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HELICOPTER SLING LOAD ACCIDENT/INCIDENT SURVEY: 1968 - 1974

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16. Abstract

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SUMMARY

A survey of the helicopter sling load accident/incident records provided by the U. S. Air Force, U. S. Army, U. S. Navy, and National Transporation Safety Board for the years 1968-1974 inclusive has been performed. The data indicate that during theperiod considered a mean of eleven accidents per year occurred and a mean of eleven persons were killed or seriously injured per year. Forty-one percent of the accidents occurred during hover, and 63 percent of the accidents had pilot error listed as a cause/factor. Many accidents involved pilots losing control of the helicopter or allowing a collision with obstructions to occur. There was a mean of 58 incidents each year and 51 percent of these occurred during cruise.

INTRODUCTION

The use of helicopters for placement and transportation of external sling loads is increasing yearly. Unfortunately, there appear to be numerous problems associated with these operations. These problems are resulting in accidents and incidents in which persons are being killed and seriously injured, and aircraft and other property are being destroyed and damaged.

It was felt that quantitative data on helicopter sling load accidents and incidents would be useful in identifying critical problem areas associated with these operations. No such data were found in the literature, so it was decided that an effort should be made to determine and document these data.

The first purpose of this report is to document the frequency, severity, and causes of accidents and incidents involving United States civil and military helicopters performing external sling load missions in the 1968-1974 time period. The second purpose of this report is to determine if there are critical problem areas associated with helicopter sling load operations so that research can be directed toward eliminating these problems.

A glossary is given in which the many terms used in this report are defined. Most of the definitions are taken from civil documents. Military definitions of certain terms may very slightly, but for all practical purposes are the same.

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The data in this report were obtained from the National Transportation Safety Board, Washington, DC; the U. S. Army Agency for Aviation Safety, Fort Rucker, AL; the U. S. Naval Safety Center, Norfolk, VA; and the U. S. Air Force Inspection and Safety Center, Norton Air Force Base, CA. U. S. Marines data are included with Navy data. U. S. Coast Guard data were not obtained. The civil data are for accidents only; no incident data were obtained. The military data do not contain any accidents or incidents that resulted from enemy action, however, mishaps that occurred out of the United States are included.

The data included in this report are tabulated in several different ways. Aircraft damage is given for the accidents and incidents by year of occurrence, primary cause/factor and sector. Personal injuries are listed according to year of occurrence, primary cause/factor and sector. The number of accidents and incidents that occurred over the 7-year period considered is given by primary cause/factor, phase of flight, and sector. The number of accidents and incidents during the period considered in which the sling load was dropped is given in terms of primary cause and sector. The number of accidents and incidents each year where pilot error was a cause/factor are given for each sector. Helicopter makes and models involved in the accidents and incidents reported herein are tabulated according to the sector. Finally, the number of all helicopter accidents and incidents and the number of injuries that occurred each year during the period considered is given.

The authors wish to acknowledge the work done by Mr. R. T. Frederick of the LaRC in reducing the data furnished by the National Transportation Safety Board.

GLOSSARY

The following terms are used in this report and the general definitions given here are intended to help the reader comprehend the data presented. Technical detail has been omitted from these definitions.

AIRCRAFT ACCIDENT - means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which any person suffers death or serious injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or the aircraft receives substantial damage.

AIRCRAFT INCIDENT - certain occurrences associated with the operation of an aircraft of a less serious nature than those of the aircraft accident. Occurrences such as precautionary landings, loss of sling load or collision of sling load with objects, collision of helicopter with objects not resulting in an accident, and those occurrences included in paragraph (2) under SUBSTANTIAL DAMAGE are typical aircraft incidents.

CABLE ASSEMBLY - used with respect to mishap cause/factors means the cable or

sling broke or the winch malfunctioned while in flight.

CAUSE/FACTOR - used with respect to aircraft accidents and incidents categorizes the cause of the mishap. There are more than one cause in many cases. Primary cause/factors are the first cause, contributing cause/factors are secondary causes.

