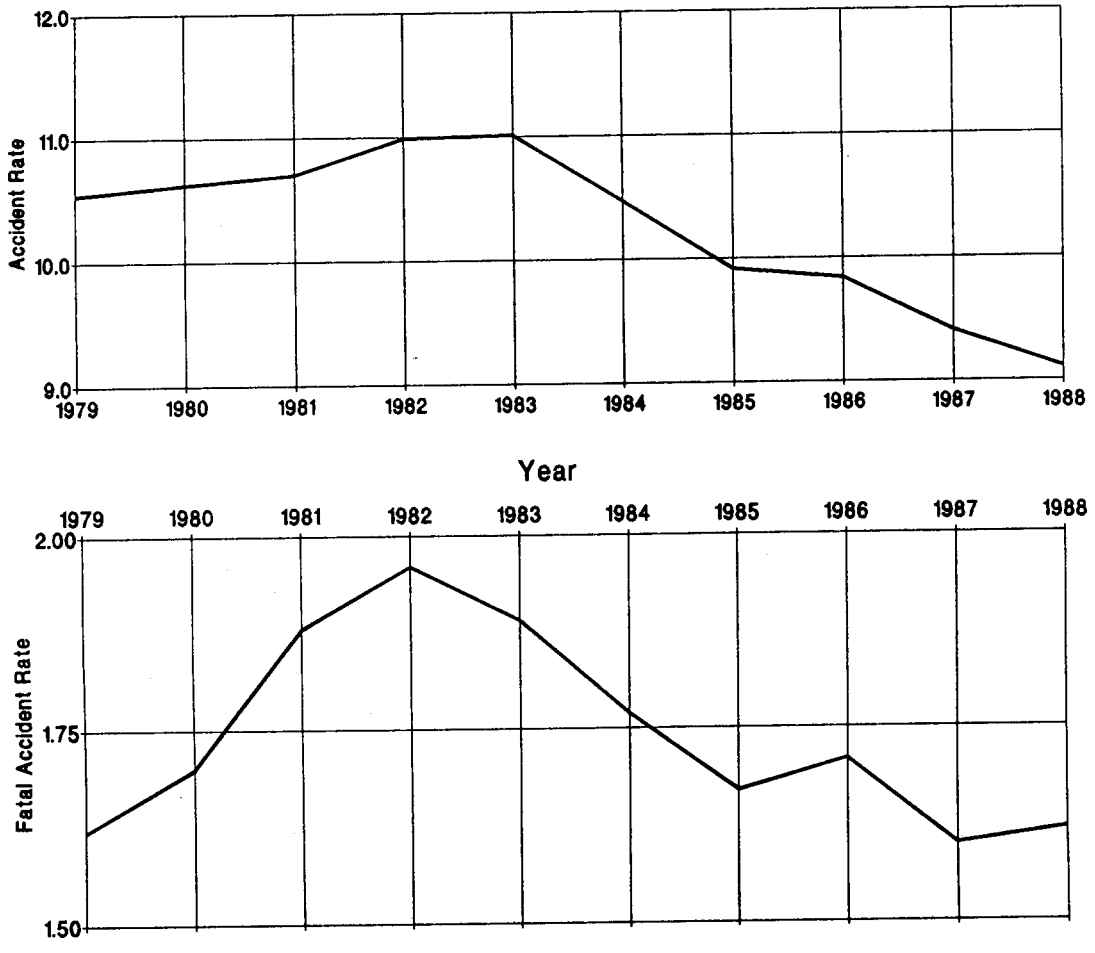

Table 6 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINE
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	358	108	258	247	5,098,000	7.02	2.12
1980	330	99	262	256	4,491,000	7.35	2.20
1981	289	94	220	218	4,833,000	5.98	1.94
1982	297	78	212	208	4,026,000	7.35	1.94
1983	243	74	193	188	3,828,000	6.35	1.93
1984	257	74	166	164	3,853,000	6.67	1.92
1985	229	68	164	160	3,639,000	6.27	1.84
1986	190	54	122	121	3,498,000	5.43	1.54
1987	186	46	115	109	3,383,000	5.50	1.36
1988	148	60	118	115	3,001,000	4.93	2.00

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1982 (1), 1985 (1)
Fatal - 1985 (1)

Figure 4 - ACCIDENTS PER 100,000 HOURS FLOWN
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINE

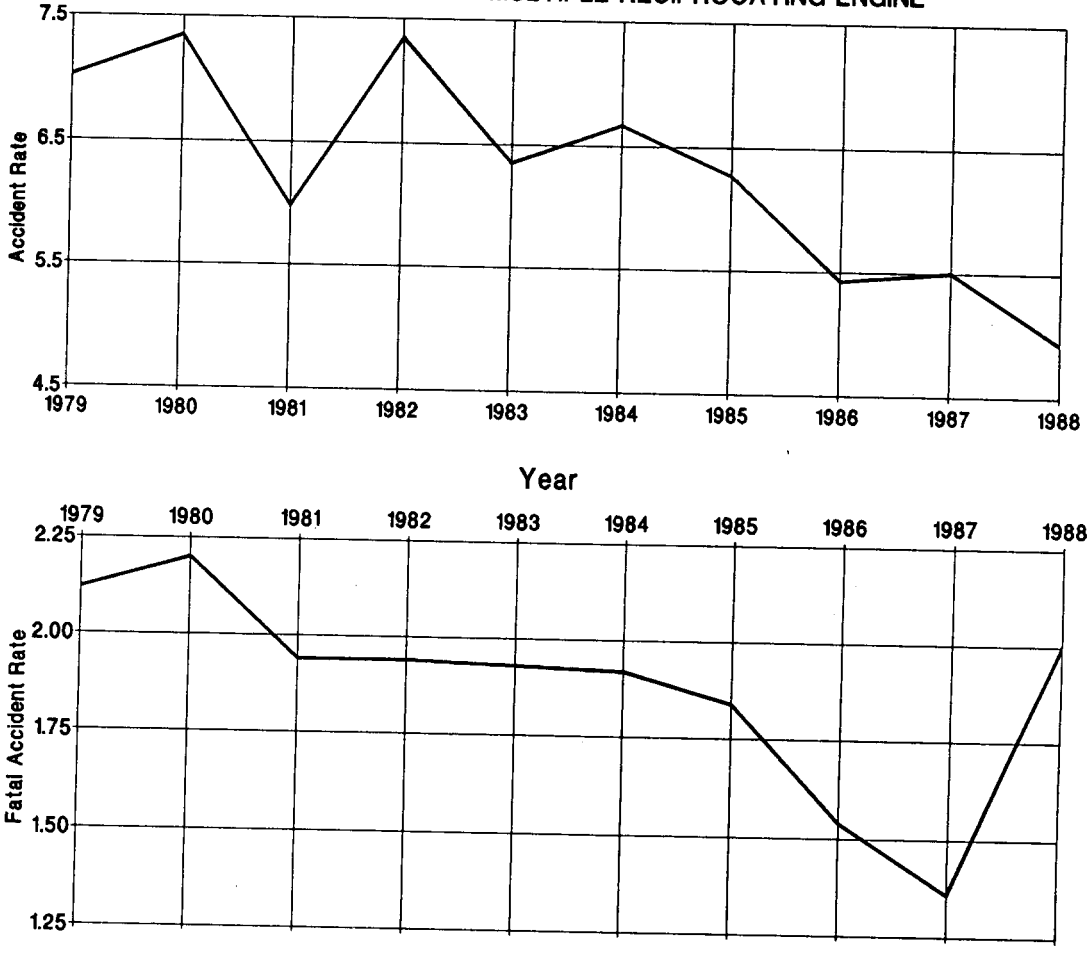

Table 7 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - TURBOPROP
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	42	14	31	30	1,375,000	3.05	1.02
1980	41	11	38	35	1,524,000	2.69	0.72
1981	49	17	61	48	1,606,000	3.05	1.06
1982	38	9	37	33	1,515,000	2.51	0.59
1983	33	10	20	19	1,460,000	2.26	0.68
1984	46	12	23	23	1,689,000	2.72	0.71
1985	46	17	55	51	1,418,000	3.24	1.20
1986	36	12	57	51	1,345,000	2.68	0.89
1987	31	9	27	27	1,407,000	2.20	0.64
1988	23	9	18	18	1,416,000	1.62	0.64

Figure 5 - ACCIDENTS PER 100,000 HOURS FLOWN
FIXED WING AIRCRAFT - TURBOPROP

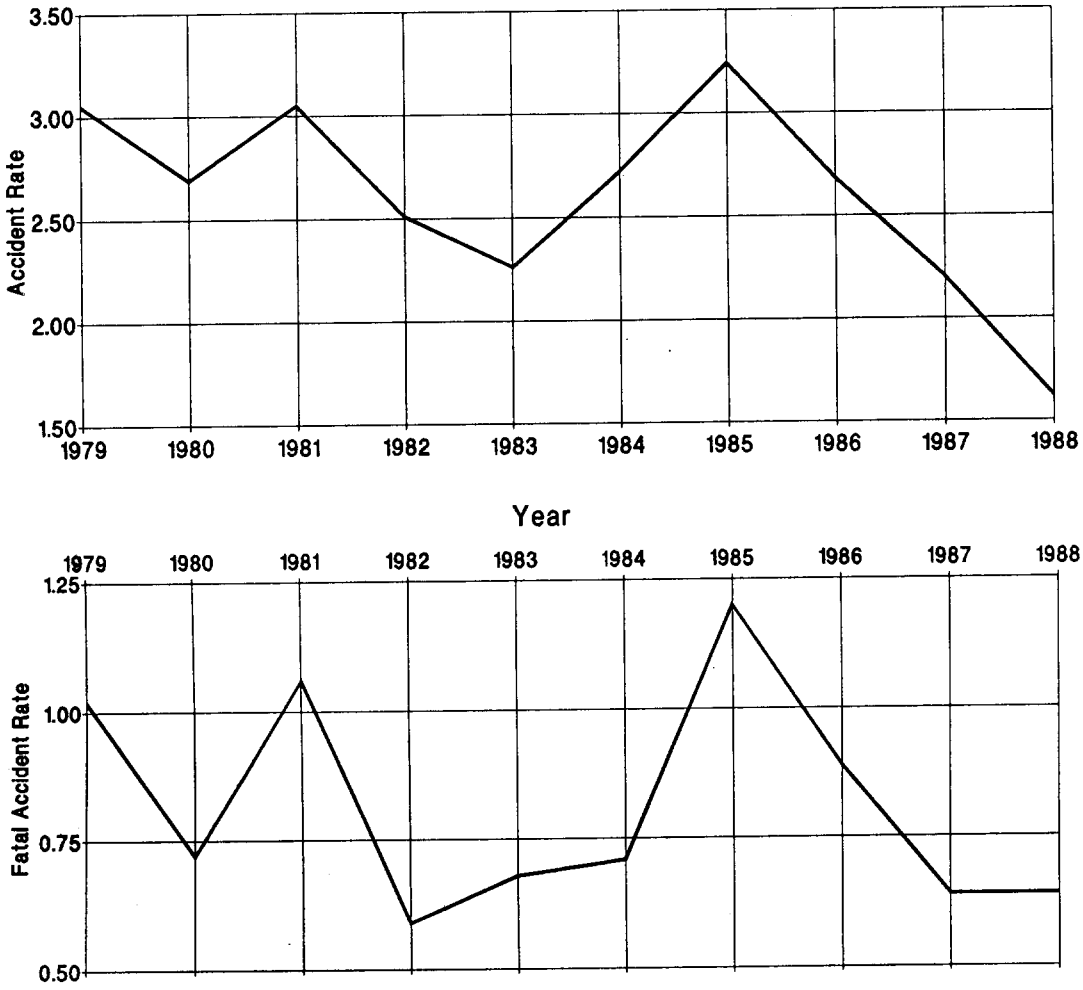

Table 8 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - TURBOJET
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	13	3	9	9	1,120,000	1.16	0.27
1980	12	3	7	7	1,244,000	0.96	0.24
1981	7	4	17	17	1,318,000	0.53	0.30
1982	10	2	7	7	1,349,000	0.74	0.15
1983	14	4	15	6	1,452,000	0.96	0.28
1984	14	5	15	15	1,303,000	1.07	0.38
1985	16	5	15	10	1,488,000	1.08	0.34
1986	13	3	10	10	1,456,000	0.89	0.21
1987	10	6	12	12	1,352,000	0.74	0.44
1988	7	4	10	10	1,481,000	0.47	0.27

Figure 6 - ACCIDENTS PER 100,000 HOURS FLOWN
FIXED WING AIRCRAFT - TURBOJET

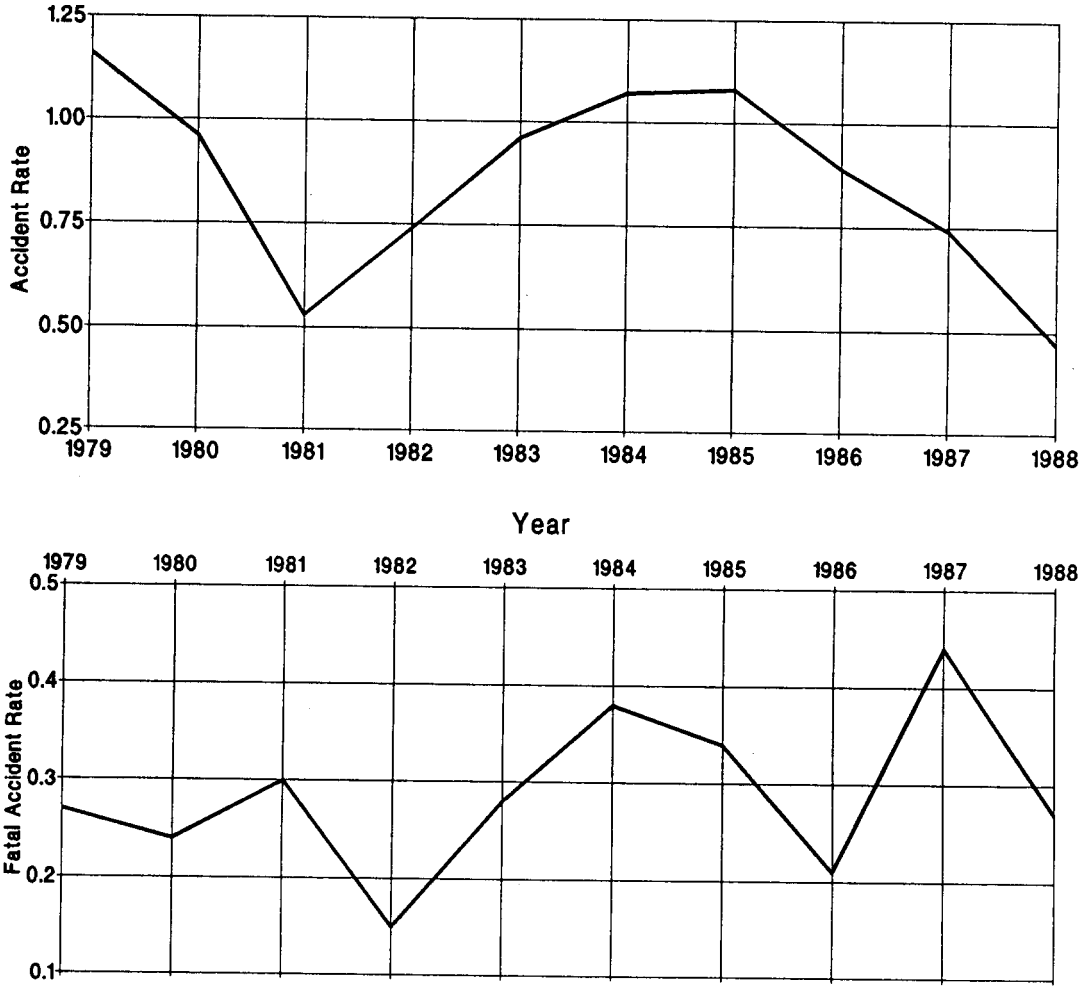

Table 9 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL ROTORCRAFT
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	265	33	56	51	1,522,000	17.41	2.17
1980	261	40	60	57	1,891,000	13.80	2.12
1981	257	30	55	52	2,303,000	11.16	1.30
1982	255	41	66	62	1,628,000	15.60	2.52
1983	238	37	58	56	1,709,000	13.93	2.17
1984	224	38	61	59	1,599,000	14.01	2.38
1985	206	36	50	47	1,706,000	12.08	2.11
1986	191	39	81	59	1,689,000	11.31	2.31
1987	171	25	40	40	1,388,000	12.32	1.80
1988	180	21	27	27	1,953,000	9.22	1.08

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1982 (1)
Fatal - None

Figure 7 - ACCIDENTS PER 100,000 HOURS FLOWN
ALL ROTORCRAFT

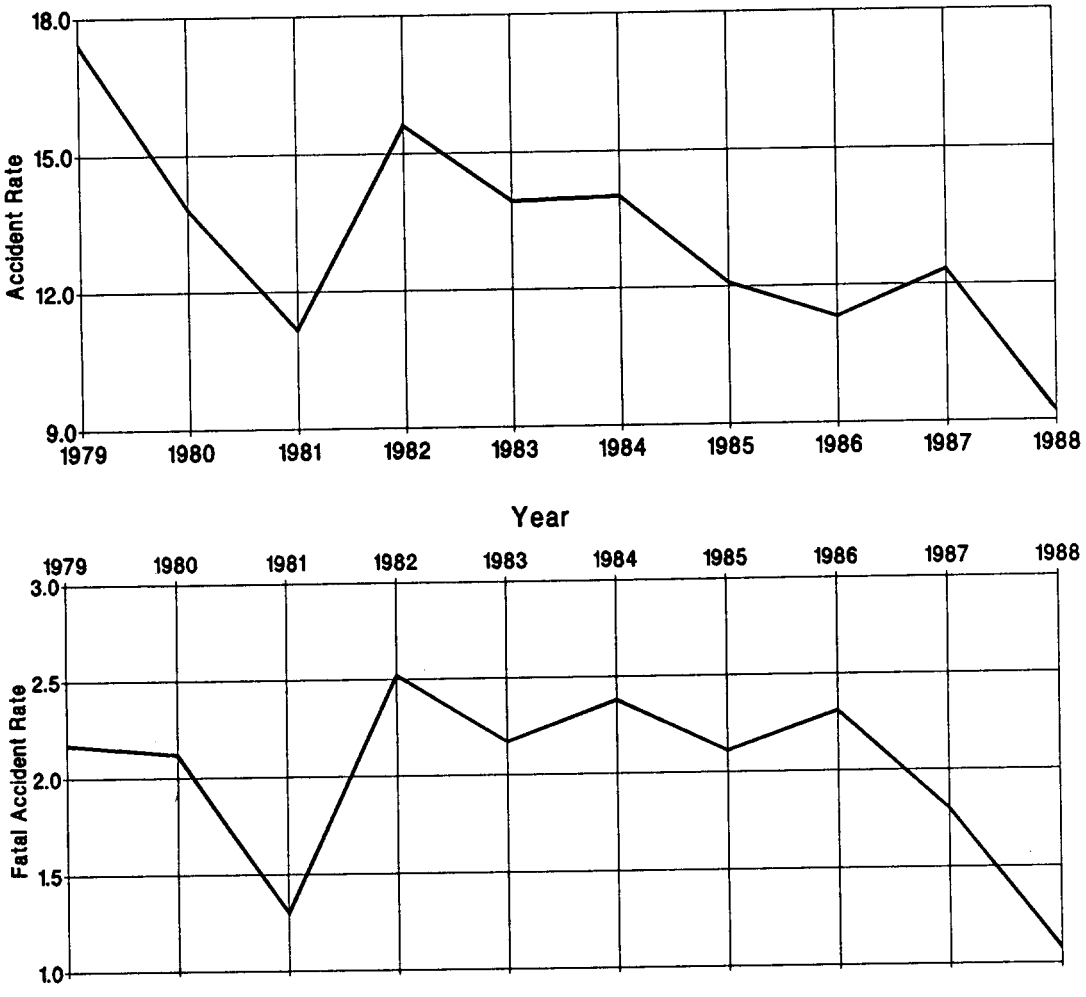

Table 10 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	185	20	30	25	859,000	21.54	2.33
1980	181	22	25	24	719,000	25.17	3.06
1981	178	21	32	29	878,000	20.27	2.39
1982	157	20	24	24	570,000	27.37	3.51
1983	143	20	25	25	566,000	25.27	3.53
1984	128	22	29	28	578,000	22.15	3.81
1985	119	12	14	13	557,000	21.36	2.15
1986	118	21	24	22	789,000	14.96	2.66
1987	114	16	23	23	646,000	17.65	2.48
1988	116	16	20	20	569,000	20.39	2.81

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1982 (1)
Fatal - None

Figure 8 - ACCIDENTS PER 100,000 HOURS FLOWN
ROTORCRAFT - RECIPROCATING ENGINE(S)

