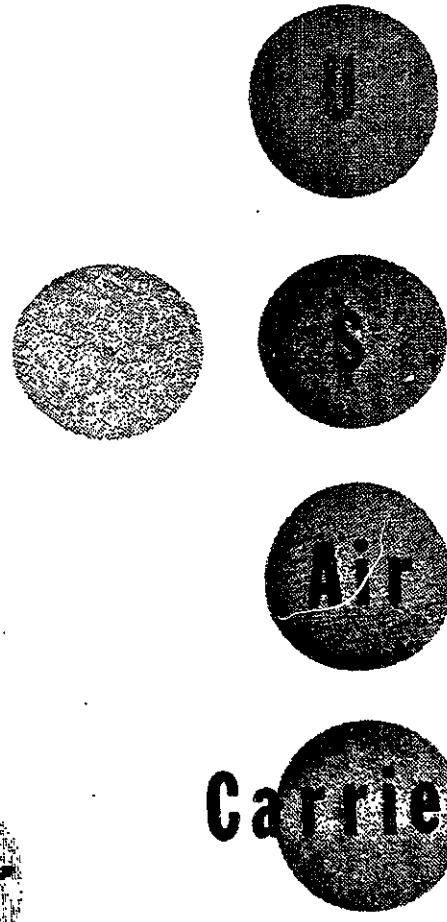
CALENDAR YEAR 1961



STATISTICAL REVIEW AND RÉSUMÉ OF ACCIDENTS

CIVIL AERONAUTICS BOARD

134

FOREWORD

The purpose of this report is to present the record of aircraft accidents, incident to flight, which occurred in U. S. Air Carrier operations during the calendar year 1961. It includes a statistical recapitulation of all accidents, and a brief description of each accident along with the probable cause as determined by the Civil Aeronautics Board.

Certain revisions and corrections have been incorporated in data dealing with years prior to 1961 due to the receipt of additional information or changes in classification.

Public reports containing greater detail have been issued by the Board on a number of the major accidents included in this report and are available upon request. In all cases, factual data obtained in the investigation may be released to inquirers at their expense when the reproduction of records is involved.

In the computation of accident rates and passenger fatality rates, dynamite accidents are excluded. Midair collisions nonfatal to Air Carrier occupants are excluded in computation of fatal accident rates.

There were two (2) propeller to person accidents during 1961.

9/20/61 Portland, Oregon (fatal)
12/ 6/61 Port Wakefield, Alaska (nonfatal)

These accidents are excluded in all statistical tabulations except where noted.

The accident record of U. S. General Aviation, small fixed-wing aircraft, large fixed-wing aircraft, and rotorcraft, is contained in a separate publication entitled, General Aviation Accidents, A Statistical Review.

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DEFINITIONS

Aircraft Accident: An aircraft accident is an accident which occurs during the starting or warming up of an engine or engines, or operation of an aircraft, which results in serious or fatal injury to one or more persons or in substantial damage to any aircraft, or which involves a collision of two or more aircraft. Whenever serious or fatal injury results from contact with a rotating propeller which is installed on an aircraft, it shall be considered an aircraft accident.

Aircraft Accident Incident to Flight: An aircraft accident incident to flight is an aircraft accident which occurs between the time an engine or engines are started for the purpose of commencing flight until the aircraft comes to rest with all engines stopped for complete or partial deplaning or unloading. It excludes death or injuries to persons on board which results from illness, altercations, and other incidents not directly attributable to flight operations.

Air Carrier: As used in this report, those operators who have been issued a Certificate Of Public Convenience And Necessity by the Civil Aeronautics Board.

Aircraft Miles: The miles (computed in airport-to-airport distances) for each interairport flight actually completed, whether or not performed in accordance with the scheduled pattern. For this purpose, operation to a flag stop is a flight completed even though a landing is not actually made. In cases where interairport distances are inapplicable, aircraft miles flown are determined by multiplying the normal crusing speed of the aircraft by the airborne hours.

All-Cargo Carriers: Certificated Route Carriers primarily engaged in the transportation of freight and express. The nonscheduled passenger operations of these carriers are included in this category. Does not include the all cargo operations of the passenger/cargo carriers.

All-Cargo Service: Transport service established primarily for the transportation of freight, express, and/or mail.

Certificate Of Public Convenience And Necessity: A certificate issued to an Air Carrier by the Civil Aeronautics Board, authorizing the carrier to engage in air transportation.