DESTROYED - used with respect to aircraft damage means aircraft damaged beyond economical repair.

FATAL INJURY - any injury which results in death within 7 days.

IMPROPER RIGGING - used with respect to mishap cause/factors means the ground crew attached or placed the sling, hook, etc., in an improper fashion or allowed the cable or sling to entangle the helicopter before takeoff.

INADVERTANT JETTISON - accidental release of the sling load by the pilot in command or by failure of an automatic release switch.

LIMITED DAMAGE - used to separate aircraft incidents into two categories, those with limited damage and those with no damage.

MEAN - arithmetic mean of a group of numbers or occurences equal to the sum of the occurrences divided by the number of items.

MISCELLANEOUS - used with respect to mishap cause/factors covers causes not covered under cable assembly failure, improper rigging, inadvertant jettison, power plant failure, swinging load or visibility. Examples of miscellaneous cause factors are pilot losing control of helicopter, foreign material being ingested into rotors, load rolling over after touchdown, and cable-landing gear entanglement during takeoff.

PHASE OF FLIGHT - one of seven flight conditions at the time of the accident/incident: takeoff, climb, cruise, turn, descent, hover, landing.

PILOT ERROR - used with respect to mishap cause factors means that the pilot in command failed to carry out his responsibility for the operation and safety of an aircraft during flight time.

POWERPLANT - used with respect to mishap cause factors means complete or partical loss of propulsive and/or lifting power.

SECTOR - refers to the sector of U. S. aviation either Civil, Army, Air Force, or Navy.

SERIOUS INJURY - means 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 damgage; (4) involves injury to any internal organ; or (5) involves second or third degree burns, or any burns affective more than 5 percent of the body surface.

STANDARD DEVIATION - a measure of dispersion around the mean equal to the square root of the sum of squares of the deviation from the mean divided by the number of items.

SUBSTANTIAL DAMAGE - (1) except as provided in subparagraph (2) of this definition, substantial damage means damage or sturctural 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 or ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wing tips are not considered "substantial damage."

SWINGING LOAD - used with respect to mishap cause/factors means the sling load was swinging with respect to the helicopter more than a nominal amount.

VISIBILITY - used with respect to mishap cause/factors means the pilot in command failed to see and/or avoid objects or obstructions.

RESULTS AND DISCUSSION

The results of this study are presented in the following discussion and accompanying 13 tables. In a number of these tables data are presented as pairs of numbers separated by a hyphen; however, in cases where both data values are zero then a single zero is used. Also, whenever a sector has no occurrences in a particular part of a table then that sector is omitted from that part of the table.

Table 1 gives the number of helicopters destroyed or substantially damaged in sling load accidents each year from 1968 - 1974. The mean and standard deviation of the number of destroyed helicopters each year is 6.0 and 5.0 respectively. The mean and standard deviation of the number substantially damaged is 5.4 and 3.3 respectively. A maximum of 23 accidents occurred in 1969 and also in 1970 followed by a general downward trend to five in 1974. The maximums in 1969 and 1970 coincide with the intense action in Vietnam; however, there were eight civil accidents in 1969. In 1970 one civil accident occurred that resulted in serious injuries but no aircraft damage. This mishap is not included in Table 1. The Air Force reported no accidents. Table 2 is a breakdown of Table 1 into six primary cause/factors; cable assembly failure, improper rigging, powerplant failure, swinging load, visibility, and miscellaneous. The most frequently cited cause/factor is powerplant failure with a mean of 4.3 accidents each year. Next is miscellaneous with a mean of 3.6 accidents followed by 1.7 accidents caused by visibility problems, 1.1 caused by swinging load, 0.4 due to cable assembly failure, and 0.3 caused by improper rigging. As will be shown later many of the accidents occurred during hover and more than 60 percent had pilot error listed as a contributing cause/factor. Many of the miscellaneous causes involved pilots losing control of the helicopter.