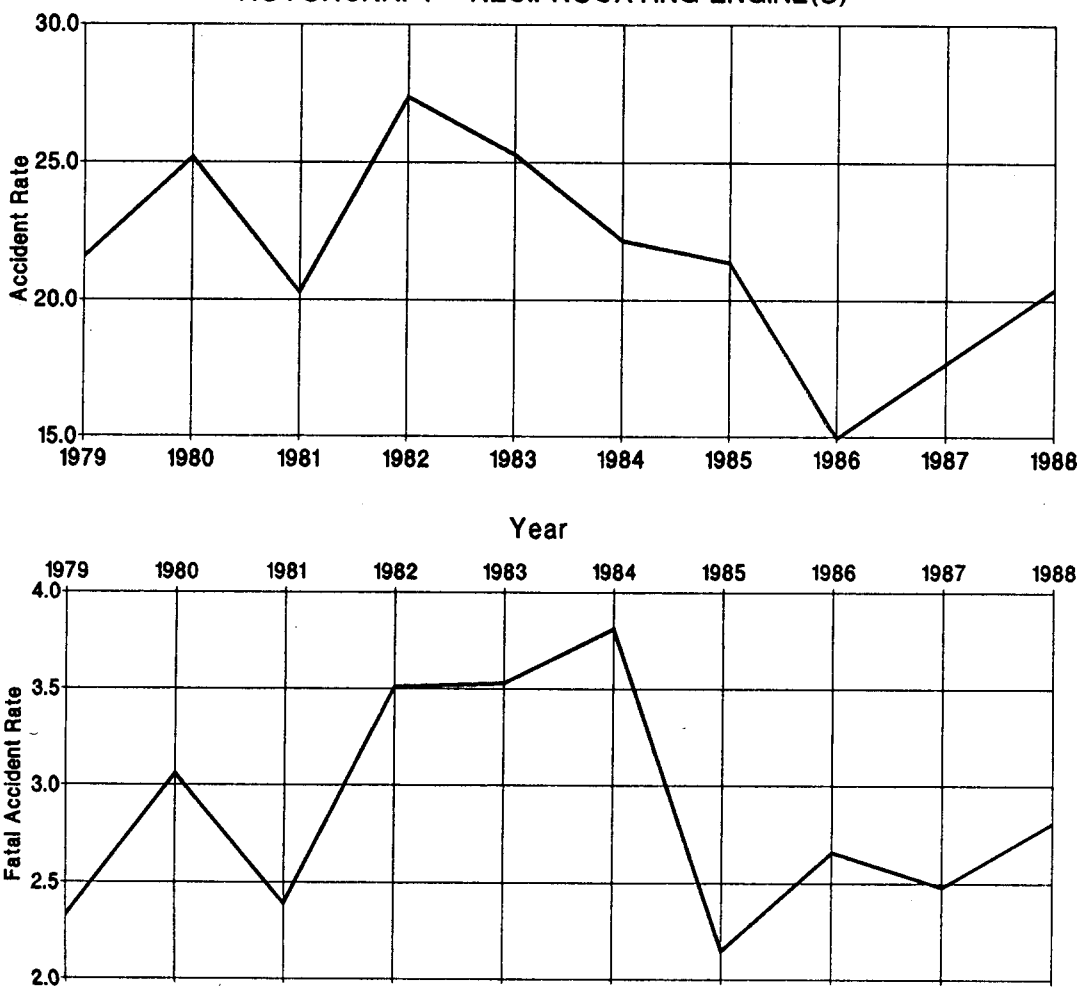

Table 11 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ROTORCRAFT - TURBINE POWERED
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	80	13	26	26	663,000	12.07	1.96
1980	80	18	35	33	1,172,000	6.83	1.54
1981	79	9	23	23	1,424,000	5.55	0.63
1982	98	21	42	38	1,061,000	9.24	1.98
1983	95	17	33	31	1,143,000	8.31	1.49
1984	96	16	32	31	1,021,000	9.40	1.57
1985	87	24	36	34	1,149,000	7.57	2.09
1986	73	18	57	37	900,000	8.11	2.00
1987	57	9	17	17	741,000	7.69	1.21
1988	64	5	7	7	1,384,000	4.62	0.36

Figure 9 - ACCIDENTS PER 100,000 HOURS FLOWN
ROTORCRAFT - TURBINE POWERED

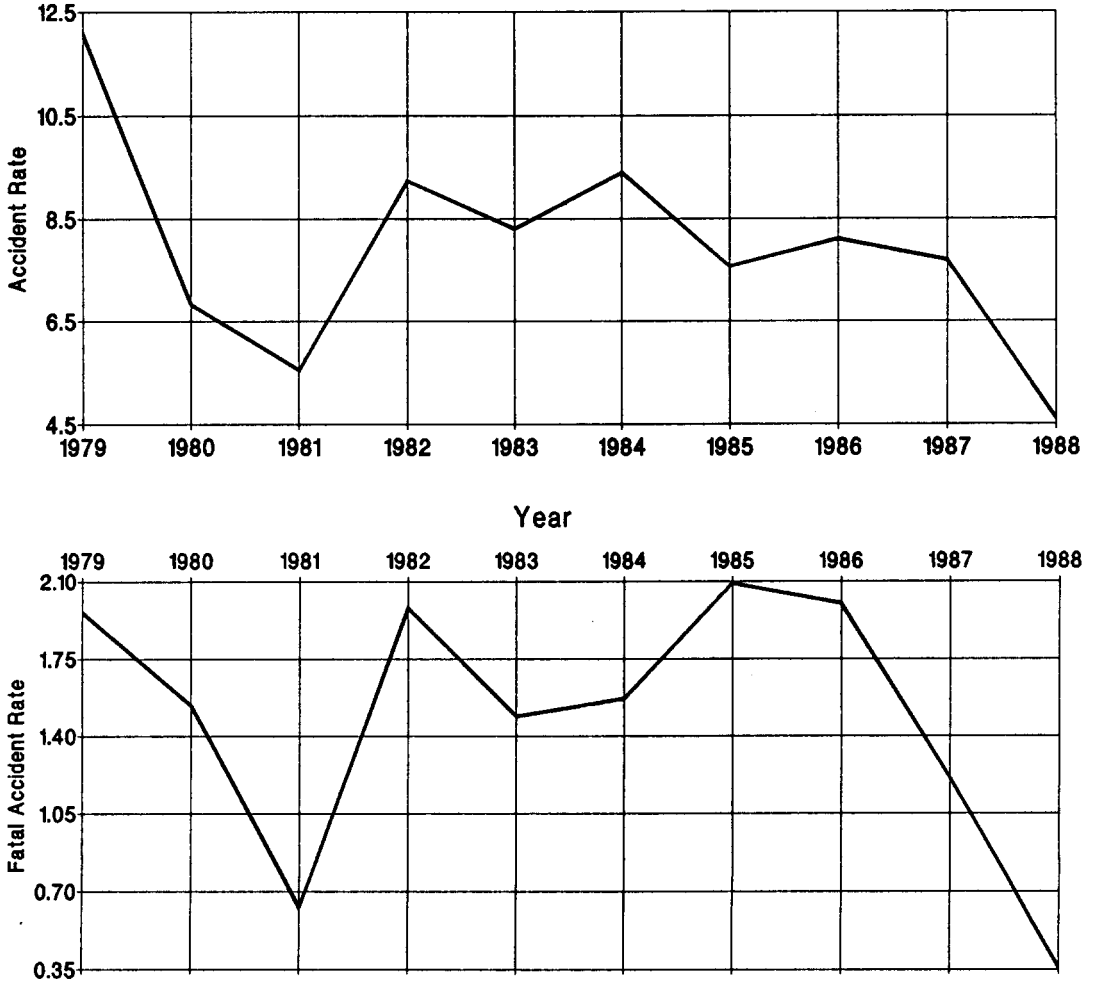

Table 12 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
PERSONAL AND BUSINESS FLYING COMBINED
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	2461	470	932	917	20,638,000	11.92	2.28
1980	2285	450	924	915	19,374,000	11.79	2.32
1981	2220	456	892	883	18,323,000	12.12	2.49
1982	2194	471	979	965	16,584,000	13.23	2.84
1983	2157	450	891	886	15,676,000	13.76	2.87
1984	2153	440	867	862	16,537,000	13.00	2.65
1985	1999	388	754	743	16,302,000	12.25	2.37
1986	1828	386	819	720	15,993,000	11.43	2.41
1987	1753	342	654	650	16,500,000	10.62	2.07
1988	1659	367	658	652	15,773,000	10.52	2.33

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1980 (1), 1984 (3), 1985 (2), 1987 (1)
Fatal - 1980 (1), 1984 (2), 1985 (1), 1987 (1)

Figure 10 - ACCIDENTS PER 100,000 HOURS FLOWN
PERSONAL AND BUSINESS FLYING COMBINED

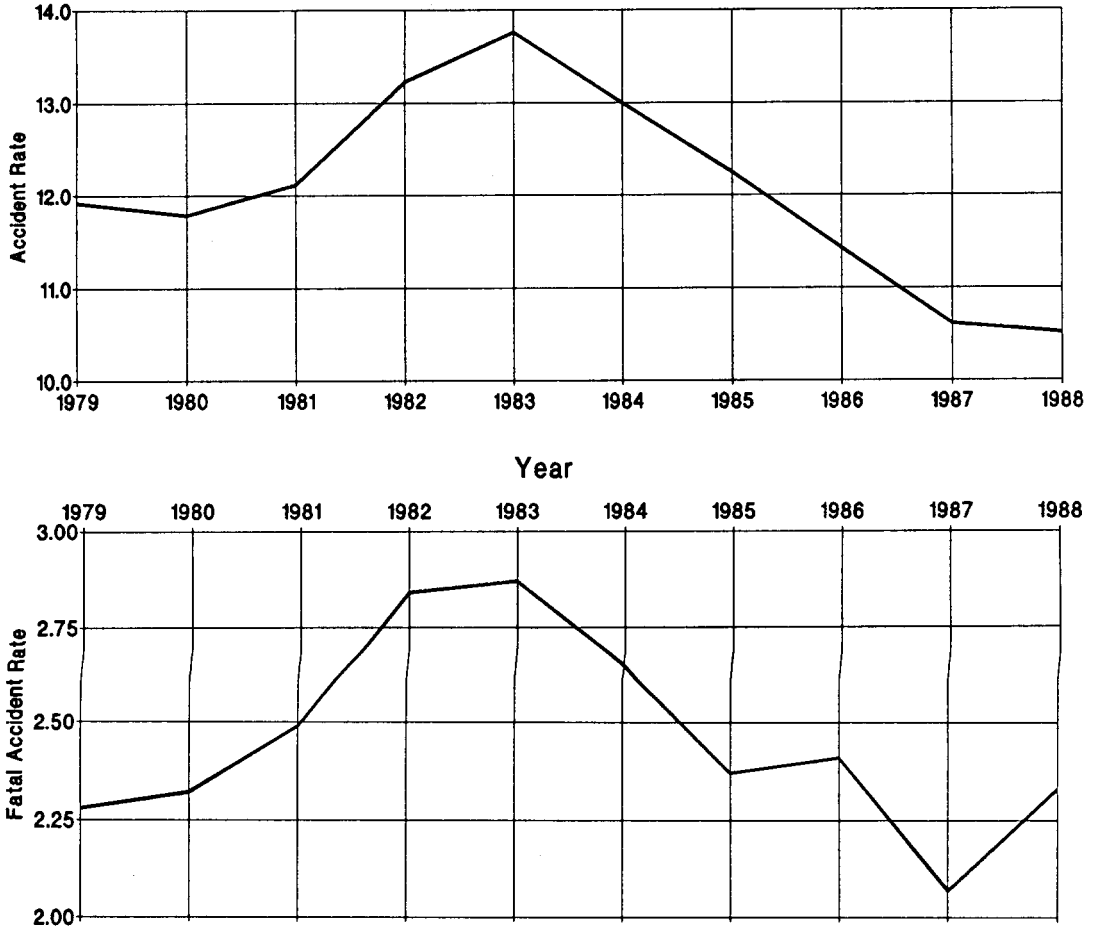

Table 13 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
CORPORATE/EXECUTIVE FLYING
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	78	15	57	51	5,022,000	1.55	0.30
1980	96	21	66	63	5,351,000	1.79	0.39
1981	84	30	99	99	6,209,000	1.35	0.48
1982	39	6	21	20	4,998,000	0.78	0.12
1983	39	6	23	23	5,253,000	0.74	0.11
1984	25	4	8	8	4,788,000	0.52	0.08
1985	37	13	37	32	4,189,000	0.88	0.31
1986	20	3	11	11	3,781,000	0.53	0.08
1987	19	4	10	7	3,403,000	0.56	0.12
1988	10	2	3	3	3,748,000	0.27	0.05

Figure 11 - ACCIDENTS PER 100,000 HOURS FLOWN
CORPORATE/EXECUTIVE FLYING

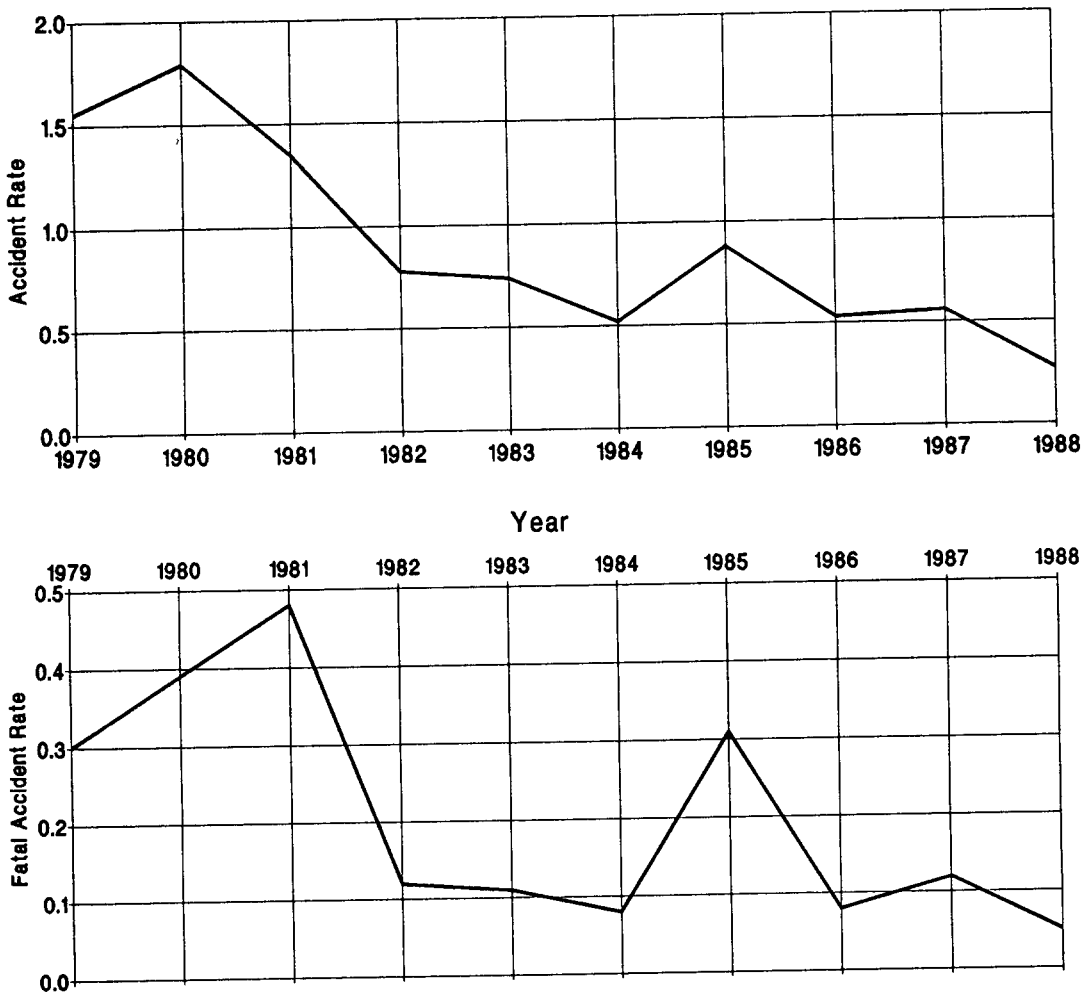

Table 14 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
AERIAL APPLICATION FLYING
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	395	27	27	25	2,393,000	16.51	1.13
1980	363	25	32	28	2,063,000	17.60	1.21
1981	378	30	36	34	2,466,000	15.33	1.22
1982	272	17	18	15	2,058,000	13.22	0.83
1983	254	15	15	15	1,774,000	14.32	0.85
1984	245	20	21	20	2,022,000	12.12	0.99
1985	167	9	9	9	2,181,000	7.66	0.41
1986	193	19	22	20	1,985,000	9.72	0.96
1987	175	11	11	10	1,666,000	10.50	0.66
1988	170	12	13	13	1,989,000	8.55	0.60

Figure 12 - ACCIDENTS PER 100,000 HOURS FLOWN
AERIAL APPLICATION

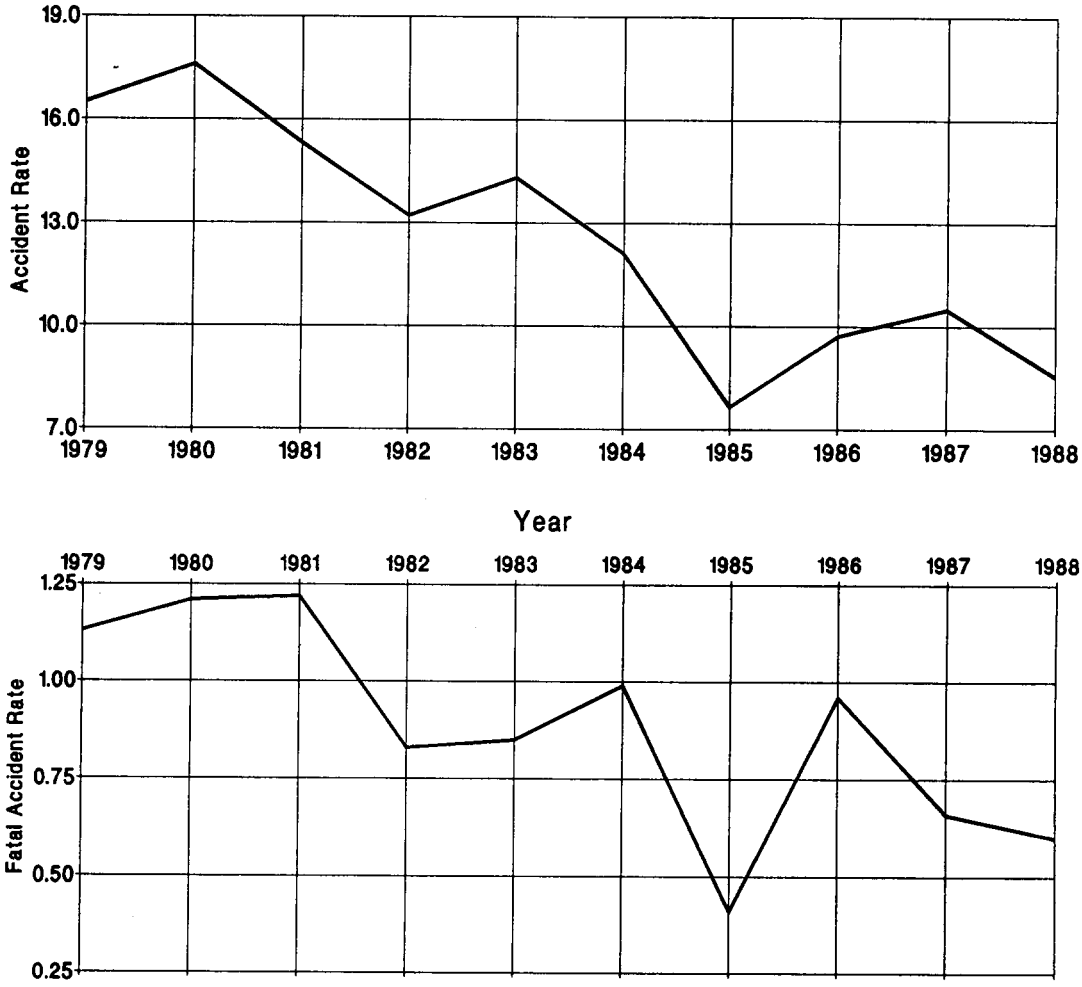

Table 15 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
INSTRUCTIONAL FLYING
1979 - 1988

Year	Accidents	Fatal Accidents	Fatalities		Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
			Total	Aboard Aircraft In This Category		Total	Fatal
1979	516	39	59	51	8,144,000	6.34	0.48
1980	461	41	73	70	7,315,000	6.30	0.56
1981	428	40	70	63	7,104,000	6.02	0.56
1982	411	22	38	36	4,939,000	8.30	0.45
1983	379	26	41	40	5,820,000	6.51	0.45
1984	353	25	54	37	5,694,000	6.20	0.44
1985	314	27	52	40	5,322,000	5.90	0.51
1986	314	23	41	37	4,677,000	6.71	0.49
1987	337	30	67	56	4,904,000	6.87	0.61
1988	337	32	50	48	5,309,000	6.33	0.60

* Suicide and sabotage accidents excluded from rates as follows :
Total - 1982 (1), 1988 (1)
Fatal - None

Figure 13 - ACCIDENTS PER 100,000 HOURS FLOWN
INSTRUCTIONAL

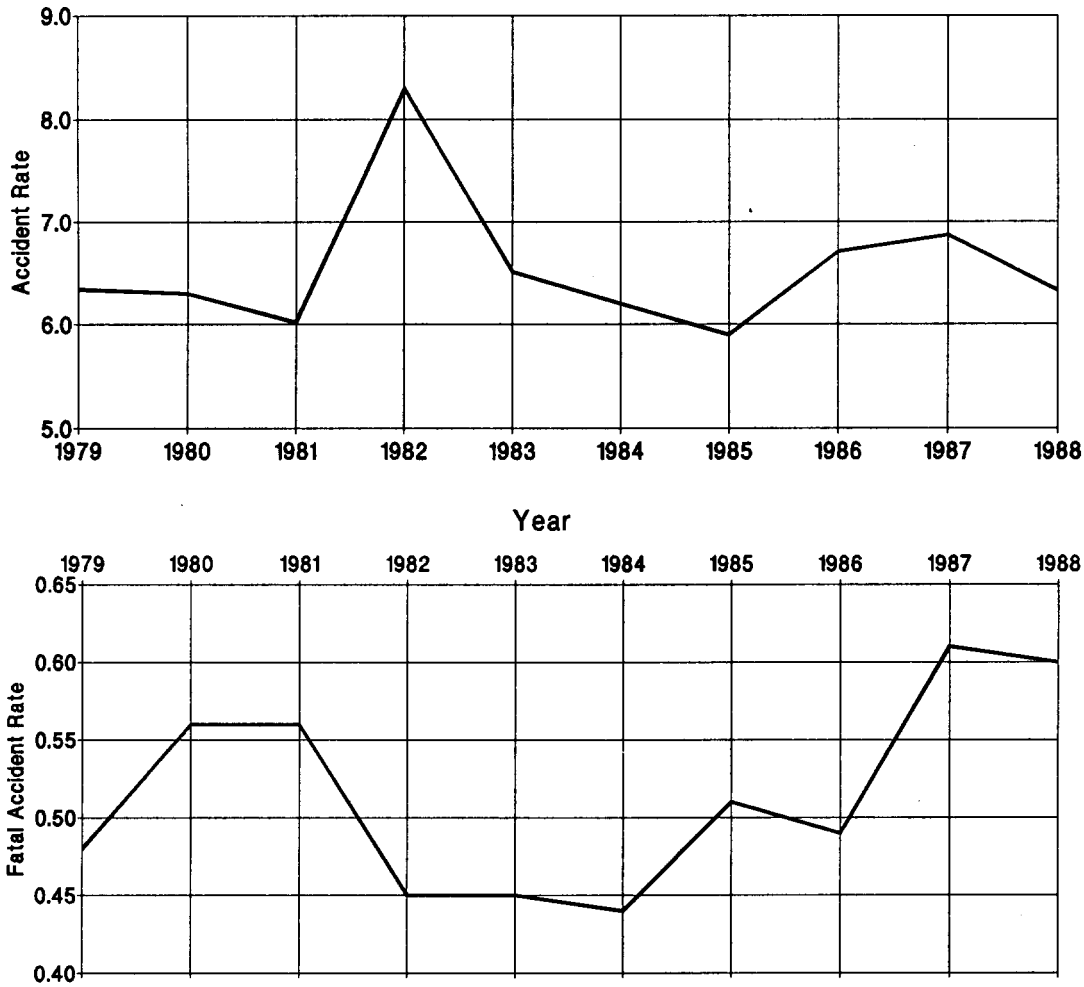

Table 16 - ACCIDENTS, FATAL ACCIDENTS AND FATALITIES
GLIDERS
1979 - 1988

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft In This Category
1979	55	3	3	3
1980	62	7	7	7
1981	59	12	13	13
1982	51	6	6	5
1983	71	11	11	11
1984	55	10	10	9
1985	43	5	6	6
1986	68	9	10	10
1987	36	4	4	4
1988	42	12	13	13