Certificated Route Carriers: One of a class of air carriers holding certificates Of Public Convenience And Necessity, issued by the Civil Aeronautics Board, authorizing the performance of scheduled air transportation over specified routes and a limited amount of nonscheduled operations. This general carrier grouping includes the all-purpose carriers (i.e., the so-called passenger/cargo carriers) and the all-cargo carriers, and comprises all of the airlines certificated by the Board, except supplemental air carriers. Certificated Route Air Carriers are often referred to as "Scheduled Airlines" although they also perform nonscheduled service.

Domestic Operations: In general, operations wholly within the territory of the United States. Includes domestic operations of the certificated trunk carriers and the local service, helicopter, Intra-Alaska, Intra-Hawaii and Domestic All-Cargo carriers.

Domestic Trunk Carriers: Those domestic "grandfather" carriers designated as "trunk carriers" in 1945-46, when "feeder" carriers (now called local service carriers) were granted certificates by the Civil Aeronautics Board to perform local feeder air service.

International and territorial operations of the trunk carriers are shown under "International and Territorial Operations" and are not included under "Domestic Operations."

Helicopter Carriers: Domestic Certificated Route Air Carriers employing helicopter aircraft for their primary operations.

International and Territorial Operations: In general, operations outside the territory of the United States, including operations between United States points separated by foreign territory or major expanses of international waters.

Intra-Alaska Operations: Statehood for Alaska since 1959 requires the inclusion of its Intra-State air carrier operations with the domestic carriers. Operations between Alaska and other States of the United States are included under International and Territorial, since such operations are over foreign territory or international waters.

Intra-Hawaii Operations: Intra-Hawaii air carrier operations, are included under domestic operations. Operations between Hawaii and other States of the United States are carried under International and Territorial Operations.

Local Service Carriers: Certificated Domestic Route Air Carriers operating routes of lesser density between the smaller traffic centers and between those centers and principal centers.

Nonscheduled Service: Revenue flights that are not operated in regular scheduled service such as charter flights and all nonrevenue flights incident to such flights.

Passenger Mile: One passenger transported one mile. Passenger miles are computed by the summation of the products of the aircraft miles flown on each interairport flight multiplied by the number of passengers carried on that flight.

Revenue Passenger: A person receiving air transportation from an air carrier for which remuneration is received by the air carrier. Air carrier employees and others receiving air transportation against whom token service charges are levied are considered nonrevenue passengers.

Revenue Plane Miles: The total plane miles flown in revenue service.

Supplemental Air Carriers: One of a class of air carriers holding temporary Certificates Of Public Convenience and Necessity, issued by the Civil Aeronautics Board, authorizing them to perform passenger and cargo charter services supplementing the scheduled service of the certificated route air carriers.

Section I

STATISTICAL REVIEW

U. S. AIR CARRIER SAFETY RECORD - 1961

The 1961 safety record of the U. S. Air Carriers is presented in this report in relation to the various classifications and groupings of air carriers, and to the different types of operations in which they engage. There are two main categories of air carriers; the Certificated Route Carriers and the Supplemental Carriers. Data is furnished in relation to each category and to the different groupings of carriers within each category. Additional breakdowns are made in respect to the different types of service performed by these carriers.

HIGHLIGHTS - U. S. AIR CARRIER SAFETY RECORD - ALL OPERATIONS

In the overall operation of the U. S. Air Carriers during 1961 there were 84 aircraft accidents incident to flight, 11 of which were fatal accidents resulting in 311 fatalities. Following is a comparison of salient points with the previous year's record.

	1961	1960
TOTAL ACCIDENTS.....	84	90
Fatal Accidents.....	11	17
Involving serious injury only	10	13
Involving minor or no injury	63	60
NUMBER AIRCRAFT DESTROYED...	14	20
Substantial damage.....	63	56
FATALITIES - TOTAL.....	311	499
Passengers.....	275	429
Crew members.....	35	57
Other persons.....	1	13
MILES FLOWN - (Billions)....	1.10	1.13
HOURS FLOWN - (Millions)....	4.19	4.66
ACCIDENT RATES		
Per 1 million aircraft miles	0.076	0.078
Per 100 thousand aircraft hours.....	2.003	1.909

CERTIFICATED ROUTE CARRIERS

ALL OPERATIONS OF CERTIFICATED ROUTE CARRIERS

In 1961 the Certificated Route Carriers had 78 accidents in their total revenue and nonrevenue operations. Eight (8) of these were fatal accidents resulting in 149 fatalities. The distribution of accidents by type of operations was as follows:

Operation	Number Accidents Total	Number Accidents Fatal	Fatalities
Scheduled Passenger Service.....	58	5	136
Scheduled Cargo Service.....	8	1	1
Nonscheduled revenue operations.....	4	1	6
Nonrevenue Operations			
Training.....	5	1	6
Other.....	3	0	0
Total All Operations.....	78	8	149

Miles - Hours Flown	
Miles Flown.....	1,056,151,088
Hours Flown.....	3,978,816

Accident Rates	Total Accidents	Fatal Accidents
Per 1 million aircraft miles.....	0.073	0.007
Per 100 thousand aircraft hours..	1.960	0.201

SCHEDULED PASSENGER SERVICE

Revenue passengers carrier.....	58.41 million
Passenger-miles (revenue and nonrevenue)	41.70 billion
Aircraft-miles flown.....	915.27 million
Passenger Fatality Rate Per 100 Million Passenger-Miles Flown.....	0.29

Accident Rate Per 1 Million Aircraft Miles	
Total Accidents.....	0.063
Fatal Accidents.....	0.005
Miles Flown Per Accident.....	15.78 million
Miles Flown Per Fatal Accident.....	183.00 million

SUPPLEMENTAL AIR CARRIERS

ALL OPERATIONS OF SUPPLEMENTAL CARRIERS

In 1961, the Supplemental Air Carriers had 6 accidents three of which were fatal, resulting in 162 fatalities. These accidents occurred in the following types of operation.

Operation	Number Accidents Total	Number Accidents Fatal	Total Fatalities
Civil Operations:			
Passenger.....	1	1	83
Cargo.....	0	0	0
Military Operations:			
Passenger.....	1	1	77
Cargo.....	2	1	2
Training.....	1	0	0
Ferry.....	1	0	0
Total - All Operations.....	6	3	162

Miles - Hours Flown	
Aircraft miles flown.....	47,983,000
Hours Flown.....	213,558

Accident Rates	Total Accidents	Fatal Accidents
Per 1 million aircraft miles	0.125	0.062
Per 100 thousand acft. hours	2.809	1.404

PASSENGER OPERATIONS

The Supplemental Carriers, in their Civil passenger operation had one accident which was fatal, resulting in 77 passenger fatalities.

In their Military passenger operations, the Supplemental Carriers had one accident which was fatal, resulting in 74 passenger fatalities.

Other pertinent statistics relating to passenger operations:

Type Operation	Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles
Civil....	NA	898,890,000	8.56
Military.	NA	644,137,000	11.48
Total....	978,171	1,543,027,000	9.78

ACCIDENT RATES
U. S. AIR CARRIERS
ALL OPERATIONS

1961

CLASS OF CARRIER	Number of Accidents: Total	Injury Index: Fatal	Injury Index: Serious	Injury Index: Minor/None	Aircraft Damage: Destroyed	Aircraft Damage: Substantial	Aircraft Miles Flown	Aircraft Hours Flown	Accident Rates: Per 1 Million Miles: Total Accidents	Per 1 Million Miles: Fatal Accidents	Per 100,000 Hours: Total Accidents	Per 100,000 Hours: Fatal Accidents
CERTIFICATED ROUTE AIR CARRIERS												
1. Domestic Carriers												
Trunk	40	4	5	31	4	31	704,494,669	2,478,548	0.056	0.005	1.613	0.161
Local Service	10	0	0	10	0	9	107,037,275	667,039	0.093	0.000	1.499	0.000
Helicopter	6	1	0	5	1	5	2,258,186	31,118	2.656	0.442	19.281	3.213
All-Cargo Carriers	2	0	1	1	0	2	33,910,722	142,832	0.058	0.000	1.400	0.000
Other	1	0	0	1	1	0	429,385	3,174	2.328	0.000	31.505	0.000
Subtotal	59	5	6	48	6	47	848,130,237	3,322,711	0.069	0.005	1.775	0.150
Intra-Alaska Carriers	12	2	1	9	3	9	9,609,427	71,760	1.248	0.208	16.722	2.787
Intra-Hawaii Carriers	0	0	0	0	0	0	5,791,135	31,377	0.000	0.000	0.000	0.000
TOTAL DOMESTIC CARRIERS	71	7	7	57	9	56	863,530,799	3,425,848	0.082	0.008	2.072	0.204
2. International/Terr. Carriers												
Passenger/Cargo Carriers	7	1	3	3	2	4	178,844,630	501,079	0.039	0.005	1.396	0.199
All-Cargo Carriers	0	0	0	0	0	0	13,775,659	51,889	0.000	0.000	0.000	0.000
TOTAL INTERNATIONAL/TERR. CARRIERS	7	1	3	3	2	4	192,620,289	552,968	0.036	0.005	1.265	0.180
TOTAL-CERTIFICATED ROUTE AIR CARRIERS	78	8	10	60	11	60	1,056,151,088	3,978,816	0.073	0.007	1.960	0.201
SUPPLEMENTAL AIR CARRIERS												
1. Domestic												
Civil Operations	2	0	0	2	0	2	9,528,097	NA	0.209	0.000	NA	0.000
Military Contract	2	1	0	1	1	1	20,134,032	NA	0.099	0.049	NA	NA
Subtotal	4	1	0	3	1	3	29,662,129	143,954	0.134	0.033	2.778	0.694
2. International												
Civil Operations	1	1	0	0	1	0	6,168,586	NA	0.162	0.162	NA	NA
Military Contract	1	1	0	0	1	0	9,893,252	NA	0.101	0.101	NA	NA
Subtotal	2	2	0	0	2	0	16,061,838	69,604	0.124	0.124	2.873	2.873
TOTAL-SUPPLEMENTAL AIR CARRIERS	6	3	0	3	3	3	45,723,967	213,558	0.131	0.065	2.809	1.404
TOTAL-ALL OPERATIONS	84	11	10	63	14	63	1,101,875,055	4,192,374	0.076	0.009	2.003	0.262