Table 3 gives the number of helicopters which received limited or no damage in sling load incidents each year from 1968 through 1974. The mean and standard deviation of the number of limited damage incidents per year is 27.1 and 15.0 respectively. The mean and standard deviation of the number of incidents reported with no damage is 30.6 and 15.5 respectively. Incident data for the civil sector were not available. A maximum of 113 incidents occurred in 1969 followed by a general downward trend to 33 in 1974. Table 4 is a breakdown of Table 3 into the same primary cause/factors used in Table 2 plus one more, inadvertant jettison. The most frequently cited cause/factor is cable assembly failure with a mean of 29.3 incidents each year. Next is miscellaneous with mean of 7.6 incidents followed by; 6.0 incidents caused by visibility problems, 6.0 caused by inadvertant jettison, 4.9 caused by swinging load, 2.6 due to improper rigging, and 1.4 caused by powerplant failure. It will be shown later that most of the incidents occurred during cruise flight.

Table 5 gives the number of fatalities and serious injuries resulting from sling load accidents each year from 1968 through 1974. The mean and standard deviation of the number of fatalities per year is 7.1 and 7.6 respectively. The mean and standard deviation of the number of serious injuries is 4.1 and 3.8 respectively. A maximum of 31 injuries occurred in 1969 followed by a general downward trend to one in 1974. Again, most of the injuries resulted during Vietnam conflict; however, the civil sector also shows a general downward trend. The Navy and Air Force reported no serious injuries. Table 6 is a breakdown of Table 5 into five of the cause/factors used above. Cause/factors that fell in the miscellaneous category, including many loss of control accidents, were responsible for the most injuries, a mean of 5.3 per year. Next were powerplant failures with a mean of 3.0 injuries followed by 1.7 injuries per year caused by swinging load mishaps, 1.3 due to visibility accidents, and 0.1 due to cable assembly failures. In 1970 one accident due to swinging load resulted in ten fatalities. In general, accidents resulting in destroyed or substantially damaged airframes resulted in serious or fatal injuries. It will be shown that most injuries occurred from hover and had pilot error listed as a contributing cause/factor in most of the cases.

Table 7 gives the number of sling load accidents and incidents according to one of seven phases of flight: takeoff, climb, cruise, turn, descent, hover, and landing. The highest percentage of accidents (41 percent of the total) occurred during hover with the second highest (19 percent) occurring during cruise. The highest percentage of incidents (51 percent of the total) occurred during cruise with the second highest (25 percent) occurring during hover. Table 8 is a breakdown of Table 7 into the seven cause/factors used before. Accidents and incidents caused by powerplant failure, visibility problems, and miscellaneous factors occurred mostly during hover and in many cases these factors involved pilots failing to observe engine instruments, failing to see and avoid obstructions, and losing control of the helicopter. Accidents and incidents caused by swinging loads occurred mostly during cruise as did incidents caused by cable assembly failure and inadvertant jettison but these mishaps were generally much less severe than the hover mishaps. Since hover had the highest percentage of accidents and since ideally minimal time is spent hovering, the data indicate that hovering is the most critical sling load flight operation.

Table 9 gives by cause/factor the number of sling-load accidents and incidents where the load was dropped. It should be noted that cable assembly failure does not necessarily imply that the load was dropped. Of all the accidents reported 26 percent involved the load being dropped. On the other hand, the load was dropped in 66 percent of the incidents reported. The cause/factor which had the largest number of accidents where the load was dropped per total number of accidents in that cause/factor was cable assembly failure followed by swinging load. The cause/factors which had the largest number of incidents where the load was dropped per total number of incidents (not counting inadvertant jettison) were improper rigging, swinging load, and cable assembly failure.

Table 10 gives the number of sling load accidents and incidents reported each year where pilot error was listed as a contributing cause/factor. For comparison purposes the total number of sling load accidents and incidents are also given. Pilot error was listed as a contributing cause/factor in 63 percent of all accidents and 21 percent of the incidents. In the civil sector pilot error was partially responsible for 67 percent of the accidents. These percentages clearly show that pilot error during sling load operations is a significant problem. It is felt that this problem is due to the high workload environment and the requirement on the pilot to control a marginally stable load through a basically unstable helicopter.