Table 17 - ACCIDENTS, FATAL ACCIDENTS AND FATALITIES
BALLOONS
1979 - 1988

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft In This Category
1979	21	3	7	7
1980	34	2	4	4
1981	23	2	6	6
1982	29	2	7	7
1983	29	2	3	3
1984	33	0	0	0
1985	24	1	1	1
1986	24	1	2	2
1987	27	3	3	3
1988	25	0	0	0

Table 18 - ACCIDENTS, FATAL ACCIDENTS AND FATALITIES
PERSONAL FLYING
1979 - 1988

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft In This Category
1979	2206	414	820	807
1980	2040	389	808	799
1981	1958	383	749	738
1982	1906	398	826	809
1983	1884	398	777	772
1984	1906	365	714	707
1985	1741	325	636	629
1986	1635	328	682	589
1987	1575	297	560	558
1988	1488	319	572	566

* The yearly accident counts include suicide and sabotage accidents as follows :
Total - 1980 (1), 1984 (3), 1985 (2), 1987 (1)
Fatal - 1980 (1), 1984 (2), 1985 (1), 1987 (1)

Table 19 - ACCIDENTS, FATAL ACCIDENTS AND FATALITIES
BUSINESS FLYING
1979 - 1988

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft In This Category
1979	255	56	112	110
1980	246	62	126	116
1981	264	74	145	145
1982	292	74	157	156
1983	276	52	114	114
1984	249	76	155	155
1985	259	63	118	114
1986	193	57	135	131
1987	180	46	98	92
1988	171	48	86	86

Table 20 - MOST PREVALENT FIRST OCCURRENCES
ALL ACCIDENTS
1988 AND 1983 - 1987

Type of Occurrence	1988		1983 - 1987	
	No.	Percent	Mean	Percent
Loss of control - in flight	346	14.5	373.6	13.3
Loss of engine power(total) - non-mechanical	297	12.5	320.0	11.4
Loss of control - on ground	276	11.6	312.4	11.1
In flight collision with object	183	7.7	216.0	7.7
In flight encounter with weather	137	5.7	189.6	6.8
Loss of engine power	129	5.4	168.8	6.0
In flight collision with terrain/water	124	5.2	161.0	5.7
Airframe/component/system failure/malfunction	141	5.9	148.4	5.3
Hard landing	106	4.4	144.6	5.2
Loss of engine power(total) - mech failure/malf	139	5.8	124.8	4.4
Overrun	57	2.4	89.8	3.2
On ground collision with object	67	2.8	76.6	2.7
Loss of engine power(partial) - mech failure/malf	69	2.9	65.6	2.3
Loss of engine power(partial) - non-mechanical	60	2.5	54.4	1.9
Undershoot	27	1.1	44.8	1.6
On ground collision with terrain/water	25	1.0	43.2	1.5
Midair collision	36	1.5	42.0	1.5
Nose over	19	.8	31.8	1.1
(All other types)	145	6.1	197.2	7.0
Number of Aircraft	2383	100.0	2804.6	100.0

Table 21 - FIRST PHASES OF OPERATION
ALL ACCIDENTS
1988 AND 1983 - 1987

Phase of Operation	1988 No.	1988 Percent	1983 - 1987 Mean	1983 - 1987 Percent
Landing	556	23.3	710.4	25.3
Takeoff	479	20.1	579.0	20.6
Cruise	421	17.7	459.8	16.4
Maneuvering	340	14.3	391.6	14.0
Approach	301	12.6	360.2	12.8
Climb	82	3.4	81.6	2.9
Descent	75	3.1	78.6	2.8
Taxi	70	2.9	71.2	2.5
Other	18	.8	36.2	1.3
Standing	34	1.4	35.4	1.3
Not reported	7	.3	.6	.0
Number of Aircraft	2383	100.0	2804.6	100.0

Table 22 - BROAD CAUSE/FACTOR ASSIGNMENTS
ALL ACCIDENTS
1988 AND 1983 - 1987

Broad Cause/Factor	1988 No.	1988 Percent	1983 - 1987 Mean	1983 - 1987 Percent
Pilot	2028	85.1	2376.0	84.7
Terrain/Runway Condition	717	30.1	752.8	26.8
Weather	670	28.1	711.8	25.4
Propulsion System and Controls	646	27.1	606.0	21.6
Object (tree, wires, etc)	505	21.2	538.8	19.2
Other Person (Not Aboard)	222	9.3	239.4	8.5
Light Conditions	191	8.0	222.6	7.9
Landing Gear	99	4.2	203.0	7.2
Systems/Equipment/Instruments	151	6.3	125.2	4.5
Airframe	69	2.9	66.2	2.4
Flight Control System	50	2.1	47.0	1.7
Other Person (Aboard)	13	.5	18.8	.7
Airport/Airways Facilities, Aids	14	.6	1.0	.0
Number of Aircraft	2383		2804.6	

Table 23 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL ACCIDENTS
1988

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	419	259	375	1330	2383
Copilot	19	1	7	19	46
Dual student	18	15	21	91	145
Check pilot	2	1	2	3	8
Other crew	6	1	7	17	31
Passenger	307	211	288	868	1674
Total aboard	771	488	700	2328	4287
Other aircraft*	6	2	4	6	18
Other ground	0	2	9	2	13
Grand total	777	492	713	2336	4318
Percent	18.0	11.4	16.5	54.1	

* 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 24 - PERSONS ABOARD BY KIND OF FLYING AND DEGREE OF INJURY
ALL ACCIDENTS
1988

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	566	349	482	1512	2909
Business	86	39	52	173	350
Corporate/Executive	3	3	3	17	26
Aerial application	13	17	27	117	174
Instructional	48	41	79	354	522
Other	55	39	57	155	306
Total	771	488	700	2328	4287
Percent	18.0	11.4	16.3	54.3	

Table 27 - AIRCRAFT BY FIRST OCCURRENCE AND TYPE OF AIRCRAFT
ALL ACCIDENTS
1988

Type of First Occurrence	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Abrupt maneuver	13	13	0	0	0	3	1	2	1	0	0	17	.7
Altitude deviation,uncontrolled	4	3	0	1	0	0	0	0	0	0	0	4	.2
Airframe/component/system fail./ malfunction	107	94	11	2	0	24	14	10	9	1	0	141	5.9
Dragged wing, rotor, pod, or float	3	3	0	0	0	3	2	1	1	0	0	7	.3
Fire	11	10	1	0	0	0	0	0	0	0	0	11	.5
Forced landing	2	2	0	0	0	0	0	0	1	0	0	3	.1
Gear collapsed	2	1	1	0	0	0	0	0	0	0	0	2	.1
Main gear collapsed	15	7	7	0	1	0	0	0	0	0	0	15	.6
Nose gear collapsed	8	5	3	0	0	0	0	0	0	0	0	8	.3
Complete gear collapsed	1	1	0	0	0	0	0	0	0	0	0	1	.0
Gear not extended	11	6	5	0	0	0	0	0	0	0	0	11	.5
Hard landing	91	85	4	2	0	10	5	5	1	4	0	106	4.4
In flight collision with object	154	142	7	5	0	16	10	6	6	7	0	183	7.7
In flight collision with terrain	113	100	10	2	1	9	7	2	1	1	0	124	5.2
In flight encounter with weather	126	113	12	0	1	5	2	3	1	5	0	137	5.7
Loss of control - in flight	292	266	21	3	2	39	30	9	12	2	1	346	14.5
Loss of control - on ground	269	261	6	1	1	6	3	3	1	0	0	276	11.6
Midair collision	30	29	1	0	0	0	0	0	6	0	0	36	1.5
Near collision between aircraft	1	1	0	0	0	0	0	0	0	0	0	1	.0
Nose down	0	0	0	0	0	0	0	0	1	0	0	1	.0
Nose over	18	18	0	0	0	1	1	0	0	0	0	19	.8
On ground collision with object	65	54	8	2	1	0	0	0	0	2	0	67	2.8
On ground collision with terrain	25	25	0	0	0	0	0	0	0	0	0	25	1.0
On ground encounter with weather	9	8	1	0	0	0	0	0	0	1	0	10	.4
Overrun	57	53	4	0	0	0	0	0	0	0	0	57	2.4
Loss of power	115	107	7	1	0	13	10	3	1	0	0	129	5.4
Loss of power(total) - mech failuare/malfunction	125	120	3	2	0	14	8	6	0	0	0	139	5.8
Loss of power(partial) - mech failure/malfunction	60	54	6	0	0	9	4	5	0	0	0	69	2.9
Loss of power(total) - non-mechanical	282	260	21	1	0	14	8	6	0	0	1	297	12.5
Loss of power(partial) - non-mechanical	56	50	6	0	0	4	4	0	0	0	0	60	2.5
Propeller blast or jet exhaust/ suction	1	1	0	0	0	0	0	0	0	0	0	1	.0
Propeller/rotor contact	4	4	0	0	0	1	0	1	0	0	0	5	.2
Roll over	0	0	0	0	0	5	3	2	0	0	0	5	.5
Undershoot	24	21	2	1	0	0	0	0	3	0	0	27	1.1
Undetermined	1	1	0	0	0	0	0	0	0	0	0	1	.0
Vortex turbulence encountered	7	7	0	0	0	1	1	0	0	0	0	8	.3
Missing aircraft	2	2	0	0	0	0	0	0	0	0	0	2	.1
Miscellaneous/other	20	19	1	0	0	3	3	0	0	2	0	25	1.0
Not reported	6	6	0	0	0	0	0	0	0	0	1	7	.3
Aircraft -													
Total -	2130	1952	148	23	7	180	116	64	45	25	2	2383	
Percent -	89.4	81.9	6.2	1.0	.3	7.6	4.9	2.7	1.9	1.0	.1	100.0	

Table 28 - AIRCRAFT BY FIRST OCCURRENCE AND KIND OF FLYING
ALL ACCIDENTS
1988

Type of first occurrence	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Percent
Abrupt maneuver	13	1	0	2	1	0	17	0.7
Altitude deviation,uncontrolled	2	0	0	0	0	2	4	0.2
Airframe/component/system failure/malfunction	83	8	0	14	17	19	141	5.9
Dragged wing, rotor, pod, or float	5	0	0	2	0	0	7	0.3
Fire	5	2	0	1	1	2	11	0.5
Forced landing	2	0	0	1	0	0	3	0.1
Gear collapsed	2	0	0	0	0	0	2	0.1
Main gear collapsed	10	0	2	2	1	0	15	0.6
Nose gear collapsed	6	2	0	0	0	0	8	0.3
Complete gear collapsed	0	0	0	0	0	1	1	0.0
Gear not extended	7	0	0	2	0	2	11	0.5
Hard landing	53	5	0	43	0	5	106	4.4
In flight collision with object	108	11	1	15	36	12	183	7.7
In flight collision with terrain	81	12	0	10	13	8	124	5.2
In flight encounter with weather	98	21	2	6	4	6	137	5.7
Loss of control - in flight	217	20	0	62	14	33	346	14.5
Loss of control - on ground	169	19	0	71	8	9	276	11.6
Midair collision	20	4	0	8	2	2	36	1.5
Near collision between aircraft	1	0	0	0	0	0	1	0.0
Nose down	1	0	0	0	0	0	1	0.0
Nose over	15	1	0	0	0	3	19	0.8
On ground collision with object	43	6	1	7	3	7	67	2.8
On ground collision with terrain	15	3	0	3	4	0	25	1.0
On ground encounter with weather	8	0	0	0	0	2	10	0.4
Overrun	43	4	0	5	1	4	57	2.4
Loss of power	79	10	1	14	10	15	129	5.4
Loss of power(total) - mech failure/malfunction	85	10	1	13	18	12	139	5.8
Loss of power(partial) - mech failure/malfunction	43	3	0	4	12	7	69	2.9
Loss of power(total) - non-mechanical	191	28	0	35	19	24	297	12.5
Loss of power(partial) - non-mechanical	38	1	0	11	4	6	60	2.5
Propeller blast or jet exhaust/suction	1	0	0	0	0	0	1	0.0
Propeller/rotor contact	3	0	0	1	0	1	5	0.2
Roll over	3	0	1	1	0	0	5	0.2
Undershoot	20	0	1	5	0	1	27	1.1
Undetermined	1	0	0	0	0	0	1	0.0
Vortex turbulence encountered	3	1	0	2	1	1	8	0.3
Missing aircraft	2	0	0	0	0	0	2	0.1
Miscellaneous/other	20	1	0	0	1	3	25	1.0
Not reported	5	0	0	0	1	1	7	0.3
Aircraft								
Number -	1501	173	10	340	171	188	2383	
Percent -	63.0	7.3	0.4	14.3	7.2	7.9		

Table 29 - AIRCRAFT BY FIRST PHASE OF OPERATION AND TYPE OF AIRCRAFT
ALL ACCIDENTS
1987

Phase of Operation	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	Aircraft No.	Aircraft Pct.
Standing	3	1	1	1	0	0	0	0	0	0	0	3	.1
Standing - pre-flight	1	1	0	0	0	0	0	0	0	0	0	1	.0
Standing - starting engine(s)	18	18	0	0	0	0	0	0	0	0	0	18	.8
Standing - engine(s) operating	8	8	0	0	0	2	1	1	0	0	0	10	.4
Standing - idling rotors	0	0	0	0	0	2	1	1	0	0	0	2	.1
Taxi	7	6	1	0	0	1	1	0	0	0	0	8	.3
Taxi - to takeoff	25	23	1	1	0	0	0	0	0	0	0	25	1.0
Taxi - from landing	31	28	3	0	0	1	0	1	0	0	0	32	1.3
Taxi - aerial	0	0	0	0	0	5	5	0	0	0	0	5	.2
Takeoff	30	30	0	0	0	15	9	6	0	0	0	45	1.9
Takeoff - aborted	16	16	0	0	0	0	0	0	0	0	0	16	.7
Takeoff - ground run	80	73	7	0	0	0	0	0	1	0	0	81	3.4
Takeoff - initial climb	305	287	15	3	0	22	19	3	8	2	0	337	14.1
Climb	22	18	4	0	0	2	1	1	1	0	0	25	1.0
Climb - to cruise	54	48	5	1	0	3	3	0	0	0	0	57	2.4
Cruise	145	134	11	0	0	8	3	5	0	2	0	155	6.5
Cruise - normal	236	215	21	0	0	22	12	10	3	1	0	262	11.0
Cruise - holding(IFR)	4	2	1	0	1	0	0	0	0	0	0	4	.2
Descent	17	16	1	0	0	4	1	3	1	0	0	22	.9
Descent - normal	44	39	3	2	0	1	0	1	0	4	0	49	2.1
Descent - emergency	2	2	0	0	0	0	0	0	1	0	0	3	.1
Descent - uncontrolled	1	1	0	0	0	0	0	0	0	0	0	1	.0
Approach	38	33	5	0	0	4	2	2	0	0	0	42	1.8
Approach - VFR pattern - downwind	19	16	3	0	0	2	2	0	1	0	0	22	.9
Approach - VFR pattern - base turn	10	9	1	0	0	1	0	1	1	0	0	12	.5
Approach - VFR pattern - base to final	14	11	2	0	1	0	0	0	1	0	0	15	.6
Approach - VFR pattern - final approach	103	96	6	1	0	5	3	2	6	1	0	115	4.8
Approach - go-around (VFR)	54	50	3	1	0	0	0	0	0	0	0	54	2.3
Approach - IAF to FAF/ outer marker (IFR)	11	7	3	1	0	0	0	0	0	0	0	11	.5
Approach - FAF/outer marker to threshold (IFR)	17	8	5	3	1	0	0	0	0	0	0	17	.7
Approach - circling(IFR)	6	2	4	0	0	0	0	0	0	0	0	6	.3
Approach - missed approach (IFR)	7	5	1	1	0	0	0	0	0	0	0	7	.3
Landing	40	37	2	1	0	4	3	1	3	9	0	56	2.3
Landing - aborted	25	25	0	0	0	1	0	1	0	0	0	26	1.1
Landing - flare/touchdown	173	160	12	1	0	17	10	7	4	6	0	200	8.4
Landing - roll	272	248	19	2	3	1	1	0	1	0	0	274	11.5
Maneuvering	181	175	5	0	1	7	5	2	8	0	2	198	8.3
Maneuvering - aerial application	62	58	0	4	0	17	15	2	0	0	0	79	3.3
Maneuvering - turn to reverse direction	21	19	2	0	0	6	5	1	4	0	0	31	1.3
Maneuvering - turn to landing area (emergency)	7	7	0	0	0	0	0	0	0	0	0	7	.3
Hover	0	0	0	0	0	25	12	13	0	0	0	25	1.0
Other	1	1	0	0	0	0	0	0	0	0	0	1	.0
Unknown	14	13	1	0	0	2	2	0	1	0	0	17	.7
Not reported	6	6	0	0	0	0	0	0	0	0	1	7	.3
Aircraft -													
Total -	2130	1952	148	23	7	180	116	64	45	25	3	2383	
Percent -	89.4	81.9	6.2	1.0	.3	7.6	4.9	2.7	1.9	1.0	.1		

Table 30 - AIRCRAFT BY FIRST PHASE OF OPERATION AND KIND OF FLYING
ALL ACCIDENTS
1988

Phase of operation	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Percent
Standing	2	0	0	0	0	1	3	0.1
Standing - pre-flight	1	0	0	0	0	0	1	0.0
Standing - starting engine(s)	13	1	0	2	1	1	18	0.8
Standing - engine(s) operating	6	2	0	1	0	1	10	0.4
Standing - idling rotors	1	0	0	0	0	1	2	0.1
Taxi	7	0	0	0	0	1	8	0.3
Taxi - to takeoff	17	1	1	3	1	2	25	1.0
Taxi - from landing	22	3	1	3	0	3	32	1.3
Taxi - aerial	2	0	0	1	0	2	5	0.2
Takeoff	21	3	0	5	11	5	45	1.9
Takeoff - aborted	10	2	0	2	0	2	16	0.7
Takeoff - ground run	47	8	0	18	5	3	81	3.4
Takeoff - initial climb	229	16	1	43	24	24	337	14.1
Climb	18	1	0	4	1	1	25	1.0
Climb - to cruise	41	6	0	4	1	5	57	2.4
Cruise	103	18	1	8	9	16	155	6.5
Cruise - normal	176	31	1	24	6	24	262	11.0
Cruise - holding(IFR)	2	0	0	1	0	1	4	0.2
Descent	15	1	0	4	0	2	22	0.9
Descent - normal	35	5	0	6	0	3	49	2.1
Descent - emergency	3	0	0	0	0	0	3	0.1
Descent - uncontrolled	1	0	0	0	0	0	1	0.0
Approach	29	3	2	7	1	0	42	1.8
Approach - VFR pattern - downwind	14	1	0	4	0	3	22	0.9
Approach - VFR pattern - base turn	9	1	0	1	0	1	12	0.5
Approach - VFR pattern - base to final	10	1	0	2	0	2	15	0.6
Approach - VFR pattern - final approach	84	5	0	16	2	8	115	4.8
Approach - go-around (VFR)	40	3	0	11	0	0	54	2.3
Approach - IAF to FAF/outer marker (IFR)	5	2	0	4	0	0	11	0.5
Approach - FAF/outer marker to threshold (IFR)	10	3	1	0	0	3	17	0.7
Approach - circling(IFR)	2	2	0	0	0	2	6	0.3
Approach - missed approach (IFR)	3	2	0	1	0	1	7	0.3
Landing	36	4	0	12	1	3	56	2.3
Landing - aborted	19	1	0	6	0	0	26	1.1
Landing - flare/touchdown	115	9	0	68	0	8	200	8.4
Landing - roll	185	16	2	50	8	13	274	11.5
Maneuvering	133	13	0	16	7	29	198	8.3
Maneuvering - aerial application	1	0	0	0	78	0	79	3.3
Maneuvering - turn to reverse direction	11	4	0	2	12	2	31	1.3
Maneuvering - turn to landing area (emergency)	2	1	0	1	1	2	7	0.3
Hover	2	4	0	8	0	11	25	1.0
Other	1	0	0	0	0	0	1	0.0
Unknown	13	0	0	2	1	1	17	0.7
Not reported	5	0	0	0	1	1	7	0.3
Aircraft								
Number -	1501	173	10	340	171	188	2383	
Percent -	63.0	7.3	0.4	14.3	7.2	7.9		

Table 31 - AIRCRAFT BY BROAD CAUSE/FACTOR AND TYPE OF AIRCRAFT
ALL ACCIDENTS
1988

Broad Cause:	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Aircraft	732	661	62	6	3	68	40	28	11	5	0	816	34.2
Propulsion System and Controls	557	517	35	4	1	51	27	24	0	0	0	608	25.5
Flight Control System	30	27	2	1	0	6	4	2	3	0	0	39	1.6
Airframe	31	28	3	0	0	2	2	0	4	0	0	37	1.6
Landing Gear	59	42	15	1	1	1	1	0	0	0	0	60	2.5
Systems/Equipment/Instruments	68	60	8	0	0	10	8	2	4	5	0	87	3.7
Environment	43	41	1	0	1	4	3	1	1	3	0	51	2.1
Weather	22	21	1	0	0	2	2	0	1	3	0	28	1.2
Light Conditions	1	1	0	0	0	0	0	0	0	0	0	1	.0
Object (trees, wires, etc.)	12	11	0	0	1	2	1	1	0	0	0	14	.6
Terrain/Runway Condition	8	8	0	0	0	0	0	0	0	0	0	8	.3
Personnel	1846	1692	130	18	6	148	99	49	43	24	2	2063	86.6
Pilot	1764	1620	122	16	6	133	88	45	41	23	2	1963	82.4
Others (Aboard)	6	6	0	0	0	1	0	1	1	2	0	10	.4
Others (Not Aboard)	128	115	10	3	0	20	16	4	5	0	0	153	6.4
Broad Factor:													
Aircraft	222	188	31	1	2	20	10	10	2	1	0	245	10.3
Propulsion System and Controls	80	71	8	0	1	7	3	4	0	0	0	87	3.7
Flight Control System	10	9	1	0	0	3	2	1	1	0	0	14	.6
Airframe	32	24	7	0	1	3	2	1	1	0	0	36	1.5
Landing Gear	45	35	9	1	0	1	1	0	0	0	0	46	1.9
Systems/Equipment/Instruments	59	52	6	0	1	8	3	5	1	1	0	69	2.9
Environment	1393	1299	75	15	4	82	46	36	20	16	2	1513	63.5
Weather	610	566	36	5	3	20	10	10	10	9	0	649	27.2
Light Conditions	186	164	16	5	1	3	2	1	1	0	0	190	8.0
Object (trees, wires, etc.)	445	412	27	6	0	29	15	14	10	7	1	492	20.6
Airport/Airways Facilities, Aids	14	12	2	0	0	0	0	0	0	0	0	14	.6
Terrain/Runway Condition	655	625	23	7	0	46	26	20	7	3	1	712	29.9
Personnel	935	841	79	11	4	68	41	27	14	13	1	1031	43.3
Pilot	877	791	71	11	4	62	39	23	12	13	1	965	40.5
Others (Aboard)	3	3	0	0	0	0	0	0	0	0	0	3	.1
Others (Not Aboard)	85	73	12	0	0	6	2	4	2	0	0	93	3.9
Either Broad Cause or Factor:													
Aircraft	844	758	76	6	4	79	48	31	13	6	0	942	39.5
Propulsion System and Controls	593	548	39	4	2	53	29	24	0	0	0	646	27.1
Flight Control System	37	33	3	1	0	9	6	3	4	0	0	50	2.1
Airframe	60	51	8	0	1	4	3	1	5	0	0	69	2.9
Landing Gear	97	74	21	1	1	2	2	0	0	0	0	99	4.2
Systems/Equipment/Instruments	123	108	14	0	1	17	10	7	5	6	0	151	6.3
Environment	1408	1314	75	15	4	82	46	36	20	18	2	1530	64.2
Weather	625	581	36	5	3	22	12	10	11	12	0	670	28.1
Light Conditions	187	165	16	5	1	3	2	1	1	0	0	191	8.0
Object (trees, wires, etc.)	457	423	27	6	1	30	16	14	10	7	1	505	21.2
Airport/Airways Facilities, Aids	14	12	2	0	0	0	0	0	0	0	0	14	.6
Terrain/Runway Condition	660	630	23	7	0	46	26	20	7	3	1	717	30.1
Personnel	1903	1741	137	19	6	155	102	53	44	25	2	2129	89.3
Pilot	1820	1669	128	17	6	140	92	48	42	24	2	2028	85.1
Others (Aboard)	9	9	0	0	0	1	0	1	1	2	0	13	.5
Others (Not Aboard)	190	168	19	3	0	25	17	8	7	0	0	222	9.3
Aircraft -													
Number -	2130	1952	148	23	7	180	116	64	45	25	3	2383	
Percent -	89.4	81.9	6.2	1.0	.3	7.6	4.9	2.7	1.9	1.0	.1		

Table 32 - AIRCRAFT BY BROAD CAUSE/FACTOR AND KIND OF FLYING
ALL ACCIDENTS
1988

Broad Cause:	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Pct.
Aircraft	511	66	5	76	73	85	816	34.2
Propulsion System and Controls	383	47	2	57	55	64	608	25.5
Flight Control System	24	2	0	1	5	7	39	1.6
Airframe	28	4	1	1	2	1	37	1.6
Landing Gear	40	3	2	9	4	2	60	2.5
Systems/Equipment/Instruments	47	9	0	6	12	13	87	3.7
Environment	36	4	0	4	1	6	51	2.1
Weather	19	2	0	3	0	4	28	1.2
Light Conditions	1	0	0	0	0	0	1	.0
Object (trees, wires, etc.)	10	2	0	0	1	1	14	.6
Terrain/Runway Condition	6	0	0	1	0	1	8	.3
Personnel	1313	157	6	313	120	154	2063	86.6
Pilot	1255	149	6	302	111	140	1963	82.4
Others (Aboard)	5	1	0	1	0	3	10	.4
Others (Not Aboard)	86	12	1	21	14	19	153	6.4
Broad Factor:								
Aircraft	149	19	1	31	20	25	245	10.3
Propulsion System and Controls	56	5	0	13	6	7	87	3.7
Flight Control System	8	1	0	1	3	1	14	.6
Airframe	20	5	0	1	5	5	36	1.5
Landing Gear	31	2	0	8	1	4	46	1.9
Systems/Equipment/Instruments	41	4	1	9	5	9	69	2.9
Environment	970	121	7	192	122	101	1513	63.5
Weather	440	57	4	86	29	33	649	27.2
Light Conditions	136	31	0	12	5	6	190	8.0
Object (trees, wires, etc.)	319	37	3	57	41	35	492	20.6
Airport/Airways Facilities, Aids	14	0	0	0	0	0	14	.6
Terrain/Runway Condition	453	54	2	88	69	46	712	29.9
Personnel	628	83	7	194	49	70	1031	43.3
Pilot	590	79	6	185	45	60	965	40.5
Others (Aboard)	3	0	0	0	0	0	3	.1
Others (Not Aboard)	52	7	2	16	4	12	93	3.9
Either Broad Cause or Factor:								
Aircraft	582	79	5	94	85	97	942	39.5
Propulsion System and Controls	406	51	2	62	57	68	646	27.1
Flight Control System	30	3	0	2	7	8	50	2.1
Airframe	45	8	1	2	7	6	69	2.9
Landing Gear	67	5	2	15	5	5	99	4.2
Systems/Equipment/Instruments	84	13	1	14	17	22	151	6.3
Environment	985	122	7	192	123	101	1530	64.2
Weather	453	59	4	89	29	36	670	28.1
Light Conditions	137	31	0	12	5	6	191	8.0
Object (trees, wires, etc.)	329	39	3	57	42	35	505	21.2
Airport/Airways Facilities, Aids	14	0	0	0	0	0	14	.6
Terrain/Runway Condition	457	54	2	89	69	46	717	30.1
Personnel	1351	161	7	322	128	160	2129	89.3
Pilot	1292	155	7	311	118	145	2028	85.1
Others (Aboard)	8	1	0	1	0	3	13	.5
Others (Not Aboard)	126	17	2	30	18	29	222	9.3
Aircraft -								
Number -	1501	173	10	340	171	188	2383	
Percent -	63.0	7.3	.4	14.3	7.2	7.9		

Table 33 - AIRCRAFT BY KIND OF FLYING AND TYPE OF AIRCRAFT
ALL ACCIDENTS
1988

Kind of Flying	Type of Aircraft: All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	Aircraft No.	Aircraft Pct.
Personal	1406	1314	85	7	0	41	34	7	36	16	2	1501	63.0
Business	142	117	21	2	2	24	11	13	0	7	0	173	7.3
Corporate/Executive	6	2	3	1	0	4	0	4	0	0	0	10	.4
Instructional	299	284	12	2	1	34	25	9	7	0	0	340	14.3
Aerial Application	139	135	0	4	0	31	26	5	0	0	1	171	7.2
Other	138	100	27	7	4	46	20	26	2	2	0	188	7.9
Aircraft -													
Total -	2130	1952	148	23	7	180	116	64	45	25	3	2383	
Percent -	89.4	81.9	6.2	1.0	.3	7.6	4.9	2.7	1.9	1.0	.1		

Table 34 - PILOTS BY TOTAL TIME AND TIME IN TYPE
ALL ACCIDENTS
1988

Total time (hours)	Time in type (hours): 0-49	50-99	100-499	500-999	1000-4999	5000-9999	10000 or more	Not reptd	Pilots No.	Pilots Percent
0 - 49	143	0	0	0	0	0	0	9	152	6.4
50 - 99	69	69	0	0	0	0	0	17	155	6.5
100 - 499	236	108	216	0	0	0	0	66	626	26.3
500 - 999	58	38	127	40	0	0	0	42	305	12.8
1000 - 4999	112	48	214	107	131	0	0	114	726	30.5
5000 - 9999	17	16	45	12	79	10	0	27	206	8.6
10000 or more	14	11	29	19	43	22	10	23	171	7.2
Not reported	1	0	1	0	0	0	0	40	42	1.8
Pilots										
Number -	650	290	632	178	253	32	10	338	2383	
Percent -	27.3	12.2	26.5	7.5	10.6	1.3	0.4	14.2		

Table 35 - PILOTS BY AGE AND KIND OF FLYING
ALL ACCIDENTS
1988

Pilot age	Kind of Flying: Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	Pilots: No.	Pilots: Percent
15 - 19	11	0	0	15	0	0	26	1.1
20 - 24	75	3	1	52	2	16	149	6.3
25 - 29	118	17	1	62	11	22	231	9.7
30 - 34	158	22	1	58	18	30	287	12.0
35 - 39	183	22	0	40	31	18	294	12.3
40 - 44	225	32	3	39	38	29	366	15.4
45 - 49	209	25	0	29	33	17	313	13.1
50 - 54	160	22	2	10	15	18	227	9.5
55 - 59	142	12	1	15	8	12	190	8.0
60 - 64	104	7	1	8	5	10	135	5.7
65 - 69	62	7	0	7	5	8	89	3.7
70 or older	36	1	0	2	0	2	41	1.7
Not reported	18	3	0	3	5	6	35	1.5
Pilots								
Number -	1501	173	10	340	171	188	2383	
Percent -	63.0	7.3	0.4	14.3	7.2	7.9		

Table 36 - MOST PREVALENT FIRST OCCURRENCES
FATAL ACCIDENTS
1988 AND 1983 - 1987

Type of Occurrence	1988: No.	1988: Percent	1983 - 1987: Mean	1983 - 1987: Percent
Loss of control - in flight	135	29.7	128.8	25.2
In flight encounter with weather	84	18.5	110.0	21.5
In flight collision with object	49	10.8	57.6	11.3
In flight collision with terrain/water	51	11.2	57.6	11.3
Airframe/component/system failure/malfunction	29	6.4	26.4	5.2
Loss of engine power(total) - non-mechanical	20	4.4	24.2	4.7
Midair collision	17	3.7	23.2	4.5
Loss of engine power	10	2.2	16.2	3.2
Loss of engine power(total) - mech failure/malf	11	2.4	11.0	2.2
Abrupt maneuver	10	2.2	9.0	1.8
Missing aircraft	2	.4	7.6	1.5
Loss of engine power(partial) - mech failure/malf	12	2.6	6.0	1.2
Loss of engine power(partial) - non-mechanical	9	2.0	5.6	1.1
Miscellaneous/other	4	.9	5.2	1.0
(All other types)	12	2.6	22.6	4.4
Number of Aircraft	455	100.0	511.0	100.0

Table 37 - FIRST PHASES OF OPERATION
FATAL ACCIDENTS
1988 AND 1983 - 1987

Phase of Operation	1988 No.	1988 Percent	1983 - 1987 Mean	1983 - 1987 Percent
Maneuvering	128	28.1	145.8	28.5
Cruise	110	24.2	122.6	24.0
Approach	65	14.3	74.4	14.6
Takeoff	80	17.6	74.0	14.5
Climb	31	6.8	27.4	5.4
Unknown	14	3.1	26.4	5.2
Descent	16	3.5	22.0	4.3
Landing	6	1.3	12.4	2.4
Standing	1	.2	4.2	.8
Taxi	2	.4	1.6	.3
Not reported	2	.4	.2	.0
Number of Aircraft	455	100.0	511.0	100.0

Table 38 - BROAD CAUSE/FACTOR ASSIGNMENTS
FATAL ACCIDENTS
1988 AND 1983 - 1987

Broad Cause/Factor	1988 No.	1988 Percent	1983 - 1987 Mean	1983 - 1987 Percent
Pilot	418	91.9	458.6	89.7
Weather	175	38.5	189.4	37.1
Terrain/Runway Condition	87	19.1	100.2	19.6
Light Conditions	77	16.9	95.8	18.7
Object (tree, wires, etc)	73	16.0	89.0	17.4
Propulsion System and Controls	61	13.4	62.0	12.1
Other Person (Not Aboard)	43	9.5	48.8	9.5
Airframe	24	5.3	26.0	5.1
Systems/Equipment/Instruments	27	5.9	20.2	4.0
Flight Control System	18	4.0	15.0	2.9
Other Person (Aboard)	2	.4	6.0	1.2
Landing Gear	3	.7	1.8	.4
Airport/Airways Facilities, Aids	5	1.1	.4	.1
Number of Aircraft	455		511.0	

Table 39 - AIRCRAFT BY FIRST OCCURRENCE AND TYPE OF AIRCRAFT
FATAL ACCIDENTS
1988

Type of First Occurrence	Type of Aircraft: All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	Aircraft No.	Aircraft Pct.
Abrupt maneuver	8	8	0	0	0	2	1	1	0	0	0	10	2.2
Altitude deviation,uncontrolled	3	2	0	1	0	0	0	0	0	0	0	3	.7
Airframe/component/system fail./ malfunction	22	20	2	0	0	3	2	1	4	0	0	29	6.4
Fire	1	1	0	0	0	0	0	0	0	0	0	1	.2
In flight collision with object	47	42	4	1	0	1	1	0	1	0	0	49	10.8
In flight collision with terrain	50	39	8	2	1	1	1	0	0	0	0	51	11.2
In flight encounter with weather	81	68	12	0	1	3	1	2	0	0	0	84	18.5
Loss of control - in flight	123	99	19	3	2	7	7	0	5	0	0	135	29.7
Midair collision	15	14	1	0	0	0	0	0	2	0	0	17	3.7
Nose over	1	1	0	0	0	0	0	0	0	0	0	1	.2
On ground collision with object	2	1	1	0	0	0	0	0	0	0	0	2	.4
Loss of power	9	7	2	0	0	0	0	0	1	0	0	10	2.2
Loss of power(total) - mech failure/malfunction	9	7	1	1	0	2	2	0	0	0	0	11	2.4
Loss of power(partial) - mech failure/malfunction	10	6	4	0	0	2	1	1	0	0	0	12	2.6
Loss of power(total) - non-mechanical	20	18	2	0	0	0	0	0	0	0	0	20	4.4
Loss of power(partial) - non-mechanical	9	6	3	0	0	0	0	0	0	0	0	9	2.0
Propeller/rotor contact	1	1	0	0	0	0	0	0	0	0	0	1	.2
Undershoot	1	0	0	1	0	0	0	0	0	0	0	1	.2
Vortex turbulence encountered	1	1	0	0	0	0	0	0	0	0	0	1	.2
Missing aircraft	2	2	0	0	0	0	0	0	0	0	0	2	.4
Miscellaneous/other	4	3	1	0	0	0	0	0	0	0	0	4	.9
Not reported	2	2	0	0	0	0	0	0	0	0	0	2	.4
Aircraft - Total -	421	348	60	9	4	21	16	5	13	0	0	455	
Percent -	92.5	76.5	13.2	2.0	.9	4.6	3.5	1.1	2.9	.0	.0		

Table 40 - AIRCRAFT BY FIRST OCCURRENCE AND KIND OF FLYING
FATAL ACCIDENTS
1988

Type of first occurrence	Kind of Flying						Aircraft	
	Personal	Business	Corp/Exec.	Instruct.	Aer. App.	Other	No.	Percent
Abrupt maneuver	7	0	0	2	1	0	10	2.2
Altitude deviation,uncontrolled	1	0	0	0	0	2	3	0.7
Airframe/component/system failure/malfunction	23	1	0	2	0	3	29	6.4
Fire	1	0	0	0	0	0	1	0.2
In flight collision with object	37	5	0	2	3	2	49	10.8
In flight collision with terrain	37	8	0	0	3	3	51	11.2
In flight encounter with weather	65	15	1	2	0	1	84	18.5
Loss of control - in flight	95	8	0	13	3	16	135	29.7
Midair collision	7	4	0	3	2	1	17	3.7
Nose over	1	0	0	0	0	0	1	0.2
On ground collision with object	2	0	0	0	0	0	2	0.4
Loss of power	8	1	0	1	0	0	10	2.2
Loss of power(total) - mech failure/malfunction	7	1	0	3	0	0	11	2.4
Loss of power(partial) - mech failure/malfunction	8	1	0	0	0	3	12	2.6
Loss of power(total) - non-mechanical	10	5	0	3	1	1	20	4.4
Loss of power(partial) - non-mechanical	6	0	0	1	0	2	9	2.0
Propeller/rotor contact	1	0	0	0	0	0	1	0.2
Undershoot	0	0	1	0	0	0	1	0.2
Vortex turbulence encountered	0	0	0	0	0	1	1	0.2
Missing aircraft	2	0	0	0	0	0	2	0.4
Miscellaneous/other	2	1	0	0	0	1	4	0.9
Not reported	1	0	0	0	0	1	2	0.4
Aircraft								
Number -	321	50	2	32	13	37	455	
Percent -	70.5	11.0	0.4	7.0	2.9	8.1		

Table 41 - AIRCRAFT BY FIRST PHASE OF OPERATION AND TYPE OF AIRCRAFT
FATAL ACCIDENTS
1988

Phase of Operation	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Standing - engine(s) operating	1	1	0	0	0	0	0	0	0	0	0	1	.2
Taxi	1	1	0	0	0	0	0	0	0	0	0	1	.2
Taxi - from landing	1	0	1	0	0	0	0	0	0	0	0	1	.2
Takeoff	5	5	0	0	0	1	1	0	0	0	0	6	1.3
Takeoff - ground run	1	1	0	0	0	0	0	0	0	0	0	1	.2
Takeoff - initial climb	66	56	8	2	0	5	5	0	2	0	0	73	16.0
Climb	5	3	2	0	0	0	0	0	0	0	0	5	1.1
Climb - to cruise	25	21	3	1	0	1	1	0	0	0	0	26	5.7
Cruise	41	33	8	0	0	3	2	1	0	0	0	44	9.7
Cruise - normal	59	45	14	0	0	4	2	2	2	0	0	65	14.3
Cruise - holding(IFR)	1	0	0	0	1	0	0	0	0	0	0	1	.2
Descent	9	8	1	0	0	0	0	0	1	0	0	10	2.2
Descent - normal	5	4	0	1	0	0	0	0	0	0	0	5	1.1
Descent - emergency	1	1	0	0	0	0	0	0	0	0	0	1	.2
Approach	11	9	2	0	0	0	0	0	0	0	0	11	2.4
Approach - VFR pattern - downwind	3	3	0	0	0	1	1	0	0	0	0	4	.9
Approach - VFR pattern - base turn	3	2	1	0	0	1	0	1	1	0	0	5	1.1
Approach - VFR pattern - base to final	5	2	2	0	1	0	0	0	1	0	0	6	1.3
Approach - VFR pattern - final approach	8	7	1	0	0	0	0	0	0	0	0	8	1.8
Approach - go-around (VFR)	8	6	1	1	0	0	0	0	0	0	0	8	1.8
Approach - IAF to FAF/outer marker (IFR)	8	5	2	1	0	0	0	0	0	0	0	8	1.8
Approach - FAF/outer marker to threshold (IFR)	7	2	3	1	1	0	0	0	0	0	0	7	1.5
Approach - circling(IFR)	3	0	3	0	0	0	0	0	0	0	0	3	.7
Approach - missed approach (IFR)	5	3	1	1	0	0	0	0	0	0	0	5	1.1
Landing - aborted	3	3	0	0	0	0	0	0	0	0	0	3	.7
Landing - flare/touchdown	2	2	0	0	0	0	0	0	0	0	0	2	.4
Landing - roll	1	1	0	0	0	0	0	0	0	0	0	1	.2
Maneuvering	104	99	4	0	1	2	1	1	4	0	0	110	24.2
Maneuvering - aerial application	6	5	0	1	0	1	1	0	0	0	0	7	1.5
Maneuvering - turn to reverse direction	10	8	2	0	0	0	0	0	1	0	0	11	2.4
Unknown	11	10	1	0	0	2	2	0	1	0	0	14	3.1
Not reported	2	2	0	0	0	0	0	0	0	0	0	2	.4
Aircraft -													
Total -	421	348	60	9	4	21	16	5	13	0	0	455	
Percent -	92.5	76.5	13.2	2.0	.9	4.6	3.5	1.1	2.9	.0	.0		

Table 42 - AIRCRAFT BY FIRST PHASE OF OPERATION AND KIND OF FLYING
FATAL ACCIDENTS
1988

Phase of operation	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Percent
Standing - engine(s) operating	1	0	0	0	0	0	1	0.2
Taxi	1	0	0	0	0	0	1	0.2
Taxi - from landing	1	0	0	0	0	0	1	0.2
Takeoff	6	0	0	0	0	0	6	1.3
Takeoff - ground run	1	0	0	0	0	0	1	0.2
Takeoff - initial climb	55	6	0	6	0	6	73	16.0
Climb	4	1	0	0	0	0	5	1.1
Climb - to cruise	21	3	0	0	0	2	26	5.7
Cruise	35	5	1	2	0	1	44	9.7
Cruise - normal	44	14	0	2	0	5	65	14.3
Cruise - holding(IFR)	0	0	0	0	0	1	1	0.2
Descent	9	1	0	0	0	0	10	2.2
Descent - normal	3	1	0	0	0	1	5	1.1
Descent - emergency	1	0	0	0	0	0	1	0.2
Approach	10	1	0	0	0	0	11	2.4
Approach - VFR pattern - downwind	2	0	0	2	0	0	4	0.9
Approach - VFR pattern - base turn	3	1	0	0	0	1	5	1.1
Approach - VFR pattern - base to final	2	1	0	1	0	2	6	1.3
Approach - VFR pattern - final approach	6	0	0	1	0	1	8	1.8
Approach - go-around (VFR)	5	0	0	3	0	0	8	1.8
Approach - IAF to FAF/outer marker (IFR)	4	2	0	2	0	0	8	1.8
Approach - FAF/outer marker to threshold (IFR)	3	2	1	0	0	1	7	1.5
Approach - circling(IFR)	0	2	0	0	0	1	3	0.7
Approach - missed approach (IFR)	3	1	0	0	0	1	5	1.1
Landing - aborted	2	0	0	1	0	0	3	0.7
Landing - flare/touchdown	2	0	0	0	0	0	2	0.4
Landing - roll	1	0	0	0	0	0	1	0.2
Maneuvering	79	7	0	9	3	12	110	24.2
Maneuvering - aerial application	0	0	0	0	7	0	7	1.5
Maneuvering - turn to reverse direction	5	2	0	1	2	1	11	2.4
Unknown	11	0	0	2	1	0	14	3.1
Not reported	1	0	0	0	0	1	2	0.4
Aircraft								
Number -	321	50	2	32	13	37	455	
Percent -	70.5	11.0	0.4	7.0	2.9	8.1		