Table 11 lists the helicopter makes and models and total numbers involved in the sling load accidents and incidents reported in this study. Out of 81 accidents 24 occurred in the Boeing H-47 operated by the Army followed by 17 in the Bell 47 operated in the civil sector. Most of the incidents (130) occurred in the Sikorsky CH-53 followed by 114 in the Boeing H-46, both operated by the Navy.

Table 12 gives the total number of all helicopter accidents and incidents for each year from 1968 through 1974. The mean and standard deviation of the number of accidents each year is 791 and 417 respectively. The mean and standard deviation of the numbers of incidents is 2043 and 234 respectively. Comparing the totals from this table with those from Table 1 for the sling load activity shows that the sling load accidents account for about 1.5 percent of the total. The number of sling load incidents account for about 2.8 percent of the total.

Table 13 lists the total number of injuries incurred in helicopter accidents and incidents for each year from 1968 through 1974. The mean and standard deviation of the number of fatalities each year is 341 and 226 respectively. The mean and standard deviation of the number of serious injuries is 245 and 154 respectively. Comparing the totals from Table 13 with those from Table 5 for the sling load activity shows that the sling load injuries account for about 2 percent of the total. The comparison of these data also shows that 63 percent of the civil sector sling load injuries were fatal whereas 53 percent of all civil sector injuries were, indicating that sling load injuries are usually more serious than non sling load ones.

CONCLUDING REMARKS

A survey of the helicopter sling load accident/incident records provided by the U. S. Air Force, U. S. Army, U. S. Navy, and National Transportation Safety Board for the years 1968 through 1974 inclusive has been performed. The following conclusions are made regarding the data in this time period.

1) There were means of six aircraft destroyed and five substantially damaged per year. This represents 1.5 percent of all helicopter accidents.

2) There were means of seven fatalities and four serious injuries per year. This represents 2.0 percent of all helicopter accident injuries.

3) Forty-one percent of the accidents occurred during hover.

4) Sixty-three percent of the accidents listed pilot error as a contributing cause/factor.

5) Many accidents involved pilots losing control of the helicopter or allowing a collision with obstructions to occur.

6) Injuries incurred in sling load accidents were usually more serious than non-sling load ones.

7) The Air Force reported no accidents and the Navy reported no serious injuries.

8) There was a mean of 58 incidents per year. This represents 2.8 percent of all helicopter incidents.

9) Fifty-one percent of the incidents occurred during cruise.

TABLE 2.- YEARLY DAMAGE FROM HELICOPTER SLING LOAD ACCIDENTS BY PRIMARY CAUSE/FACTOR[a]

Sector	1968	1969	1970	1971	1972	1973	1974
Cable assembly failure							
Civil	0	0-1	0	0	0	1-0	0
Navy	0	0	0-1	0	0	0	0
Improper rigging							
Civil	0-1	0	0	0	0	0-1	0
Powerplant failure							
Civil	0	0	0-3	0-1	1-3	0-1	0-1
Army	2-0	8-1	4-2	2-0	0	0	0
Navy	0	0	0	0	0	0-1	0
Swinging load							
Civil	1-0	0	0	0	0	0	0-1
Army	0	0	2-1	1-0	0	0	0
Navy	0	0-1	0	0	0	0-1	0
Visibility							
Civil	0-1	0-1	0	0-1	0	0	0-1
Army	0	1-0	2-3	1-0	1-0	0	0
Miscellaneous							
Civil	1-0	3-3	1-1	2-0	0	0-2	1-1
Army	1-0	3-1	2-1	1-1	0	0	0

[a]The two numbers separated by a hyphen represent the number of aircraft (Destroyed - Substantially damaged).