Table 43 - AIRCRAFT BY BROAD CAUSE/FACTOR AND TYPE OF AIRCRAFT
FATAL ACCIDENTS
1988

Broad Cause:	Type of Aircraft: All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	Aircraft No.	Aircraft Pct.
Aircraft	82	65	14	2	1	5	3	2	5	0	0	92	20.2
Propulsion System and Controls	46	37	7	1	1	3	2	1	0	0	0	49	10.8
Flight Control System	12	9	2	1	0	2	1	1	1	0	0	15	3.3
Airframe	15	14	1	0	0	0	0	0	3	0	0	18	4.0
Landing Gear	1	1	0	0	0	0	0	0	0	0	0	1	.2
Systems/Equipment/Instruments	9	5	4	0	0	0	0	0	1	0	0	10	2.2
Environment	6	5	1	0	0	0	0	0	0	0	0	6	1.3
Weather	4	3	1	0	0	0	0	0	0	0	0	4	.9
Object (trees, wires, etc.)	2	2	0	0	0	0	0	0	0	0	0	2	.4
Personnel	399	331	57	7	4	18	15	3	13	0	0	430	94.5
Pilot	386	320	55	7	4	17	14	3	11	0	0	414	91.0
Others (Aboard)	1	1	0	0	0	0	0	0	1	0	0	2	.4
Others (Not Aboard)	31	28	3	0	0	2	2	0	1	0	0	34	7.5
Broad Factor:													
Aircraft	46	33	11	0	2	2	2	0	1	0	0	49	10.8
Propulsion System and Controls	18	14	3	0	1	1	1	0	0	0	0	19	4.2
Flight Control System	4	3	1	0	0	0	0	0	0	0	0	4	.9
Airframe	8	2	5	0	1	0	0	0	0	0	0	8	1.8
Landing Gear	1	0	1	0	0	1	1	0	0	0	0	2	.4
Systems/Equipment/Instruments	18	15	2	0	1	0	0	0	1	0	0	19	4.2
Environment	248	204	36	6	2	6	4	2	2	0	0	256	56.3
Weather	169	141	24	3	1	3	1	2	2	0	0	174	38.2
Light Conditions	77	60	13	3	1	0	0	0	0	0	0	77	16.9
Object (trees, wires, etc.)	69	56	10	3	0	2	1	1	0	0	0	71	15.6
Airport/Airways Facilities, Aids	5	4	1	0	0	0	0	0	0	0	0	5	1.1
Terrain/Runway Condition	84	75	7	2	0	2	2	0	1	0	0	87	19.1
Personnel	235	187	39	6	3	9	7	2	6	0	0	250	54.9
Pilot	226	181	36	6	3	8	6	2	6	0	0	240	52.7
Others (Not Aboard)	15	12	3	0	0	1	1	0	0	0	0	16	3.5
Either Broad Cause or Factor:													
Aircraft	110	85	21	2	2	7	5	2	6	0	0	123	27.0
Propulsion System and Controls	57	45	9	1	2	4	3	1	0	0	0	61	13.4
Flight Control System	15	11	3	1	0	2	1	1	1	0	0	18	4.0
Airframe	21	15	5	0	1	0	0	0	3	0	0	24	5.3
Landing Gear	2	1	1	0	0	1	1	0	0	0	0	3	.7
Systems/Equipment/Instruments	25	18	6	0	1	0	0	0	2	0	0	27	5.9
Environment	250	206	36	6	2	6	4	2	2	0	0	258	56.7
Weather	170	142	24	3	1	3	1	2	2	0	0	175	38.5
Light Conditions	77	60	13	3	1	0	0	0	0	0	0	77	16.9
Object (trees, wires, etc.)	71	58	10	3	0	2	1	1	0	0	0	73	16.0
Airport/Airways Facilities, Aids	5	4	1	0	0	0	0	0	0	0	0	5	1.1
Terrain/Runway Condition	84	75	7	2	0	2	2	0	1	0	0	87	19.1
Personnel	402	332	58	8	4	18	15	3	13	0	0	433	95.2
Pilot	390	322	56	8	4	17	14	3	11	0	0	418	91.9
Others (Aboard)	1	1	0	0	0	0	0	0	1	0	0	2	.4
Others (Not Aboard)	40	35	5	0	0	2	2	0	1	0	0	43	9.5
Aircraft -													
Number -	421	348	60	9	4	21	16	5	13	0	0	455	
Percent -	92.5	76.5	13.2	2.0	.9	4.6	3.5	1.1	2.9	.0	.0		

Table 44 - AIRCRAFT BY BROAD CAUSE/FACTOR AND KIND OF FLYING
FATAL ACCIDENTS
1988

Broad Cause:	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Pct.
Aircraft	64	10	0	6	1	11	92	20.2
Propulsion System and Controls	31	6	0	6	1	5	49	10.8
Flight Control System	11	0	0	0	0	4	15	3.3
Airframe	14	3	0	0	0	1	18	4.0
Landing Gear	1	0	0	0	0	0	1	.2
Systems/Equipment/Instruments	8	1	0	0	0	1	10	2.2
Environment	4	2	0	0	0	0	6	1.3
Weather	3	1	0	0	0	0	4	.9
Object (trees, wires, etc.)	1	1	0	0	0	0	2	.4
Personnel	304	50	2	30	12	32	430	94.5
Pilot	293	47	2	29	12	31	414	91.0
Others (Aboard)	1	0	0	0	0	1	2	.4
Others (Not Aboard)	21	4	0	5	2	2	34	7.5
Broad Factor:								
Aircraft	33	7	0	3	0	6	49	10.8
Propulsion System and Controls	13	2	0	2	0	2	19	4.2
Flight Control System	3	1	0	0	0	0	4	.9
Airframe	4	2	0	0	0	2	8	1.8
Landing Gear	2	0	0	0	0	0	2	.4
Systems/Equipment/Instruments	13	1	0	1	0	4	19	4.2
Environment	182	38	2	11	7	16	256	56.3
Weather	128	28	2	6	2	8	174	38.2
Light Conditions	54	19	0	1	0	3	77	16.9
Object (trees, wires, etc.)	48	8	2	4	4	5	71	15.6
Airport/Airways Facilities, Aids	5	0	0	0	0	0	5	1.1
Terrain/Runway Condition	68	10	0	3	2	4	87	19.1
Personnel	180	30	2	16	3	19	250	54.9
Pilot	173	30	2	14	3	18	240	52.7
Others (Not Aboard)	9	2	0	3	0	2	16	3.5
Either Broad Cause or Factor:								
Aircraft	85	15	0	7	1	15	123	27.0
Propulsion System and Controls	39	8	0	6	1	7	61	13.4
Flight Control System	13	1	0	0	0	4	18	4.0
Airframe	17	4	0	0	0	3	24	5.3
Landing Gear	3	0	0	0	0	0	3	.7
Systems/Equipment/Instruments	19	2	0	1	0	5	27	5.9
Environment	183	39	2	11	7	16	258	56.7
Weather	128	29	2	6	2	8	175	38.5
Light Conditions	54	19	0	1	0	3	77	16.9
Object (trees, wires, etc.)	49	9	2	4	4	5	73	16.0
Airport/Airways Facilities, Aids	5	0	0	0	0	0	5	1.1
Terrain/Runway Condition	68	10	0	3	2	4	87	19.1
Personnel	305	50	2	31	12	33	433	95.2
Pilot	294	48	2	30	12	32	418	91.9
Others (Aboard)	1	0	0	0	0	1	2	.4
Others (Not Aboard)	27	5	0	6	2	3	43	9.5
Aircraft -								
Number -	321	50	2	32	13	37	455	
Percent -	70.5	11.0	.4	7.0	2.9	8.1		

Table 45 - AIRCRAFT BY KIND OF FLYING AND TYPE OF AIRCRAFT
FATAL ACCIDENTS
1988

Kind of Flying	Type of Aircraft: All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	Aicraft No.	Aicraft Pct.
Personal	302	266	35	1	0	8	8	0	11	0	0	321	70.5
Business	47	34	12	1	0	3	2	1	0	0	0	50	11.0
Corporate/Executive	1	0	0	1	0	1	0	1	0	0	0	2	.4
Instructional	28	24	2	2	0	4	4	0	0	0	0	32	7.0
Aerial Application	11	10	0	1	0	2	1	1	0	0	0	13	2.9
Other	32	14	11	3	4	3	1	2	2	0	0	37	8.1
Aircraft - Number -	421	348	60	9	4	21	16	5	13	0	0	455	
Percent	92.5	76.5	13.2	2.0	.9	4.6	3.5	1.1	2.9	.0	.0		

Table 46 - PILOTS BY TOTAL TIME AND TIME IN TYPE
FATAL ACCIDENTS
1988

Total time (hours)	Time in type (hours): 0-49	50-99	100-499	500-999	1000-4999	5000-9999	Not reptd	Pilots: No.	Pilots: Percent
0 - 49	12	0	0	0	0	0	0	12	2.6
50 - 99	8	7	0	0	0	0	3	18	4.0
100 - 499	35	27	35	0	0	0	22	119	26.2
500 - 999	10	2	30	5	0	0	28	75	16.5
1000 - 4999	17	9	30	16	23	0	74	169	37.1
5000 - 9999	3	0	3	1	8	1	14	30	6.6
10000 or more	2	0	1	1	2	0	12	18	4.0
Not reported	0	0	1	0	0	0	13	14	3.1
Pilots Number -	87	45	100	23	33	1	166	455	
Percent -	19.1	9.9	22.0	5.1	7.3	0.2	36.5		

Table 47 - PILOTS BY AGE AND KIND OF FLYING
FATAL ACCIDENTS
1988

Pilot age	Kind of Flying: Per sonal	Busi ness	Corp/ Exec.	Inst ruct.	Aer. App.	Other	Pilots: No.	Pilots: Percent
15 - 19	3	0	0	1	0	0	4	0.9
20 - 24	18	0	0	6	1	3	28	6.2
25 - 29	20	5	0	5	1	5	36	7.9
30 - 34	33	8	0	3	1	9	54	11.9
35 - 39	36	5	0	3	3	2	49	10.8
40 - 44	46	9	1	6	2	4	68	14.9
45 - 49	51	3	0	4	0	3	61	13.4
50 - 54	31	10	0	1	3	3	48	10.5
55 - 59	29	4	0	2	0	1	36	7.9
60 - 64	30	2	1	0	1	3	37	8.1
65 - 69	11	4	0	0	0	2	17	3.7
70 or older	8	0	0	0	0	1	9	2.0
Not reported	5	0	0	1	1	1	8	1.8
Pilots Number -	321	50	2	32	13	37	455	
Percent -	70.5	11.0	0.4	7.0	2.9	8.1		

Table 48 - AIRCRAFT BY FIRST OCCURRENCE AND TYPE OF AIRCRAFT
SERIOUS INJURY ACCIDENTS
1988

Type of First Occurrence	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Abrupt maneuver	1	1	0	0	0	0	0	0	0	0	0	1	.3
Airframe/component/system failure/ malfunction	10	9	1	0	0	2	0	2	1	1	0	14	4.8
Dragged wing, rotor, pod, or float	0	0	0	0	0	1	1	0	0	0	0	1	.3
Fire	1	1	0	0	0	0	0	0	0	0	0	1	.3
Hard landing	2	2	0	0	0	0	0	0	0	3	0	5	1.7
In flight collision with object	32	30	1	1	0	6	2	4	1	3	0	42	14.5
In flight collision with terrain	7	7	0	0	0	1	0	1	0	1	0	9	3.1
In flight encounter with weather	14	14	0	0	0	0	0	0	0	3	0	17	5.9
Loss of control - in flight	44	44	0	0	0	5	2	3	4	1	1	55	19.0
Loss of control - on ground	11	11	0	0	0	1	1	0	0	0	0	12	4.1
Midair collision	4	4	0	0	0	0	0	0	0	0	0	4	1.4
Near collision between aircraft	1	1	0	0	0	0	0	0	0	0	0	1	.3
Nose over	1	1	0	0	0	0	0	0	0	0	0	1	.3
On ground collision with object	1	1	0	0	0	0	0	0	0	0	0	1	.3
On ground collision with terrain	1	1	0	0	0	0	0	0	0	0	0	1	.3
On ground encounter with weather	1	1	0	0	0	0	0	0	0	0	0	1	.3
Overrun	1	1	0	0	0	0	0	0	0	1	0	2	.7
Loss of power	17	16	1	0	0	1	1	0	0	0	0	1	.3
Loss of power(total) - mech failure/malfunction	22	21	1	0	0	3	1	2	0	0	0	18	6.2
Loss of power(partial) - mech failure/malfunction	8	7	1	0	0	2	2	0	0	0	0	25	8.6
Loss of power(total) - non-mechanical	46	43	3	0	0	4	1	3	0	0	0	10	3.4
Loss of power(partial) - non-mechanical	5	5	0	0	0	1	1	0	0	0	0	50	17.2
Propeller/rotor contact	3	3	0	0	0	1	0	1	0	0	0	6	2.1
Roll over	0	0	0	0	0	1	1	0	0	0	0	4	1.4
Undershoot	1	1	0	0	0	0	0	0	1	0	0	1	.3
Vortex turbulence encountered	2	2	0	0	0	0	0	0	0	0	0	2	.7
Miscellaneous/other	2	2	0	0	0	0	0	0	0	2	0	2	.7
												4	1.4
Aircraft -													
Total -	238	229	8	1	0	29	13	16	7	15	1	290	
Percent -	82.1	79.0	2.8	.3	.0	10.0	4.5	5.5	2.4	5.2	.3		

Table 49 - AIRCRAFT BY FIRST OCCURRENCE AND KIND OF FLYING
SERIOUS INJURY ACCIDENTS
1988

Type of First occurrence	Kind of Flying					Aircraft	
	Personal	Business	Instruct.	Aer. App.	Other	No.	Percent
Abrupt maneuver	1	0	0	0	0	1	0.3
Airframe/component/system failure/malfunction	9	0	2	1	2	14	4.8
Dragged wing, rotor, pod, or float	1	0	0	0	0	1	0.3
Fire	0	0	0	0	1	1	0.3
Hard landing	2	1	1	0	1	5	1.7
In flight collision with object	22	3	4	9	4	42	14.5
In flight collision with terrain	8	1	0	0	0	9	3.1
In flight encounter with weather	12	3	1	1	0	17	5.9
Loss of control - in flight	41	2	7	1	4	55	19.0
Loss of control - on ground	6	2	3	0	1	12	4.1
Midair collision	4	0	0	0	0	4	1.4
Near collision between aircraft	1	0	0	0	0	1	0.3
Nose over	0	1	0	0	0	1	0.3
On ground collision with object	1	0	0	0	0	1	0.3
On ground collision with terrain	1	0	0	0	0	1	0.3
On ground encounter with weather	2	0	0	0	0	2	0.7
Overrun	1	0	0	0	0	1	0.3
Loss of power	12	2	2	0	2	18	6.2
Loss of power(total) - mech failure/malfunction	18	1	2	1	3	25	8.6
Loss of power(partial) - mech failure/malfunction	8	0	0	1	1	10	3.4
Loss of power(total) - non-mechanical	33	3	5	2	7	50	17.2
Loss of power(partial) - non-mechanical	6	0	0	0	0	6	2.1
Propeller/rotor contact	2	0	1	0	1	4	1.4
Roll over	1	0	0	0	0	1	0.3
Undershoot	2	0	0	0	0	2	0.7
Vortex turbulence encountered	0	1	0	1	0	2	0.7
Miscellaneous/other	4	0	0	0	0	4	1.4
Aircraft Number -	198	20	28	17	27	290	
Percent -	68.3	6.9	9.7	5.9	9.3		

Table 50 - AIRCRAFT BY FIRST PHASE OF OPERATION AND TYPE OF AIRCRAFT
SERIOUS INJURY ACCIDENTS
1988

Phase of Operation	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Standing - starting engine(s)	3	3	0	0	0	0	0	0	0	0	0	3	1.0
Standing - engine(s) operating	1	1	0	0	0	0	0	0	0	0	0	1	.3
Standing - idling rotors	0	0	0	0	0	1	0	1	0	0	0	1	.3
Taxi - to takeoff	1	1	0	0	0	0	0	0	0	0	0	1	.3
Takeoff	5	5	0	0	0	2	1	1	0	0	0	7	2.4
Takeoff - aborted	1	1	0	0	0	0	0	0	0	0	0	1	.3
Takeoff - ground run	2	2	0	0	0	0	0	0	0	0	0	2	.7
Takeoff - initial climb	64	64	0	0	0	5	4	1	2	2	0	73	25.2
Climb	3	2	1	0	0	1	1	0	0	0	0	4	1.4
Climb - to cruise	4	4	0	0	0	1	1	0	0	0	0	5	1.7
Cruise	16	16	0	0	0	2	0	2	0	0	0	18	6.2
Cruise - normal	27	27	0	0	0	4	1	3	0	1	0	32	11.0
Descent	1	1	0	0	0	0	0	0	0	0	0	1	.3
Descent - normal	1	1	0	0	0	0	0	0	0	1	0	2	.7
Descent - uncontrolled	1	1	0	0	0	0	0	0	0	0	0	1	.3
Approach	6	5	1	0	0	1	1	0	0	0	0	7	2.4
Approach - VFR pattern - downwind	4	3	1	0	0	0	0	0	0	0	0	4	1.4
Approach - VFR pattern - base turn	2	2	0	0	0	0	0	0	0	0	0	2	.7
Approach - VFR pattern - base to final	2	2	0	0	0	0	0	0	0	0	0	2	.7
Approach - VFR pattern - final approach	23	20	3	0	0	2	1	1	3	1	0	29	10.0
Approach - go-around (VFR)	7	7	0	0	0	0	0	0	0	0	0	7	2.4
Approach - IAF to FAF/outer marker (IFR)	1	0	1	0	0	0	0	0	0	0	0	1	.3
Approach - FAF/outer marker to threshold (IFR)	5	3	1	1	0	0	0	0	0	0	0	5	1.7
Approach - circling(IFR)	1	1	0	0	0	0	0	0	0	0	0	1	.3
Landing	1	1	0	0	0	0	0	0	1	5	0	7	2.4
Landing - aborted	4	4	0	0	0	0	0	0	0	0	0	4	1.4
Landing - flare/touchdown	5	5	0	0	0	2	2	0	0	5	0	12	4.1
Landing - roll	9	9	0	0	0	0	0	0	0	0	0	9	3.1
Maneuvering	21	21	0	0	0	1	1	0	1	0	1	24	8.3
Maneuvering - aerial application	14	14	0	0	0	0	0	0	0	0	0	14	4.8
Maneuvering - turn to reverse direction	2	2	0	0	0	0	0	0	0	0	0	2	.7
Hover	0	0	0	0	0	7	0	7	0	0	0	7	2.4
Unknown	1	1	0	0	0	0	0	0	0	0	0	1	.3
Aircraft -													
Total -	238	229	8	1	0	29	13	16	7	15	1	290	
Percent -	82.1	79.0	2.8	.3	.0	10.0	4.5	5.5	2.4	5.2	.3		

Table 51 - AIRCRAFT BY FIRST PHASE OF OPERATION AND KIND OF FLYING
SERIOUS INJURY ACCIDENTS
1988

Phase of operation	Kind of Flying					Aircraft	
	Personal	Business	Instruct.	Aer. App.	Other	No.	Percent
Standing - starting engine(s)	2	0	1	0	0	3	1.0
Standing - engine(s) operating	1	0	0	0	0	1	0.3
Standing - idling rotors	0	0	0	0	1	1	0.3
Taxi - to takeoff	1	0	0	0	0	1	0.3
Takeoff	4	1	1	0	1	7	2.4
Takeoff - aborted	0	0	1	0	0	1	0.3
Takeoff - ground run	2	0	0	0	0	2	0.7
Takeoff - initial climb	57	2	9	1	4	73	25.2
Climb	4	0	0	0	0	4	1.4
Climb - to cruise	4	1	0	0	0	5	1.7
Cruise	13	3	0	0	2	18	6.2
Cruise - normal	23	1	4	0	4	32	11.0
Descent	1	0	0	0	0	1	0.3
Descent - normal	2	0	0	0	0	2	0.7
Descent - uncontrolled	1	0	0	0	0	1	0.3
Approach	4	1	2	0	0	7	2.4
Approach - VFR pattern - downwind	3	1	0	0	0	4	1.4
Approach - VFR pattern - base turn	2	0	0	0	0	2	0.7
Approach - VFR pattern - base to final	2	0	0	0	0	2	0.7
Approach - VFR pattern - final approach	24	1	3	0	1	29	10.0
Approach - go-around (VFR)	5	0	2	0	0	7	2.4
Approach - IAF to FAF/outer marker (IFR)	0	0	1	0	0	1	0.3
Approach - FAF/outer marker to threshold (IFR)	4	0	0	0	1	5	1.7
Approach - circling(IFR)	1	0	0	0	0	1	0.3
Landing	2	2	1	0	2	7	2.4
Landing - aborted	4	0	0	0	0	4	1.4
Landing - flare/touchdown	9	2	1	0	0	12	4.1
Landing - roll	6	2	1	0	0	9	3.1
Maneuvering	15	3	1	1	4	24	8.3
Maneuvering - aerial application	0	0	0	14	0	14	4.8
Maneuvering - turn to reverse direction	1	0	0	1	0	2	0.7
Hover	0	0	0	0	7	7	2.4
Unknown	1	0	0	0	0	1	0.3
Aircraft							
Number -	198	20	28	17	27	290	
Percent -	68.3	6.9	9.7	5.9	9.3		

Table 52 - AIRCRAFT BY KIND OF FLYING AND TYPE OF AIRCRAFT
SERIOUS INJURY ACCIDENTS
1988

Kind of Flying	Type of Aircraft: All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	Aircraft No.	Aircraft Pct.
Personal	175	170	5	0	0	9	8	1	4	9	1	198	68.3
Business	12	12	0	0	0	4	1	3	0	4	0	20	6.9
Instructional	24	22	2	0	0	1	1	0	3	0	0	28	9.7
Aerial Application	16	16	0	0	0	1	1	0	0	0	0	17	5.9
Other	11	9	1	1	0	14	2	12	0	2	0	27	9.3
Aircraft -													
Number -	238	229	8	1	0	29	13	16	7	15	1	290	
Percent -	82.1	79.0	2.8	.3	.0	10.0	4.5	5.5	2.4	5.2	.3		

Table 53 - PILOTS BY TOTAL TIME AND TIME IN TYPE
SERIOUS INJURY ACCIDENTS
1988

Total time (hours)	Time in type (hours): 0-49	50-99	100-499	500-999	1000-4999	5000-9999	10000 or more	Not reptd	Pilots No.	Pilots Percent
0 - 49	11	0	0	0	0	0	0	1	12	4.1
50 - 99	8	7	0	0	0	0	0	4	19	6.6
100 - 499	32	14	31	0	0	0	0	12	89	30.7
500 - 999	6	9	16	7	0	0	0	3	41	14.1
1000 - 4999	14	4	28	12	14	0	0	7	79	27.2
5000 - 9999	4	2	3	2	13	2	0	0	26	9.0
10000 or more	3	1	5	1	5	3	1	2	21	7.2
Not reported	0	0	0	0	0	0	0	3	3	1.0
Pilots										
Number -	78	37	83	22	32	5	1	32	290	
Percent -	26.9	12.8	28.6	7.6	11.0	1.7	0.3	11.0		

Table 54 - PILOTS BY AGE AND KIND OF FLYING
SERIOUS INJURY ACCIDENTS
1988

Pilot age	Kind of Flying					Pilots	
	Personal	Business	Instruct.	Aer. App.	Other	No.	Percent
15 - 19	1	0	2	0	0	3	1.0
20 - 24	6	0	7	0	0	13	4.5
25 - 29	22	4	4	0	3	33	11.4
30 - 34	26	2	3	4	5	40	13.8
35 - 39	24	1	1	4	3	33	11.4
40 - 44	22	2	5	5	8	42	14.5
45 - 49	24	8	0	3	2	37	12.8
50 - 54	22	1	1	0	3	27	9.3
55 - 59	29	0	1	1	1	32	11.0
60 - 64	9	0	2	0	1	12	4.1
65 - 69	9	0	1	0	1	11	3.8
70 or older	4	0	1	0	0	5	1.7
Not reported	0	2	0	0	0	2	0.7
Pilots							
Number -	198	20	28	17	27	290	
Percent -	68.3	6.9	9.7	5.9	9.3		

Table 56 - AIRCRAFT BY FIRST OCCURRENCE AND KIND OF FLYING
PROPERTY DAMAGE ACCIDENTS
1988

Type of first occurrence	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Percent
Abrupt maneuver	5	1	0	0	0	0	6	0.4
Altitude deviation,uncontrolled	1	0	0	0	0	0	1	0.1
Airframe/component/system failure/malfunction	51	7	0	10	16	14	98	6.0
Dragged wing, rotor, pod, or float	4	0	0	2	0	0	6	0.4
Fire	4	2	0	1	1	1	9	0.5
Forced landing	2	0	0	1	0	0	3	0.2
Gear collapsed	2	0	0	0	0	0	2	0.1
Main gear collapsed	10	0	2	2	1	0	15	0.9
Nose gear collapsed	6	2	0	0	0	0	8	0.5
Complete gear collapsed	0	0	0	0	0	1	1	0.1
Gear not extended	7	0	0	2	0	2	11	0.7
Hard landing	51	4	0	42	0	4	101	6.2
In flight collision with object	49	3	1	9	24	6	92	5.6
In flight collision with terrain	36	3	0	10	10	5	64	3.9
In flight encounter with weather	21	3	1	3	3	5	36	2.2
Loss of control - in flight	81	10	0	42	10	13	156	9.5
Loss of control - on ground	163	17	0	68	8	8	264	16.1
Midair collision	9	0	0	5	0	1	15	0.9
Nose down	1	0	0	0	0	0	1	0.1
Nose over	14	0	0	0	0	3	17	1.0
On ground collision with object	40	6	1	7	3	7	64	3.9
On ground collision with terrain	14	3	0	3	4	0	24	1.5
On ground encounter with weather	6	0	0	0	0	2	8	0.5
Overrun	42	4	0	5	1	4	56	3.4
Loss of power	59	7	1	11	10	13	101	6.2
Loss of power(total) - mech failure/malfunction	60	8	1	8	17	9	103	6.3
Loss of power(partial) - mech failure/malfunction	27	2	0	4	11	3	47	2.9
Loss of power(total) - non-mechanical	148	20	0	27	16	16	227	13.9
Loss of power(partial) - non-mechanical	26	1	0	10	4	4	45	2.7
Propeller blast or jet exhaust/suction	1	0	0	0	0	0	1	0.1
Roll over	2	0	1	1	0	0	4	0.2
Undershoot	18	0	0	5	0	1	24	1.5
Undetermined	1	0	0	0	0	0	1	0.1
Vortex turbulence encountered	3	0	0	2	0	0	5	0.3
Miscellaneous/other	14	0	0	0	1	2	17	1.0
Not reported	4	0	0	0	1	0	5	0.3
Aircraft								
Number -	982	103	8	280	141	124	1638	
Percent -	60.0	6.3	0.5	17.1	8.6	7.6		

Table 57 - AIRCRAFT BY FIRST PHASE OF OPERATION AND TYPE OF AIRCRAFT
PROPERTY DAMAGE ACCIDENTS
1988

Phase of Operation	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Standing	3	1	1	1	0	0	0	0	0	0	0	3	.2
Standing - pre-flight	1	1	0	0	0	0	0	0	0	0	0	1	.1
Standing - starting engine(s)	15	15	0	0	0	0	0	0	0	0	0	15	.9
Standing - engine(s) operating	6	6	0	0	0	2	1	1	0	0	0	8	.5
Standing - idling rotors	0	0	0	0	0	1	1	0	0	0	0	1	.1
Taxi	6	5	1	0	0	1	1	0	0	0	0	7	.4
Taxi - to takeoff	24	22	1	1	0	0	0	0	0	0	0	24	1.5
Taxi - from landing	30	28	2	0	0	1	0	1	0	0	0	31	1.9
Taxi - aerial	0	0	0	0	0	5	5	0	0	0	0	5	.3
Takeoff	20	20	0	0	0	12	7	5	0	0	0	32	2.0
Takeff - aborted	15	15	0	0	0	0	0	0	0	0	0	15	.9
Takeoff - ground run	77	70	7	0	0	0	0	0	1	0	0	78	4.8
Takeoff - initial climb	175	167	7	1	0	12	10	2	4	0	0	191	11.7
Climb	14	13	1	0	0	1	0	1	1	0	0	16	1.0
Climb - to cruise	25	23	2	0	0	1	1	0	0	0	0	26	1.6
Cruise	88	85	3	0	0	3	1	2	0	2	0	93	5.7
Cruise - normal	150	143	7	0	0	14	9	5	1	0	0	165	10.1
Cruise - holding(IFR)	3	2	1	0	0	0	0	0	0	0	0	3	.2
Descent	7	7	0	0	0	4	1	3	0	0	0	11	.7
Descent - normal	38	34	3	1	0	1	0	1	0	3	0	42	2.6
Descent - emergency	1	1	0	0	0	0	0	0	1	0	0	2	.1
Approach	21	19	2	0	0	3	1	2	0	0	0	24	1.5
Approach - VFR pattern - downwind	12	10	2	0	0	1	1	0	1	0	0	14	.9
Approach - VFR pattern - base turn	5	5	0	0	0	0	0	0	0	0	0	5	.3
Approach - VFR pattern - base to final	7	7	0	0	0	0	0	0	0	0	0	7	.4
Approach - VFR pattern - final approach	72	69	2	1	0	3	2	1	3	0	0	78	4.8
Approach - go-around (VFR)	39	37	2	0	0	0	0	0	0	0	0	39	2.4
Approach - IAF to FAF/outer marker (IFR)	2	2	0	0	0	0	0	0	0	0	0	2	.1
Approach - FAF/outer marker to threshold (IFR)	5	3	1	1	0	0	0	0	0	0	0	5	.3
Approach - circling(IFR)	2	1	1	0	0	0	0	0	0	0	0	2	.1
Approach - missed approach (IFR)	2	2	0	0	0	0	0	0	0	0	0	2	.1
Landing	39	36	2	1	0	4	3	1	2	4	0	49	3.0
Landing - aborted	18	18	0	0	0	1	0	1	0	0	0	19	1.2
Landing - flare/touchdown	166	153	12	1	0	15	8	7	4	1	0	186	11.4
Landing - roll	262	238	19	2	3	1	1	0	1	0	0	264	16.1
Maneuvering	56	55	1	0	0	4	3	1	3	0	1	64	3.9
Maneuvering - aerial application	42	39	0	3	0	16	14	2	0	0	0	58	3.5
Maneuvering - turn to reverse direction	9	9	0	0	0	6	5	1	3	0	0	18	1.1
Maneuvering - turn to landing area (emergency)	7	7	0	0	0	0	0	0	0	0	0	7	.4
Hover	0	0	0	0	0	18	12	6	0	0	0	18	1.1
Unknown	2	2	0	0	0	0	0	0	0	0	0	2	.1
Not reported	4	4	0	0	0	0	0	0	0	0	1	5	.3
Other	1	1	0	0	0	0	0	0	0	0	0	1	.1
Aircraft - Total -	1471	1375	80	13	3	130	87	43	25	10	2	1638	
Percent -	89.8	83.9	4.9	.8	.2	7.9	5.3	2.6	1.5	.6	.1		

Table 58 - AIRCRAFT BY FIRST PHASE OF OPERATION AND KIND OF FLYING
PROPERTY DAMAGE ACCIDENTS
1988

Phase of operation	Kind of Flying						Aircraft	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Percent
Standing	2	0	0	0	0	1	3	0.2
Standing - pre-flight	1	0	0	0	0	0	1	0.1
Standing - starting engine(s)	11	1	0	1	1	1	15	0.9
Standing - engine(s) operating	4	2	0	1	0	1	8	0.5
Standing - idling rotors	1	0	0	0	0	0	1	0.1
Taxi	6	0	0	0	0	1	7	0.4
Taxi - to takeoff	16	1	1	3	1	2	24	1.5
Taxi - from landing	21	3	1	3	0	3	31	1.9
Taxi - aerial	2	0	0	1	0	2	5	0.3
Takeoff	11	2	0	4	11	4	32	2.0
Takeoff - aborted	10	2	0	1	0	2	15	0.9
Takeoff - ground run	44	8	0	18	5	3	78	4.8
Takeoff - initial climb	117	8	1	28	23	14	191	11.7
Climb	10	0	0	4	1	1	16	1.0
Climb - to cruise	16	2	0	4	1	3	26	1.6
Cruise	55	10	0	6	9	13	93	5.7
Cruise - normal	109	16	1	18	6	15	165	10.1
Cruise - holding(IFR)	2	0	0	1	0	0	3	0.2
Descent	5	0	0	4	0	2	11	0.7
Descent - normal	30	4	0	6	0	2	42	2.6
Descent - emergency	2	0	0	0	0	0	2	0.1
Approach	15	1	2	5	1	0	24	1.5
Approach - VFR pattern - downwind	9	0	0	2	0	3	14	0.9
Approach - VFR pattern - base turn	4	0	0	1	0	0	5	0.3
Approach - VFR pattern - base to final	6	0	0	1	0	0	7	0.4
Approach - VFR pattern - final approach	54	4	0	12	2	6	78	4.8
Approach - go-around (VFR)	30	3	0	6	0	0	39	2.4
Approach - IAF to FAF/outer marker (IFR)	1	0	0	1	0	0	2	0.1
Approach - FAF/outer marker to threshold (IFR)	3	1	0	0	0	1	5	0.3
Approach - circling(IFR)	1	0	0	0	0	1	2	0.1
Approach - missed approach (IFR)	0	1	0	1	0	0	2	0.1
Landing	34	2	0	11	1	1	49	3.0
Landing - aborted	13	1	0	5	0	0	19	1.2
Landing - flare/touchdown	104	7	0	67	0	8	186	11.4
Landing - roll	178	14	2	49	8	13	264	16.1
Maneuvering	39	3	0	6	3	13	64	3.9
Maneuvering - aerial application	1	0	0	0	57	0	58	3.5
Maneuvering - turn to reverse direction	5	2	0	1	9	1	18	1.1
Maneuvering - turn to landing area (emergency)	2	1	0	1	1	2	7	0.4
Hover	2	4	0	8	0	4	18	1.1
Unknown	1	0	0	0	0	1	2	0.1
Not reported	4	0	0	0	1	0	5	0.3
Other	1	0	0	0	0	0	1	0.1
Aircraft								
Number -	982	103	8	280	141	124	1638	
Percent -	60.0	6.3	0.5	17.1	8.6	7.6		

Table 59 - AIRCRAFT BY KIND OF FLYING AND TYPE OF AIRCRAFT
PROPERTY DAMAGE ACCIDENTS
1988

Kind of Flying	Type of Aircraft											Aircraft	
	All Fixed Wing	Fixed Wing Singl Recip Engin	Fixed Wing Multi Recip Engin	Fixed Wing Turbo prop	Fixed Wing Turbo Jet	All Rotor craft	Rotor craft Recip Engin	Rotor craft Turb Engin	Glid ers	Ball oons	Other	No.	Pct.
Personal	929	878	45	6	0	24	18	6	21	7	1	982	60.0
Business	83	71	9	1	2	17	8	9	0	3	0	103	6.3
Corporate/Executive	5	2	3	0	0	3	0	3	0	0	0	8	.5
Instructional	247	238	8	0	1	29	20	9	4	0	0	280	17.1
Aerial Application	112	109	0	3	0	28	24	4	0	0	1	141	8.6
Other	95	77	15	3	0	29	17	12	0	0	0	124	7.6
Aircraft -													
Number -	1471	1375	80	13	3	130	87	43	25	10	2	1638	
Percent -	89.8	83.9	4.9	.8	.2	7.9	5.3	2.6	1.5	.6	.1		

Table 60 - PILOTS BY TOTAL TIME AND TIME IN TYPE
PROPERTY DAMAGE ACCIDENTS
1988

Total time (hours)	Time in type (hours)								Pilots	
	0-49	50-99	100-499	500-999	1000-4999	5000-9999	10000 or more	Not reptd	No.	Percent
0 - 49	120	0	0	0	0	0	0	8	128	7.8
50 - 99	53	55	0	0	0	0	0	10	118	7.2
100 - 499	169	67	150	0	0	0	0	32	418	25.5
500 - 999	42	27	81	28	0	0	0	11	189	11.5
1000 - 4999	81	35	156	79	94	0	0	33	478	29.2
5000 - 9999	10	14	39	9	58	7	0	13	150	9.2
10000 or more	9	10	23	17	36	19	9	9	132	8.1
Not reported	1	0	0	0	0	0	0	24	25	1.5
Pilots										
Number -	485	208	449	133	188	26	9	140	1638	
Percent -	29.6	12.7	27.4	8.1	11.5	1.6	0.5	8.5		

Table 61 - PILOTS BY AGE AND KIND OF FLYING
PROPERTY DAMAGE ACCIDENTS
1988

Pilot age	Kind of Flying						Pilots	
	Personal	Business	Corp/ Exec.	Instruct.	Aer. App.	Other	No.	Percent
15 - 19	7	0	0	12	0	0	19	1.2
20 - 24	51	3	1	39	1	13	108	6.6
25 - 29	76	8	1	53	10	14	162	9.9
30 - 34	99	12	1	52	13	16	193	11.8
35 - 39	123	16	0	36	24	13	212	12.9
40 - 44	157	21	2	28	31	17	256	15.6
45 - 49	134	14	0	25	30	12	215	13.1
50 - 54	107	11	2	8	12	12	152	9.3
55 - 59	84	8	1	12	7	10	122	7.4
60 - 64	65	5	0	6	4	6	86	5.3
65 - 69	42	3	0	6	5	5	61	3.7
70 or older	24	1	0	1	0	1	27	1.6
Not reported	13	1	0	2	4	5	25	1.5
Pilots								
Number -	982	103	8	280	141	124	1638	
Percent -	60.0	6.3	0.5	17.1	8.6	7.6		

Table 62 - SUMMARY OF LOSSES
MIDAIR COLLISION ACCIDENTS
(One or Both Aircraft General Aviation)
1984 - 1988

	1984	1985	1986	1987	1988
Accidents					
Fatal	14	13	17	13	9
Involved Serious Injury	0	1	4	1	2
Involved Minor Injury	1	0	3	1	2
Involved No Injury	10	9	5	10	6
Total	25	23	29	25	19
Fatalities					
Passenger	22	14	29	14	3
Crew	25	19	28	25	13
Other Persons	0	2	79	5	0
Total	47	35	136	44	16
Aircraft Damaged*					
Destroyed	24	18	26	21	16
Substantial	17	20	24	19	15
Minor	8	3	5	7	6
None	1	1	1	1	1
Total	50	42	56	48	38

* Number of General AViation Aircraft

Table 63 - ACCIDENTS BY TYPES OF OPERATIONS
MIDIAIR COLLISION ACCIDENTS
1979 - 1988

Year	Accidents Total	Accidents Fatal	Total Fatalities	Number of Accidents Involving A General Aviation Aircraft AND 121	S135	N135	GA	US Mil	Forgn	Not Reg
1979	25	14	34	0	0	3	21	1	0	0
1980	24	19	57	0	0	2	21	1	0	0
1981	29	12	45	0	1	2	25	1	0	0
1982	28	17	56	0	1	1	25	0	1	0
1983	12	7	22	0	0	1	10	0	1	0
1984	25	14	47	0	1	0	24	0	0	0
1985	23	13	35	0	0	0	19	2	1	1
1986	29	17	136	0	0	0	27	1	1	0
1987	25	13	44	0	3	2	18	2	0	0
1988	19	9	16	0	0	2	17	0	0	0
	239	135	492	0	6	13	223	8	4	1

NOTE: 121 = 14 CFR 121, 125 or 127 Operation
S135 = Scheduled 14 CFR 135 Operation
N135 = Nonscheduled 14 CFR 135 Operation
GA = General Aviation Operation
US Mil = United States Military Operation
Forgn = Foreign Registered Aircraft Operation
Not Reg = Operation by Unregistered Aircraft

Table 64 - ACCIDENTS BY WEATHER AND VISIBILITY
MIDAIR COLLISION ACCIDENTS
1988

Weather Conditions		
Visual Meteorological Conditions (VMC)	19	100.0
Instrument Meteorological Conditions (IMC)	0	0
Total	19	
Visibility		
Less Than 5 Miles	1	5.3
Greater than, Equal to 5 Miles, Less Than 10 Miles	2	10.5
Greater than, Equal to 10 Miles, Less than 20 Miles	6	31.6
Greater than, Equal to 20 Miles	10	52.6
Total	19	

Table 65 - ACCIDENTS BY PHASES OF OPERATION
MIDAIR COLLISION ACCIDENTS
1988

Phases of Operation		Accidents*	
Aircraft 1	Aircraft 2	No.	Percent
Takeoff - Initial Climb	Cruise	1	5.3
Takeoff - Initial Climb	Approach - VFR Pattern - Downwind	1	5.3
Total (Either or Both Aircraft in Takeoff Phase)		2	10.5
Climb	Descent	1	5.3
Climb to Cruise	Climb to Cruise	1	5.3
Climb to Cruise	Maneuvering	1	5.3
Total (Either or Both Aircraft in Climb Phase)		3	15.8
Cruise	Cruise	1	5.3
Cruise - Normal	Cruise - Normal	2	10.5
Cruise	Takeoff - Initial Climb	1	5.3
Total (Either or Both Aircraft in Cruise Phase)		4	21.1
Descent	Climb	1	5.3
Descent - Normal	Approach - VFR Pattern - Base to Final	1	5.3
Total (Either or Both Aircraft in Descent Phase)		2	10.5
Approach - VFR Pattern - Final Approach	Approach - VFR - Final Approach	4	21.1
Approach - VFR Pattern - Base to Final	Descent - Normal	1	5.3
Approach - VFR Pattern - Downwind	Takeoff - Initial Climb	1	5.3
Total (Either or Both Aircraft in Approach Phase)		6	31.7
Landing - Flare/Touchdown	Landing - Flare/Touchdown	2	10.5
Total (Either or Both Aircraft in Landing Phase)		2	10.5
Maneuvering	Maneuvering	3	15.8
Maneuvering - Turn to Reverse Direction	Maneuvering - Turn to Reverse Direction	1	5.3
Maneuvering	Climb to Cruise	1	5.3
Total (Either or Both Aircraft in Maneuvering Phase)		5	26.4
Total Number of Midair Accidents		19	

* Midair collision accidents in this table are grouped according to the Phase of Operation of ONE of the involved aircraft. Column totals do not equal the total number of accidents since collisions between aircraft with different phases of operation are listed in both groupings.

Table 66 - MIDAIR COLLISION ACCIDENTS BY TYPES OF FLIGHT PLANS FILED
1988

Types of Flight Plan Filed	Accidents* No.	Percent
None and None	16	84.2
None and Company (VFR)	2	10.5
None and Military (VFR)	1	5.3
Total (Either or Both Aircraft with No Flight Plan Filed)	19	100.0
Company (VFR) and None	2	10.5
Total (Either or Both Aircraft with Company (VFR) Flight Plan Filed)	2	10.5
Military (VFR) and None	1	5.3
Total (Either or Both Aircraft with Military (VFR) Flight Plan Filed)	1	5.3
Total Number of Midair Accidents	19	

* Midair collision accidents in this table are grouped according to the Type of Flight Plan filed by ONE of the involved aircraft. Column totals do not equal the total number of accidents since collisions between aircraft with different types of flight plans are listed in both groups.

Table 67 - MIDAIR COLLISION ACCIDENTS BY TYPES OF AIRCRAFT
1988

Type(s) of Aircraft	Accidents* No.	Percent
Fixed Wing Single Reciprocating Engine and Fixed Wing Single Reciprocating Engine	14	73.7
Fixed Wing Single Reciprocating Engine and Fixed Wing Multiple Reciprocatiing Engine	1	5.3
Fixed Wing Single Reciprocating Engine and Rotorcraft, Reciprocating Engine	1	5.3
Total Fixed Wing (Either or Both Aircraft)	16	84.3
Rotorcraft, Reciprocating Engine and Fixed Wing Single Reciprocating Engine	1	5.3
Total Rotorcraft (Either or Both Aircraft)	1	5.3
Glider and Glider	3	15.8
Total Gliders (Either or Both Aircraft)	3	15.8
Total Number of Midair Accidents	19	

* Midair collision accidents in this table are grouped according to the Type of Aircraft of ONE of the involved aircraft. Column totals do not equal the total number of accidents since collisions between different types of aircraft are listed in both groupings.