TABLE 3.- YEARLY DAMAGE FROM HELICOPTER SLING LOAD INCIDENTS[a]

Sector	1968	1969	1970	1971	1972	1973	1974
Air Force	2-9	2-6	2-3	6-3	10-2	0	6-0
Army	7-0	21-3	25-0	13-0	4-0	1-0	4-0
Navy	20-39	30-51	14-13	9-19	6-21	4-26	4-19
Totals	29-48	53-60	41-16	28-22	20-23	5-26	14-19

[a]The two numbers separated by a hyphen represent the number of aircraft sustaining (Limited - No) damage.

TABLE 4.- YEARLY DAMAGE FROM HELICOPTER SLING LOAD INCIDENTS BY PRIMARY CAUSE/FACTOR[a]

Sector	1968	1969	1970	1971	1972	1973	1974
Cable assembly failure							
Air Force	2-3	0-2	1-1	2-0	4-1	0	3-0
Army	0	1-2	5-0	1-0	0	1-0	1-0
Navy	10-30	21-44	5-9	4-13	2-16	2-8	1-10
Improper rigging							
Navy	2-3	0-3	1-1	0-1	0-2	0-4	0-1
Inadvertant jettison							
Air Force	0-6	1-4	1-2	4-2	6-0	0	2-0
Navy	0-2	0-2	0-3	0-3	0	0-4	0
Powerplant failure							
Army	1-0	1-1	4-0	1-0	0	0	0
Navy	0	0	0	0	1-0	0-1	0
Swinging load							
Air Force	0	0	0	0	0	0	1-0
Army	0	0	1-0	1-0	0	0	1-0
Navy	5-1	1-2	4-0	3-0	0-1	0-5	1-7
Visibility							
Army	3-0	0	7-0	5-0	4-0	0	2-0
Navy	2-0	4-0	4-0	2-0	3-1	2-2	1-0
Miscellaneous							
Air Force	0	1-0	0	0-1	0-1	0	0
Army	3-0	19-0	8-0	5-0	0	0	0
Navy	1-3	4-0	0	0-2	0-1	0-2	1-1

[a]The two numbers separated by a hyphen represent the number of aircraft sustaining (Limited - No) damage.

TABLE 5.- YEARLY INJURIES FROM HELICOPTER SLING LOAD ACCIDENTS[a]

Sector	1968	1969	1970	1971	1972	1973	1974
Civil	1-0	4-0	0-3	3-3	2-0	1-1	1-0
Army	0	19-8	12-7	5-5	2-3	0	0
Totals	1-0	23-8	12-10	8-8	4-3	1-1	1-0

[a]The two numbers separated by a hyphen represent the number of (Fatal-Serious) injuries.

TABLE 6.- YEARLY INJURIES FROM HELICOPTER SLING LOAD ACCIDENTS BY PRIMARY CAUSE/FACTOR[a]

Sector	1968	1969	1970	1971	1972	1973	1974
Cable assembly failure							
Civil	0	1-0	0	0	0	0	0
Powerplant failure							
Civil	0	0	0	0	2-0	0	0
Army	0	8-4	0-2	2-3	0	0	0
Swinging load							
Civil	1-0	0	0	0	0	0	0
Army	0	0	10-0	0-1	0	0	0
Visibility							
Army	0	0	1-0	3-0	2-3	0	0
Miscellaneous							
Civil	0	3-0	0-3	3-3	0	1-1	1-0
Army	0	11-4	1 5	0-1	0	0	0

[a]The two numbers separated by a hyphen represent the number of (Fatal-Serious) injuries.