Table 68 - MIDAIR COLLISIONS BY KINDS OF FLYING
MIDAIR COLLISION ACCIDENTS
1988

Kind(s) of Flying	Accidents*	
	No.	Percent
Personal and Personal	7	36.8
Personal and Instruction	4	21.1
Personal and Other	2	10.5
Total (Personal Flying by Either or Both Aircraft)	13	68.4
Business and Business	2	10.5
Total (Business Flying By Either or Both Aircraft)	2	10.5
Instruction and Personal	4	21.1
Instruction and Instruction	2	10.5
Total (Instructional Flying by Either or Both Aircraft)	6	31.6
Aerial Application and Aerial Application	1	5.3
Total (Aerial Application Flying by Either or Both Aircraft)	1	5.3
Other and Personal	2	10.5
Other and Other	1	5.3
Total (Other Kind of Flying by Either or Both Aircraft)	3	15.8
Total Number of Midair Accidents	19	

* Midair collision accidents in this table are grouped according to the Kind of Flying of ONE of the involved aircraft. Column totals do not equal the total number of accidents since collisions between aircraft with different Kinds of Flying are listed in both groupings.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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Member

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 cause(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 occurrence or circumstance occurred. In the event that there was more than one occurrence in one operational phase, the same phase is recorded for each of those occurrences.

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 OCCURRENCE: "Occurrences" is the highest level of an accident classification mechanism known as the Sequence of Events. This concept was introduced in 1982 accident investigations to describe the circumstances in an accident. To describe an accident, up to five occurrences may be used. Typically each occurrence is further defined by one or more "findings" which, when presented chronologically depict the accident scenario from beginning to end in considerable detail. The findings are developed by NTSB analysts from a menu of words and phrases, and are the most detailed means of classifying an accident. The findings are also the vehicle used to describe the probable cause of, and related factors in an accident. The example below illustrates the relationship between occurrences and findings.

Occurrence	IN FLIGHT COLLISION WITH TERRAIN
Phase of Operation	LANDING - FLARE/TOUCHDOWN

Finding(s)

1. WHEELS UP LANDING - INADVERTENT - PILOT IN COMMAND
2. IMPROPER USE OF PROCEDURE, DIVERTED ATTENTION - PILOT IN COMMAND

TYPES OF WEATHER CONDITIONS: The types of weather conditions (VMC/IMC) 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 VMC/IMC as carried under Type of Weather Conditions.

APPENDIX B

CAUSE/FACTOR ASSIGNMENTS

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Aircraft		
1 engine	2	1
Accessory drive assy	2	2
Accessory drive assy,drive gear	7	6
Accessory drive assy,drive shaft	2	1
Aerial application equipment	1	1
Aircraft performance	8	6
Aircraft performance,climb capability	8	6
Aircraft performance,helicopter hover performance	3	3
Aircraft performance,hydroplaning condition	2	1
Aircraft performance,landing capability	3	3
Aircraft performance,takeoff capability	2	2
Aircraft performance,turn capability	1	1
Annunciator panel lights	1	0
Anti-ice/de-ice system	1	0
Anti-ice/de-ice system,carburetor de-ice	1	1
Autopilot/flight director	3	0
Balloon equipment,basket	2	1
Balloon equipment,control system	2	2
Balloon equipment,envelope	2	2
Balloon equipment,heater system	1	1
Carburetor heat control	4	3
Carburetor heat control,torque box	1	1
Comm/nav equipment	1	0
Comm/nav equipment,VOR receiver	1	0
Comm/nav equipment,transceiver	2	0
Comm/nav equipment,transmitter	1	0
Comm/nav equipment,transponder	1	0
Compressor assembly,blade	1	1
Compressor assembly,rotor disc	1	1
Cooling system,cowling	5	2
Door	4	3
Door,exterior crew	3	1
Door,landing gear	1	0
Door,passenger	1	1
Electrical system	5	2
Electrical system,alternator	5	1
Electrical system,battery	9	1
Electrical system,circuit breaker	3	1
Electrical system,electric switch	2	1
Electrical system,electric wiring	3	2
Electrical system,generator	2	0
Eng assembly,crankshaft counterweights/vib damper	3	3
Engine accessories	1	0
Engine accessories,engine starter	2	0
Engine accessories,vacuum pump	2	2
Engine assembly	17	13
Engine assembly,bearing	5	4
Engine assembly,camshaft	4	3
Engine assembly,connecting rod	14	13
Engine assembly,connecting rod bolt	8	7
Engine assembly,connecting rod cap	4	3
Engine assembly,crankcase	2	2
Engine assembly,crankshaft	7	6
Engine assembly,cylinder	28	22
Engine assembly,mount	1	1
Engine assembly,piston	9	9
Engine assembly,ring	1	0
Engine assembly,rocker arm/tappet	4	4
Engine assembly,timing gear	1	1
Engine assembly,valve keeper	2	2
Engine assembly,valve,exhaust	14	14

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Aircraft (continued)		
Engine assembly,valve,intake	3	3
Engine compartment	5	4
Engine installation,suspension mounts	1	1
Engine instruments,fuel quantity gage	11	0
Engine instruments,tachometer	1	1
Exhaust system	3	2
Exhaust system,manifold	1	1
Exhaust system,muffler	5	5
Exhaust system,probe	1	0
Exhaust system,stack	1	1
Exhaust system,turbocharger	2	0
Exterior lights	2	0
External load sling/harness	3	1
Flight control surfaces/attachments	1	0
Flight control system	2	2
Flight control,aileron	7	4
Flight control,aileron attachment	1	1
Flight control,elevator	1	1
Flight control,elevator attachment	2	1
Flight control,elevator surface	1	1
Flight control,gust lock	1	1
Flight control,rudder	4	3
Flight control,stabilator	1	0
Flight/nav instruments,airspeed indicator	2	0
Flight/nav instruments,attitude gyro	2	2
Flight/nav instruments,attitude indicator	3	0
Flight/nav instruments,directional gyro	2	0
Flt control syst, aileron control attach points	1	1
Flt control syst, elevator control cable/rod	1	1
Flt control syst, rudder	1	1
Flt control syst, rudder control attach points	1	1
Flt control syst, rudder control cable/rod	1	1
Flt control syst, yoke/control stick	2	2
Flt control syst,aileron control	2	2
Flt control syst,elevator control	7	6
Flt control syst,elevator tab control(trim)	1	0
Flt control syst,rudder control	2	2
Flt control syst,stabilator trim	1	1
Flt control syst,wing flap control	2	1
Fluid	2	2
Fluid,fuel	324	315
Fluid,fuel grade	8	3
Fluid,hydraulic	3	3
Fluid,oil	34	30
Fluid,water	1	1
Fuel injection control/system	1	1
Fuel system	16	12
Fuel system,cap	6	5
Fuel system,carburetor	59	58
Fuel system,carburetor float	10	8
Fuel system,drain	2	2
Fuel system,electric boost pump	6	4
Fuel system,filter	3	2
Fuel system,fuel control	5	5
Fuel system,fuel flow divider/distributor	2	2
Fuel system,fuel quantity float/sensor	3	0
Fuel system,injector	1	1
Fuel system,line	14	12
Fuel system,line fitting	6	6
Fuel system,primer system	1	1
Fuel system,pump	10	8

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Aircraft (continued)		
Fuel system,screen	3	2
Fuel system,selector valve	6	4
Fuel system,strainer	3	3
Fuel system,tank	4	3
Fuel system,transfer pump	1	0
Fuel system,vent	7	5
Fuselage	3	2
Fuselage,cabin	4	0
Fuselage,crew compartment	7	1
Fuselage,firewall	1	1
Fuselage,instrument/electrical panel	1	1
Fuselage,seat	3	2
Glider launch/tow equipment	3	3
Horizontal stabilizer attachment	1	1
Horizontal stabilizer surface	2	1
Hydraulic system	2	1
Hydraulic system,line	2	2
Hydraulic system,motor	2	2
Hydraulic system,reservoir	1	1
Hydraulic system,seal	1	1
Ignition system	4	3
Ignition system,ignition harness	1	0
Ignition system,ignition switch	3	2
Ignition system,magneto	19	15
Ignition system,magneto grounding lead (p-lead)	1	1
Ignition system,spark plug	11	3
Induction air control,air filter/screen	3	3
Induction air control,alternate air door	1	1
Induction air control,ram/induction air ducting	2	1
Induction air control/system	2	2
Instrument lights	1	0
Landing gear	1	0
Landing gear,axle	2	2
Landing gear,emergency brake system	1	1
Landing gear,emergency extension assembly	2	1
Landing gear,float assembly	2	1
Landing gear,gear indicating system	1	0
Landing gear,gear locking mechanism	5	5
Landing gear,gear warning system	3	0
Landing gear,main gear	11	4
Landing gear,main gear attachment	8	5
Landing gear,main gear strut	6	5
Landing gear,normal brake system	21	18
Landing gear,normal retraction/extension assembly	9	4
Landing gear,nose gear	16	2
Landing gear,nose gear assembly	6	6
Landing gear,nose gear attach point	1	1
Landing gear,nose gear strut	2	1
Landing gear,parking brake	2	1
Landing gear,skid assembly	1	0
Landing gear,steering system	4	4
Landing gear,tailwheel assembly	2	0
Landing gear,tailwheel lock	1	0
Landing gear,tire	2	2
Landing gear,wheel	2	2
Landing light	1	0
Lubricating system	4	4
Lubricating system,oil cooler	3	2
Lubricating system,oil filler cap	2	2
Lubricating system,oil filter/screen	3	3
Lubricating system,oil gasket	3	3

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Aircraft (continued)		
Lubricating system,oil hose	4	4
Lubricating system,oil line	8	8
Lubricating system,oil pressure pump	1	1
Lubricating system,oil quickdrain/drain plug	1	1
Lubricating system,oil seal	1	0
Lubricating system,oil tubing	2	2
Misc eqpt/furnishings	2	2
Misc eqpt/furnishings,seat belt	1	0
Misc eqpt/furnishings,shoulder harness	2	0
Misc rotorcraft,emergency floatation gear	1	0
Misc rotorcraft,tail boom	1	0
Misc rotorcraft,tail pylon	2	2
Miscellaneous	1	1
Mixture control	1	1
Mixture control,cable	1	1
Mixture control,linkage	2	2
Pitot/static system	2	2
Powerplant	33	29
Propeller system/accessories	5	4
Propeller system/accessories,blade	8	8
Propeller system/accessories,dome	1	1
Propeller system/accessories,electric pitch ctl	1	1
Propeller system/accessories,governor	1	1
Propeller system/accessories,hub	2	2
Propeller system/accessories,pitch change mech	1	1
Propeller system/accessories,prop blade retention	1	1
Propeller system/accessories,reversing system	2	2
Rotor drive system,clutch assembly	1	1
Rotor drive system,engine to transmission drive	1	1
Rotor drive system,freewheeling sprag unit	1	1
Rotor drive system,intermediate gear box(42 deg)	2	2
Rotor drive system,main rotor driving pulley	1	1
Rotor drive system,tail rotor drive shaft	4	4
Rotor drive system,tail rotor drive shaft bearing	1	1
Rotor drive system,tail rotor drive shaft coupling	1	1
Rotor system	1	1
Rotor system,main rotor blade skin	1	1
Rotor system,main rotor hub damper	2	1
Rotor system,tail rotor blade	2	1
Rotor system,tail rotor hub	1	1
Rotor system,tail rotor hub pitch link	1	1
Rotorcraft flight control system,collective trim	1	0
Rotorcraft flight control system,primary servo	1	1
Rotorcraft flight control,collective control	2	1
Rotorcraft flight control,cyclic control	1	1
Rotorcraft flight control,swashplate assembly	1	1
Rotorcraft flight control,tail rotor cable	1	1
Rotorcraft flight control,tail rotor control	2	1
Safety system(other)	1	0
Sign towing equipment	4	3
Spray/dusting equipment	3	0
Stabilizer	2	2
Stall warning system	1	0
Throttle/power lever	4	4
Throttle/power lever,bellcrank	1	1
Throttle/power lever,cable	6	6
Throttle/power lever,linkage	2	2
Towing/advertising equipment	3	2
Turbine assembly,turbine blade	1	1
Turbine assembly,turbine wheel	1	1
Turboshaft engine	2	2

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Aircraft (continued)		
Turboshaft engine,free (power) turbine	1	1
Turboshaft engine,free turbine governor	1	1
Turboshaft engine,gas generator turbine	1	1
Vacuum system	2	1
Window,canopy	4	1
Window,flight compartment window/windshield	9	0
Wing	17	12
Wing,bracing strut	2	2
Wing,skin	2	2
Wing,spar	6	5
Wing,wing attachment bolt	1	1
Wing,wing rib	1	1
Facility		
ATC clearance procedure	1	0
Airport facilities,runway edge lights	4	0
Airport facilities,runway marking	2	0
Airport facilities,runway/landing area condition	18	2
Airport facilities,visual apch slope ind(VASI)	1	0
Airport facilities,wind direction indicator	1	0
Departure procedure	1	0
Radar,approach/departure	1	0
Radar,conflict alert	2	0
Visual approach procedure	1	0
Environment		
Aircraft moving on ground	12	0
Aircraft parked	13	0
Airport facility	7	0
Animal(s)	7	4
Approach light/navaid	4	0
Below approach minimums	7	0
Bird(s)	6	5
Bridge/overpass	1	0
Bright night	6	0
Building(nonresidential)	16	1
Carburetor icing conditions	59	7
Clouds	31	0
Crosswind	146	0
Dark night	122	0
Dawn	3	0
Downdraft	27	5
Drizzle	7	0
Dusk	30	0
Electrical tower	1	0
Fence	58	0
Fence post	5	0
Fog	93	0
Gusts	140	6
Guy wire	7	0
Hail	1	0
Haze/smoke	5	0
High density altitude	79	1
High wind	38	1
Icing conditions	20	0
Lightning	1	0
Lightning strike	1	1
Low ceiling	87	0
Mountain wave	4	0
Night	20	0
No thermal lift	2	0
Obscuration	27	0
Other person	2	0

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Environment (continued)		
Pole	15	0
Rain	32	0
Residence	9	0
Runway light	6	0
Sand/dust storm	1	0
Sign	9	0
Snow	20	0
Submerged object	1	1
Sunglare	12	1
Tailwind	72	1
Temperature extremes	17	0
Terrain condition	704	6
Thermal lift	1	0
Thunderstorm	16	0
Thunderstorm,level II	2	0
Thunderstorm,level III	2	1
Thunderstorm,outflow	1	0
Tower,unmarked	1	0
Tree(s)	238	1
Turbulence	31	0
Turbulence in clouds	3	1
Turbulence(thunderstorms)	5	0
Turbulence,clear air	2	1
Unfavorable wind	41	4
Updraft	3	1
Utility pole	10	0
Vehicle	25	0
Wall/barricade	5	0
Whiteout	3	0
Windshear	14	3
Wire,static	22	1
Wire,static(marked)	1	0
Wire,transmission	80	1
Flight Crew	1	1
ATC clearance	10	7
Abort	15	12
Aborted landing	32	27
Aborted takeoff	2	0
Acft/equip inadequate, visual restriction	1	1
Acft/equip, inadequate handling/perf capabilities	7	7
Adequate rotor rpm	22	11
Aerobatics	59	59
Aircraft control	104	88
Aircraft preflight	2	2
Aircraft service	3	2
Aircraft unattended/engine(s) running	26	10
Aircraft weight and balance	21	17
Airplane handling	198	177
Airspeed	1	0
Airspeed indicator	3	2
Airspeed(Vlof)	10	10
Airspeed(Vmc)	2	2
Airspeed(Vne)	1	0
Airspeed(Vref)	20	19
Airspeed(Vs)	9	9
Airspeed(Vso)	1	1
Airspeed(Vxse)	1	1
Airspeed(Vyse)	4	1
All available runway	1	1
Altimeter setting	114	96
Altitude		

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Flight Crew(continued)		
Anxiety/apprenhension	8	0
Attitude indicator	1	1
Autorotation	16	12
Became lost/disoriented	25	16
Brakes(normal)	21	17
Buzzing	11	8
Carburetor heat	60	59
Checklist	17	9
Clearance	101	97
Climb	16	14
Collective	5	4
Communications	5	0
Compensation for wind conditions	169	158
Complacency	7	0
Control interference	4	4
Correcting lenses not worn	1	0
Crew/group briefing	2	1
Cyclic	3	3
Decision height	7	7
Descent	17	16
Design stress limits of aircraft	25	25
Directional control	260	252
Distance	29	26
Diverted attention	59	20
Documentation	1	0
Electrical system	1	0
Elevator trim	2	2
Emergency equipment	2	0
Emergency procedure	51	24
Emotional reaction	2	0
Engine instrument	1	1
External load equipment	1	1
FSS service	1	0
Fatigue(flight and ground schedule)	3	0
Fatigue(flight schedule)	7	0
Fatigue(lack of sleep)	2	0
Fire extinguishing equipment	1	0
Flare	122	99
Flight advisories	1	1
Flight controls	60	59
Flight into known adverse weather	59	52
Flight manuals	1	0
Flight to alternate destination	13	4
Fuel boost pump selector position	2	1
Fuel consumption calculations	42	34
Fuel supply	43	42
Fuel system	4	3
Fuel tank selector position	63	61
Gear down and locked	4	4
Gear extension	8	6
Gear retraction	8	4
Generator	1	1
Glider tow release	1	1
Go-around	77	58
Ground loop/swerve	32	30
Habit interference	6	1
Hazardous weather advisory	6	1
IFR procedure	19	17
Ice/frost removal from aircraft	2	2
Improper training	1	1
Improper transition/upgrade training	1	0

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Flight Crew(continued)		
In flight briefing service	3	0
In flight weather advisories	4	4
In-flight planning/decision	280	228
Inadequate initial training	2	0
Inadequate recurrent training	5	1
Inadequate training	4	0
Inadequate training(emergency procedure(s))	3	0
Inadequate transition/upgrade training	5	0
Inattentive	10	0
Incapacitation	1	1
Incapacitation(alcohol)	2	2
Incapacitation(drugs)	1	1
Incapacitation(heart attack)	5	5
Incapacitation(loss of consciousness)	1	1
Incapacitation(other cardiovascular)	2	2
Information	1	0
Information insufficient	1	0
Instructions,written/verbal	2	1
Interpersonal relations	2	0
Judgement	28	22
Lack of familiarity with aircraft	28	4
Lack of familiarity with geographic area	8	0
Lack of recent experience	15	1
Lack of recent experience in type of aircraft	7	0
Lack of recent experience in type operation	6	0
Lack of recent instrument time	7	0
Lack of recent total experience	6	0
Lack of total experience	132	4
Lack of total experience in kind of aircraft	1	0
Lack of total experience in type of aircraft	81	2
Lack of total experience in type operation	48	3
Lack of total instrument time	26	0
Landed at wrong airport	2	0
Landing gear	1	0
Landing lights	1	1
Level off	6	6
Lift-off	27	23
Load jettison	14	2
Low pass	12	4
Lowering of flaps	11	5
Maintenance	6	4
Maintenance,adjustment	2	2
Maintenance,annual inspection	3	2
Maintenance,inspection of aircraft	4	4
Maintenance,installation	4	3
Maintenance,modification	5	4
Maintenance,recordkeeping	1	0
Maintenance,service of aircraft	4	2
Maneuver	47	41
Material inadequate	1	1
Minimum descent altitude	5	5
Missed approach	8	7
Mixture	10	8
NOTAMs	4	1
Nosewheel steering	1	1
Operation with known deficiencies in equipment	38	25
Ostentatious display	8	3
Other psychological condition	2	0
Over confidence in aircraft's ability	7	0
Over confidence in personal ability	32	3
Parking brakes	2	2

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Flight Crew(continued)		
Passenger briefing	2	1
Performance data	12	7
Physical impairment	3	0
Physical impairment(alcohol)	18	13
Physical impairment(carbon monoxide)	1	0
Physical impairment(drugs)	14	5
Physical impairment(other cardiovascular)	1	1
Planned approach	58	37
Planning-decision	34	30
Powerplant controls	9	8
Precautionary landing	17	2
Preflight briefing service	17	4
Preflight planning/preparation	225	155
Pressure induced by others	1	0
Procedures/directives	41	27
Propeller feathering	8	2
Proper alignment	35	26
Proper altitude	63	58
Proper assistance	8	5
Proper climb rate	10	9
Proper descent rate	8	6
Proper glidepath	23	19
Proper touchdown point	57	44
Psychological condition	5	3
Pull-up	8	8
Radio communications	5	0
Raising of flaps	28	15
Recovery from bounced landing	65	62
Refueling	48	39
Relinquishing of control	4	4
Remedial action	45	30
Removal of control/gust lock(s)	2	1
Rotation	5	4
Rotor rpm	13	12
Rotorcraft flight controls	27	25
Rudder	5	4
Run on landing	3	2
Self-induced pressure	10	0
Spatial disorientation	51	40
Spiral	3	3
Stall	122	111
Stall/mush	70	60
Stall/spin	62	58
Starting procedure	17	17
Stolen aircraft/unauthorized use	3	0
Supervision	73	67
Tail rotor	1	1
Taxispeed	7	5
Throttle/power control	28	24
Throttle/power control friction lock	1	1
Tie down	9	7
Touch-and-go	1	0
Touchdown	5	3
Trim setting	2	0
Undetermined	1	1
Unsafe/hazardous condition warning	2	2
Unsuitable terrain	82	72
VFR flight into IMC	71	69
VFR procedures	4	3
Vertical takeoff	1	1
Visual lookout	104	98

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Flight Crew(continued)		
Visual separation	3	3
Visual/aural detection	6	1
Visual/aural perception	43	8
Wake turbulence	7	3
Weather evaluation	81	47
Weather forecast	4	4
Wheels down landing in water	1	1
Wheels up landing	7	4
Wind information	20	8
Wrong propeller feathered	1	0
Wrong runway	38	31
Other Person		
ARTCC service	1	1
ATC clearance	1	1
Acft/equip inadequate, visual restriction	4	0
Acft/equip, inadequate aircraft component	2	2
Acft/equip, inadequate aircraft manuals	1	0
Acft/equip, inadequate airframe	1	1
Air/ground communications	1	0
Aircraft control	2	2
Aircraft service	2	1
Aircraft weight and balance	2	0
Aircraft/equipment, inadequate design	6	2
Aircraft/equipment,inadqt compliance determination	1	1
Airplane handling	3	3
Airport snow removal	1	0
Anxiety/apprenhension	2	0
Clearance	6	5
Communications	4	1
Company-induced pressure	1	0
Control interference	3	3
Crew/group briefing	1	0
Descent	1	1
Design stress limits of aircraft	1	1
Distance	1	1
Diverted attention	2	1
Emergency equipment	1	1
Equipment, other	1	1
External load equipment	1	1
Facility inadequate, visual restriction	2	0
Facility, inadequate external lighting	1	0
Flare	1	1
Flight advisories	1	0
Flight controls	1	1
Fuel consumption calculations	1	0
Go-around	1	1
Ground loop/swerve	1	1
In-flight planning/decision	2	1
Inadequate certification/approval	1	0
Inadequate certification/approval - Aircraft	2	0
Inadequate certification/approval - Manufacturer	1	0
Inadequate certification/approval - Op'n/operator	1	0
Inadequate initial training	2	0
Inadequate recurrent training	1	1
Inadequate surveillance of operation	2	0
Inadequate training	2	1
Inadequate training(emergency procedure(s))	2	0
Information	2	1
Installation	1	1
Instructions,written/verbal	6	4
Insufficient standards/requirements	1	0

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Other Person (continued)		
Insufficient stds/rqmts - Airman	1	0
Insufficient stds/rqmts - Operation/operator	1	0
Judgement	1	1
Lack of familiarity with aircraft	1	0
Lack of total experience	4	0
Lack of total experience in type of aircraft	1	0
Lack of total experience in type operation	1	1
Landing gear	2	1
Maintenance	13	9
Maintenance,100 hour inspection	5	4
Maintenance,adjustment	8	8
Maintenance,alignment	1	1
Maintenance,annual inspection	14	6
Maintenance,compliance with AD	4	3
Maintenance,design change	1	1
Maintenance,inspection of aircraft	26	14
Maintenance,installation	21	18
Maintenance,lubrication	2	1
Maintenance,major repair	8	7
Maintenance,modification	9	7
Maintenance,overhaul	6	6
Maintenance,overhaul,major	5	3
Maintenance,rebuild/remanufacture	1	1
Maintenance,replacement	3	3
Maintenance,service bulletins	4	1
Maintenance,service of aircraft	6	4
Material defect(inadequate quality control)	2	2
Monitoring	1	0
NOTAMs	1	0
Ostentatious display	1	0
Other airport/runway maintenance	1	0
Over confidence in personal ability	4	0
Panic	1	0
Performance data	1	0
Physical impairment(alcohol)	1	0
Planned approach	1	0
Planning-decision	2	0
Preflight briefing service	1	0
Preflight planning/preparation	3	0
Pressure induced by others	1	0
Procedure inadequate	1	1
Procedures/directives	9	6
Proper assistance	1	1
Proper touchdown point	1	0
Radar assistance to VFR aircraft	3	0
Radio communications	6	0
Refueling	2	2
Rotorcraft flight controls	1	1
Sabotage	1	1
Safety advisory	4	0
Stall	2	2
Starting procedure	1	1
Stolen aircraft/unauthorized use	3	1
Substantiation - Inadequate documentation	1	0
Supervision	9	4
Taxispeed	1	0
Throttle/power control	2	1
Traffic advisory	1	1
VFR flight into IMC	1	1
VFR procedures	1	0
Visual lookout	42	41

CAUSE / FACTOR TABLE
ALL ACCIDENTS - 1988

	Cause or Factor	Cause
Other Person (continued)		
Visual separation	1	1
Visual/aural perception	4	0
Weather evaluation	1	0
Weather forecast	1	0
Wind information	1	0

APPENDIX C

N.T.S.B. FORM 6120.4

FACTUAL REPORT
AVIATION
ACCIDENT/INCIDENT

National Transportation Safety Board
Washington, D.C. 20594

National Transportation Safety Board

FACTUAL REPORT
AVIATION

1 NTSB Accident/Incident Number

2
1 ☐ Accident
2 ☐ Incident

3 Investigation
1 ☐ NTSB
2 ☐ FAA Delegated

4 Aircraft Registration Number	**5 Flight Number** ____ A Other	*For collision between aircraft, enter reg. no. and flt. no. for other aircraft*	**6 Aircraft Registration Number**	**7 Flight Number** ____ A Other

8 Nearest City/Place	**9 State**	**10 Zip Code** *(First 5 numbers only)*	**11 Accident Site Elevation** ____ Feet MSL

12 Date of Accident *(Nos. for M, D, Y)*	**13 Day of Week** *(First 2 letters)*	**14 Local Time** *(24 hour clock)*	**15 Time Zone**

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident

Additional Persons Participating in this Accident/Incident Investigation *(Name, address, affiliation, Continue on page 2 if necessary)*

17 Date *(Nos. for M, D, Y)*	**18 Agency**	**19 Name/Signature**

NTSB Form 6120.4 (Rev. 1-84)

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

Attach additional pages as necessary (Page 2a, 2b, 2c, etc.)

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

[illegible]

24 ☐ **Not applicable** *(Go to block 39)*

25 Airport Name

____

A Other

26 Airport Identifier

______

27 Accident Location

1 ☐ Off airport/airstrip
2 ☐ On airport
3 ☐ On airstrip
A Other

28 Distance From Airport Center *(Nearest SM)*

________ SM

A Other

29 Direction From Airport

________ °mag

A Other

30 VFR Approach/Landing *(Multiple entry)*

1 ☐ None
2 ☐ Traffic pattern
3 ☐ Straight-in
4 ☐ Valley/terrain following
5 ☐ Go around
6 ☐ Touch and go
7 ☐ Full stop
8 ☐ Stop and go
9 ☐ Simulated forced landing
10 ☐ Forced landing
11 ☐ Precautionary landing
A Other

31 Type Instrument Approach Flown *(Multiple entry)*

1 ☐ None
2 ☐ ADF/NDB
3 ☐ SDF
4 ☐ VOR/TVOR
5 ☐ VOR/DME
6 ☐ TACAN
7 ☐ ILS-complete
8 ☐ ILS-localizer
9 ☐ ILS-backcourse
10 ☐ RNAV
11 ☐ MLS
12 ☐ LDA
13 ☐ ASR
14 ☐ PAR
15 ☐ Sidestep
16 ☐ Visual
17 ☐ Contact
18 ☐ Circling
19 ☐ Practice
A Other

32 Runway Used Identifier

______

A Other

33 Runway Length

______ Feet

A Other

34 Runway Width

______ Feet

A Other

35 Airport Elevation

______ Ft. MSL

A Other

36 Runway/Landing Surface

1 ☐ Macadam
2 ☐ Asphalt
3 ☐ Concrete
4 ☐ Gravel
5 ☐ Dirt
6 ☐ Grass/turf
7 ☐ Snow
8 ☐ Ice
9 ☐ Water
10 ☐ Metal/wood
A Other

37 Runway/Landing Surface Condition

1 ☐ Dry
2 ☐ Wet
3 ☐ Ice covered
4 ☐ Snow—dry
5 ☐ Snow—wet
6 ☐ Snow—crusted
7 ☐ Snow—compacted
8 ☐ Vegetation
9 ☐ Water—calm
10 ☐ Water—choppy
11 ☐ Water—glassy
12 ☐ Rubber deposits
13 ☐ Soft
14 ☐ Rough
15 ☐ Slush covered
16 ☐ Holes
A Other

If accident occurred during approach, departure or on airport, see instructions for completing Supplement Q.

Aircraft Information

39 Aircraft Manufacturer

40 Aircraft Model/Series

41 Serial No.

____

A Other

42 Certificated Maximum Gross Weight

____

A Other

43 Type of Aircraft

1 ☐ Airplane
2 ☐ Helicopter
3 ☐ Glider
4 ☐ Balloon
5 ☐ Blimp/dirigible
6 ☐ Ultralight
7 ☐ Gyroplane
A Specify

______

44 Type Airworthiness Certificate *(Multiple entry)*

Standard
1 ☐ Normal
2 ☐ Utility
3 ☐ Acrobatic
4 ☐ Transport

Special
5 ☐ Restricted
6 ☐ Limited
7 ☐ Provisional
8 ☐ Special flight
9 ☐ Experimental

A Other

45 Home Built

1 ☐ Yes
2 ☐ No
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

First Pilot Information *(continued)* *(Multiple entry - blocks 98-102)*

98 Ratings—Airplane
1 ☐ None
2 ☐ Single engine land
3 ☐ Multiengine land
4 ☐ Single engine sea
5 ☐ Multiengine sea

99 Rotorcraft/Glider/LTA
1 ☐ None
2 ☐ Helicopter
3 ☐ Gyroplane
4 ☐ Airship
5 ☐ Free balloon
6 ☐ Glider

100 Instrument Rating
1 ☐ None
2 ☐ Airplane
3 ☐ Helicopter

101 Instructor Rating(s)
1 ☐ None
2 ☐ Airplane SE
3 ☐ Airplane ME
4 ☐ Helicopter
5 ☐ Gyroplane
6 ☐ Glider
7 ☐ Instrument plane
8 ☐ Instrument helicopter

102 Ground Instructor
1 ☐ None
2 ☐ Basic
3 ☐ Advanced
4 ☐ Instrument

103 Type Rating Endorsement This Aircraft
1 ☐ Yes
2 ☐ No *(Go to block 105)*
A Other

104 Months Since Check/Endorsement This Aircraft
_____ Months
A Other

105 Biennial Flight Review *(Or equivalent)*
1 ☐ Yes
2 ☐ No
A Other

106 Months Since Last BFR
_____ Months
A Other

107 BFR *(or equivalent)* **Aircraft Make/Model**
A Make _____
B Model _____
C Other

108 Medical Certificate
1 ☐ None
2 ☐ Class 1
3 ☐ Class 2
4 ☐ Class 3
A Other

109 Medical Certificate Validity
1 ☐ Valid medical—no waivers/limitations
2 ☐ Valid medical—with waivers/limitations
3 ☐ Non valid medical for this flight
4 ☐ Expired
5 ☐ No medical certificate
A Other

110 Date of Last Medical *(Nos. for M, D, Y)*
_____
A Other _____

111 Medical limitation
1 ☐ None
2 ☐ Vision
A Specify _____
B Other

112 Medical wavier
1 ☐ None
2 ☐ Vision
3 ☐ Hearing
A Specify _____
B Other

113 Statement of Demonstrated Ability
1 ☐ Yes
2 ☐ No
A Other

114 Correcting Lenses *(Multiple entry)*
1 ☐ Not required
2 ☐ Required to be in possession
3 ☐ Required, not in possession
4 ☐ Required to be worn
5 ☐ Required, not worn
6 ☐ Worn at time of accident
A Other

115 Source of Pilot Flight Time *(Multiple entry)*
1 ☐ Pilot log
2 ☐ Company
3 ☐ FAA
4 ☐ Pilot/Operator Report
5 ☐ Investigator's Estimate
6 ☐ Relative
7 ☐ Other Person
A Other

Flight Time	A All A/C	B This Make & Model	C Airplane Single Engine	D Airplane Multiengine	E Night	F Instrument Actual	G Instrument Simulated	H Rotorcraft	I Glider	J Lighter Than Air	K Other
125 Total Time											
126 Pilot in Command (PIC)											
127 Instructor											
128 This Make/Model											
129 Last 90 Days											
130 Last 30 Days											
131 Last 24 Hours											

132 Landings—Last 90 Days All Aircraft
_____ Day
A Other

133 Landings—Last 90 Days All Aircraft
_____ Night
A Other

134 Landings—Last 90 Days This Make/Model
_____ Day
A Other

135 Landings—Last 90 Days This Make/Model
_____ Night
A Other

136 Seatbelt Available
1 ☐ Yes
2 ☐ No
A Other

137 Seatbelt Used
1 ☐ Yes
2 ☐ No
A Other

138 Shoulder Harness Available
1 ☐ Yes
2 ☐ No
A Other

139 Shoulder Harness Used
1 ☐ Yes
2 ☐ No
A Other

140 Autopsy Performed *(This pilot)*
1 ☐ Yes
2 ☐ No
A Other

141 Toxicology Performed *(This pilot)*
1 ☐ Yes
2 ☐ No
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

Pilot Information (continued)

142 Person at Controls
1 ☐ Pilot in command 4 ☐ Non-pilot
2 ☐ Second pilot 5 ☐ No one
3 ☐ Both pilots A Other

143 Simulated Instrument Flight
1 ☐ Yes
2 ☐ No
A Other

144 Vision Restricting Device Used
1 ☐ Yes
2 ☐ No
A Other

145 Second Pilot
1 ☐ Yes *(Complete second pilot supplement)*
2 ☐ No

Flight Itinerary Information

155 Last Departure Point *(Multiple entry)*
1 ☐ Same as accident/incident location or
A Airport identifier _____
B City/Place _____
C State D Other

156 Time of Departure
A Time _____ C Other
B Time Zone _____

157 Destination *(Multiple entry)*
1 ☐ Same as accident/incident location or
2 ☐ Local flight
A Airport Identifier _____
B City/Place _____
C State _____
D Other

158 Flight Plan Filed *(Multiple entry)*
1 ☐ None
2 ☐ Visual Flight Rules (VFR)
3 ☐ Instrument Flight Rules (IFR)
4 ☐ VFR/IFR
5 ☐ Company (VFR)
6 ☐ Military (VFR)
A Other

159 Type of Clearance
1 ☐ None 6 ☐ VFR on top
2 ☐ VFR 7 ☐ Cruise
3 ☐ Special VFR 8 ☐ Traffic Advisory
4 ☐ IFR 9 ☐ VFR Flight Following
5 ☐ Special IFR
A Other

160 Airspace
1 ☐ Uncontrolled 8 ☐ Stage II TRSA 15 ☐ Warning area
2 ☐ Controlled 9 ☐ Stage III TRSA 16 ☐ FAR 93
3 ☐ Airport traffic area 10 ☐ Prohibited area ☐ (Special air traffic areas)
4 ☐ Control zone 11 ☐ Restricted area A Other
5 ☐ Airport advisory area 12 ☐ Military Operating Area (MOA)
6 ☐ Positive control area 13 ☐ Student Jet Training Area
7 ☐ Terminal control area 14 ☐ Demo Area

161 Control Area
1 ☐ None
2 ☐ Victor airway
3 ☐ Jet airway
4 ☐ Control airway
5 ☐ Colored airway
A Other

162 Route
1 ☐ None 7 ☐ VR route (military)
2 ☐ Standard instrument departure 8 ☐ IR route (military)
3 ☐ Standard terminal arrival 9 ☐ SR route (military)
4 ☐ RNAV/OMEGA/LCRAN/INS 10 ☐ Refueling route (military)
5 ☐ Direct A Other
6 ☐ Profile Descent

163 Last Two Way Communications Established
1 ☐ None
2 ☐ Yes
A Facility Identifier _____
B Other

Aircraft Loading Information

164 Fuel on Board at Takeoff *(Multiple entry)*
1 ☐ Estimated
2 ☐ Verified
A _____ Gallons or
B _____ Pounds
C Other

165 Fuel Types *(Multiple entry)*
1 ☐ 80/87 5 ☐ Kerosene 9 ☐ Mixture
2 ☐ 100 low lead 6 ☐ JP 3, 4, 5, 6 10 ☐ Automotive
3 ☐ 100/130 7 ☐ Jet A 11 ☐ Anti-ice additive added *(If known)*
4 ☐ 115/145 8 ☐ Jet B A Other

166 Aircraft Weight at Takeoff *(Multiple entry)*
1 ☐ At or below max cert. gross takeoff weight
2 ☐ Above max certified gross takeoff weight
3 ☐ Estimated
4 ☐ Verified A Other

167 Aircraft CG at Takeoff *(Multiple entry)*
1 ☐ Within limits 5 ☐ Estimated
2 ☐ Exceeded fwd limit 6 ☐ Verified
3 ☐ Exceeded aft limit A Other
4 ☐ Exceeded lateral limit

168 Aircraft Weight at Accident *(Multiple entry)*
1 ☐ Same as takeoff
2 ☐ At or below max cert. gross takeoff weight
3 ☐ Above max certified gross takeoff weight
4 ☐ Estimated
5 ☐ Verified
A Other

169 Aircraft CG at Accident *(Multiple entry)*
1 ☐ Same as takeoff
2 ☐ Within limits 6 ☐ Estimated
3 ☐ Exceeded fwd limit 7 ☐ Verified
4 ☐ Exceeded aft limit A Other
5 ☐ Exceeded lateral limit

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

Aircraft Information (Continued)

170 Load Description *(Multiple entry)*

1 ☐ None
2 ☐ Passengers
3 ☐ Cargo
4 ☐ Towing glider
5 ☐ Towing banner
6 ☐ Other external
7 ☐ Parachutists
8 ☐ Water
9 ☐ Chemical
10 ☐ Livestock
11 ☐ Illegal cargo
A Other

Weather Information

180 Source of Weather Briefing *(Multiple entry)*

1 ☐ No record of briefing *(Go to block 183)*
2 ☐ National Weather Service (NWS)
3 ☐ Flight Service Station
4 ☐ PATWAS (Pilot Automated Tel. WX Answering Svc)
5 ☐ VRS (Voice Response System)
6 ☐ Company
7 ☐ Commercial weather service
8 ☐ TV/radio weather
9 ☐ Military
A Other

181 Method of Briefing *(Multiple entry)*

1 ☐ In person
2 ☐ Teletype
3 ☐ Telephone
4 ☐ Aircraft radio
5 ☐ TV/radio
A Other

182 Completeness of Weather briefing

1 ☐ Weather not pertinent
2 ☐ Full
3 ☐ Partial—limited by pilot
4 ☐ Partial—limited by briefer/forecaster
A Other

183 Investigator's Source of Weather Information

1 ☐ Pilot *(Go to block 185)*
2 ☐ Witness *(Go to block 185)*
3 ☐ Weather observation facility

184 Weather Observation Facility

A Identifier _____
B Time of observation _____ zone _____
C Elevation _____ feet MSL
D Distance from accident site _____ NM
E Direction from accident site _____ °magnetic

185 Basic Weather Conditions at Accident Site

1 ☐ Visual Meteorological Conditions (VMC)
2 ☐ Instrument Meteorological Conditions (IMC)
A Other

186 Conditions of Light

1 ☐ Dawn
2 ☐ Daylight
3 ☐ Night (Dark)
4 ☐ Night (Bright)
5 ☐ Dusk
A Other

187 Sky/Lowest/Cloud Condition

1 ☐ Clear
2 ☐ Scattered
3 ☐ Thin broken
4 ☐ Thin overcast
5 ☐ Partial obscuration
A _____ Feet AGL
B Other

188 Lowest Ceiling

1 ☐ None
2 ☐ Broken
3 ☐ Overcast
4 ☐ Obscured
A _____ Feet AGL
B Other

189 Visibility *(decimals)*

A _____ SM
B RVR _____ Feet
C RVV _____ SM
D Other

190 Temperature

_____ ° F
A Other

191 Dew Point

_____ ° F
A Other

192 Wind (From)

1 ☐ Variable
A _____ ° Magnetic
B Other

193 Wind Speed

1 ☐ Calm
2 ☐ Light and Variable
A _____ Kts.
B Other

194 Gusts

1 ☐ None
A _____ Kts.
B Other

195 Altimeter Setting

_____ " Hg
A Other

196 Density Altitude

_____ Feet
A Other

197 Restrictions to Visibility

1 ☐ None
2 ☐ Haze (H)
3 ☐ Dust (D)
4 ☐ Smoke (K)
5 ☐ Fog (F)
6 ☐ Ice fog (IF)
7 ☐ Ground fog (GF)
8 ☐ Blowing spray (BY)
9 ☐ Blowing dust (BD)
10 ☐ Blowing snow (BS)
11 ☐ Blowing sand (BN)
A Other

198 Type of Precipitation

1 ☐ None *(Go to block 200)*
2 ☐ Rain (R)
3 ☐ Snow (S)
4 ☐ Hail (A)
5 ☐ Rain showers (RW)
6 ☐ Freezing rain (ZR)
7 ☐ Snow shower (SW)
8 ☐ Drizzle (L)
9 ☐ Ice pellets (IP)
10 ☐ Snow pellets (SP)
11 ☐ Snow grains (SG)
12 ☐ Freezing drizzle (ZL)
13 ☐ Ice crystals (IC)
14 ☐ Ice pellet shower (IPW)
A Other

199 Intensity of Precipitation

1 ☐ Light
2 ☐ Moderate
3 ☐ Heavy
A Other

NTSB Form 6120.4 (Rev. 1-84)

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

Accident Information

200 Aircraft Damage
1 ☐ None
2 ☐ Minor
3 ☐ Substantial
4 ☐ Destroyed

201 Aircraft Fire
1 ☐ None
2 ☐ In-flight
3 ☐ On ground
A Other

202 Explosion
1 ☐ None
2 ☐ In-flight
3 ☐ On ground
A Other

203 Damage to Property
1 ☐ None
2 ☐ Residence
3 ☐ Residential area
4 ☐ Commercial bldg.
5 ☐ Vehicle(s)
6 ☐ Airport facility
7 ☐ Trees
8 ☐ Crops
9 ☐ Fence
10 ☐ Wires/poles
11 ☐ Other property

204 Injury Index *(Most critical injury)*
1 ☐ None 2 ☐ Minor 3 ☐ Serious 4 ☐ Fatal

Injury Summary *(Enter only one digit per block)*	A Fatal	B Serious	C Minor	D None	E Total
205 First Pilot					
206 Co-pilot					
207 Dual Student					
208 Check Pilot					
209 Flight Engineer					
210 Cabin Attendants					
211 Other Crew					
212 Passengers					
213 TOTAL ABOARD					
214 Other Aircraft					
215 Other Ground					
216 GRAND TOTAL					

217 Classification
1 ☐ U.S. Registered Aircraft on U.S. Soil, Territories and Possessions, or International Waters
2 ☐ U.S. Registered Aircraft on Foreign Soil
3 ☐ U.S. Registered Aircraft operated by a Foreign Operator
4 ☐ Foreign Registered Aircraft on U.S. Soil, Territories or Possessions
5 ☐ Military Aircraft
6 ☐ Aircraft not Registered

Part Failure/Incorrect Part

220 Part Failure/Malfunction *(Multiple entry)*
1 ☐ None
2 ☐ Part/component #1
3 ☐ Part/component #2
4 ☐ Part/component #3
A Other _____

221 Incorrect Part *(Multiple entry)*
1 ☐ None
2 ☐ Part/component #1
3 ☐ Part/component #2
4 ☐ Part/component #3
A Other _____

	A Part/Component #1	B Part/Component #2	C Part/Component #3
222 Part Name			
223 ATA Code			
224 Manufacturer			
225 Mfg. Part #			
226 Mfg. Model #			
227 Serial #			
228 Part Condition			
229 Total Time			
230 TSO			
231 TSI			
232 Cycles Total			
233 Cycles Since Overhaul			
234 Cycles Since Inspection			
235 Service Difficulty Report or Malfunction/Defect Report Submitted	1 ☐ Yes 2 ☐ No	1 ☐ Yes 2 ☐ No	1 ☐ Yes 2 ☐ No
236 Bogus Part	1 ☐ Yes 2 ☐ No	1 ☐ Yes 2 ☐ No	1 ☐ Yes 2 ☐ No

* U.S. G.P.O.:1991-281-626:20037