TABLE 7.- HELICOPTER SLING LOAD ACCIDENTS AND INCIDENTS BY PHASE OF OPERATION[a]

Sector	Takeoff	Climb	Cruise	Turn	Descent	Hover	Landing
Civil	9-0	0	8-0	0	5-0	11-0	3-0
Air Force	0-3	0-3	0-19	0-3	0	0-13	0-10
Army	5-9	0	5-9	0	0	20-48	11-12
Navy	0-32	0-18	2-178	0-6	0	2-39	0-2
Totals	14-44	0-21	15-206	0-9	5-0	33-100	14-24

[a]The two numbers separated by a hyphen represent the number of (Accidents-Incidents)

TABLE 8.- HELICOPTER SLING LOAD ACCIDENTS AND INCIDENTS BY PHASE OF OPERATION AND PRIMARY CAUSE/FACTOR[a]

Sector	Takeoff	Climb	Cruise	Turn	Descent	Hover	Landing
Cable assembly failure							
Civil	1-0	0	0	0	0	1-0	0
Air Force	0-2	0-1	0-6	0	0	0-10	0
Army	0-1	0	0-5	0	0	0-4	0-1
Navy	0-18	0-12	0-130	0-3	0	1-12	0
Totals	1-21	0-13	0-141	0-3	0	2-26	0-1
Improper rigging							
Civil	1-0	0	0	0	1-0	0	0
Navy	0-9	0-3	0-5	0	0	0-1	0
Totals	1-9	0-3	0-5	0	1-0	0-1	0
Inadvertant jettison							
Air Force	0-1	0-2	0-9	0-3	0	0-3	0-10
Navy	0-1	0-2	0-10	0-1	0	0	0
Totals	0-2	0-4	0-19	0-4	0	0-3	0-10
Powerplant failure							
Civil	2-0	0	2-0	0	2-0	4-0	0
Army	2-1	0	2-0	0	0	7-5	8-2
Navy	0	0	1-1	0	0	0-1	0
Totals	4-1	0	5-1	0	2-0	11-6	8-2

[a]The two numbers separated by a hyphen represent number of (Accidents-Incidents).

TABLE 8.- HELICOPTER SLING LOAD ACCIDENTS AND INCIDENTS BY PHASE OF OPERATION AND PRIMARY CAUSE/FACTOR - concluded

Sector	Takeoff	Climb	Cruise	Turn	Descent	Hover	Landing
Swinging load							
Civil	0	0	2-0	0	0	0	0
Air Force	0	0	0-1	0	0	0	0
Army	1-1	0	2-2	0	0	1-0	0
Navy	0-2	0-1	1-25	0-2	0	1-0	0
Totals	1-3	0-1	5-28	0-2	0	2-0	0
Visibility							
Civil	0	0	0	0	0	3-0	1-0
Army	1-1	0	1-1	0	0	4-17	2-2
Navy	0	0	0	0	0	0-20	0-1
Totals	1-1	0	1-1	0	0	7-37	3-3
Miscellaneous							
Civil	5-0	0	4-0	0	2-0	3-0	2-0
Air Force	0	0	0-3	0	0	0	0
Army	1-5	0	0-1	0	0	8-22	1-7
Navy	0-2	0	0-7	0	0	0-5	0-1
Totals	6-7	0	4-11	0	2-0	11-27	3-8

TABLE 9 .- HELICOPTER SLING LOAD ACCIDENTS AND INCIDENTS
BY CAUSE/FACTOR WHERE THE LOAD WAS DROPPED

Sector	Cable Assembly Failure	Improper Rigging	Inadvertent Jettison	Powerplant Failure	Swinging Load	Visibility	Misc.	Totals
				Accidents[a]				
Civil	1-2	0-2	0	4-10	2-2	1-4	6-16	14-36
Army	0	0	0	4-19	2-4	0-8	0-10	6-41
Navy	1-1	0	0	1-1	1-2	0	0	3-4
Totals	2-3	0-2	0	9-30	5-8	1-12	6-26	23-81
				Incidents[b]				
Air Force	14-19	0	28-28	0	1-1	0	0-3	43-51
Army	5-11	0	0	1-8	1-3	0-21	1-35	8-78
Navy	149-175	16-18	14-14	1-2	27-30	6-21	2-15	215-275
Totals	168-205	16-18	42-42	2-10	29-34	6-42	3-53	266-[illegible]

[a]The numbers separated by a hyphen represent (Number of accidents where load was dropped - Number of accidents).

[b]The numbers separated by a hyphen represent (Number of incidents where load was dropped - Number of incidents).

TABLE 10.- YEARLY HELICOPTER/SLING-LOAD ACCIDENTS AND INCIDENTS WHERE PILOT ERROR WAS A CONTRIBUTING CAUSE/FACTOR

Sector	1968	1969	1970	1971	1972	1973	1974
				Accidents[a]			
Civil	3-4	7-8	2-6	3-4	0-4	5-5	4-5
Army	1-3	11-14	11-17	3-6	1-1	0	0
Navy	0	0-1	0-1	0	0	0-2	0
				Incidents[b]			
Air Force	1-11	0-8	0-5	1-9	1-12	0	1-6
Army	2-7	16-24	13-25	9-13	4-4	1-1	0-4
Navy	12-59	5-81	7-27	6-28	2-27	2-30	1-23

[a]The numbers separated by a hyphen represent(Number of accidents where pilot error was a contributing cause/factor - Number of accidents).

[b]The numbers separated by a hyphen represent(Number of incidents where pilot error was a contributing cause/factor - Number of incidents).

TABLE 11.- HELICOPTER MAKES AND MODELS IN SLING-LOAD ACCIDENTS AND INCIDENTS[a]

Model	Civil	Air Force	Army	Navy	Totals
			Bell		
47, OH-13	16-0	0	1-0	0	17-0
204, UH-1B,D	2-0	0	1-6	0	3-6
205, UH-1H	2-0	0-5	8-16	0	10-21
206	4-0	0	0	0	4-0
212, UH-1N	0	0-4	0	0-1	0-5
			Sikorsky		
S-56, H-37	0	0	1-1	0	1-1
S-58, H-34	4-0	0-2	0-2	0-6	4-10
S-61, H-3	1-0	0-12	0	0-17	1-29
S-64-CH-54	0	0	5-2	0	5-2
S-65-CH-53	0	0-3	0	0-127	0-130
			Kaman		
H-2	0	0	0	0-10	0-10
K-600	2-0	0	0	0	2-0
H-43	0	0-25	0	0	0-25
			Boeing		
107, H-46	0	0	0	4-114	4-114
114, H-47	0	0	24-49	0	24-49
			Hiller		
FH-1100	1-0	0	0	0	1-0
UH-12	2-0	0	0	0	2-0
			Hughes		
269	1-0	0	0	0	1-0
369	0	0	0-2	0	0-2
			Alouette		
III	2-0	0	0	0	2-0

[a]Numbers separated by a hyphen represent the number of (Accidents - Incidents).

TABLE 12.- YEARLY HELICOPTER ACCIDENTS/INCIDENTS

Sector	1968	1969	1970	1971	1972	1973	1974
Accidents							
Civil	228	265	243	218	223	257	261
Air Force	16	23	11	12	11	10	7
Army	1064	959	648	319	121	95	84
Navy	83	111	83	59	49	44	33
Totals	1391	1358	985	608	404	406	385
Incidents							
Air Force	206	177	175	203	237	201	215
Army	1293	1307	940	453	227	217	212
Navy	481	1021	1074	1062	1385	1596	1622
Totals	1980	2505	2189	1718	1849	2014	2049

TABLE 13.- YEARLY INJURIES FROM HELICOPTER ACCIDENTS[a]

Sector	1968	1969	1970	1971	1972	1973	1974
Civil	36-33	51-34	26-24	25-32	61-36	36-48	51-45
Air Force	11-13	19-3	7-2	6-2	7-0	9-3	1-1
Army	492-371	519-404	292-168	273-151	61-60	20-29	23-21
Navy	81-48	98-44	86-45	22-20	30-36	24-21	25-24
Totals	620-465	687-485	411-239	326-205	159-132	89-101	100-91

[a]The two numbers separated by a hyphen represent the number of (Fatal-Serious) injuries.