NA - Not available.

ACCIDENT RATES
CERTIFICATED ROUTE AIR CARRIERS
REVENUE OPERATIONS

1961

CLASS OF CARRIER	Number of Accidents				Aircraft Miles Flown	Aircraft Hours Flown	Number of Departures	Accident Rates					
		Injury Index						Total Accidents			Fatal Accidents		
	Total	Fatal	Serious	Minor None				1 Million Miles	100,000 Hours	100,000 Departures	1 Million Miles	100,000 Hours	100,000 Departures
SCHEDULED SERVICE													
1. Domestic Carriers													
Trunk	33	3	5	25	676,780,539	2,386,985	2,105,370	0.048	1.382	1.567	0.004	0.125	0.142
Local Service	10	0	0	10	103,208,673	644,524	1,124,966	0.096	1.551	0.888	0.000	0.000	0.000
Helicopter	6	1	0	5	2,156,169	29,676	147,064	2.782	20.218	4.079	0.463	3.369	0.679
All Cargo	2	0	1	1	7,213,240	31,942	12,745	0.277	6.261	15.692	0.000	0.000	0.000
Other	1	0	0	1	390.109	2,859	9,340	2.563	34.977	10.672	0.000	0.000	0.000
Sub-Total	52	4	6	42	789,748,730	3,095,986	3,399,485	0.065	1.679	1.529	0.005	0.129	0.117
Intra-Alaska	9	2	0	7	7,402,983	54,508	99.391	1.215	16.511	9.055	0.270	3.669	2.012
Intra-Hawaii	0	0	0	0	5,230.564	28,380	46,183	0.000	0.000	0.000	0.000	0.000	0.000
Total Domestic	61	6	6	49	802,382.277	3,178,874	3.545.059	0.076	1.918	1.720	0.007	0.188	0.169
2. International/Terr'l Carriers													
Passenger/Cargo Carriers	0	0	2	3	161,296,565	452,319	197,895	0.030	1.105	2.526	0.000	0.000	0.000
All Cargo	0	0	0	0	5,977,540	23,310	7,410	0.000	0.000	0.000	0.000	0.000	0.000
Total International/Terr'l.	5	0	2	3	167,274,105	475,629	205,305	0.029	1.051	2.435	0.000	0.000	0.000
TOTAL-SCHEDULED SERVICE	66	6	8	52	969,656,382	3,654,503	3,750,364	0.068	1.805	1.759	0.006	0.164	0.159
NONSCHEDULED REVENUE SERVICE													
1. Domestic Carriers													
Trunk	0	0	0	0	3,416,723	13,994	6,050	0.000	0.000	0.000	0.000	0.000	0.000
Local Service	0	0	0	0	1,140,358	6,566	4,586	0.000	0.000	0.000	0.000	0.000	0.000
Helicopter	0	0	0	0	34,287	582	2,879	0.000	0.000	0.000	0.000	0.000	0.000
All Cargo	0	0	0	0	23,938,062	100,211	43,534	0.000	0.000	0.000	0.000	0.000	0.000
Other	0	0	0	0	30,490	238	473	0.000	0.000	0.000	0.000	0.000	0.000
Sub-Total	0	0	0	0	28,559,920	121,591	57,522	0.000	0.000	0.000	0.000	0.000	0.000
Intra-Alaska Carriers	2	0	1	1	1,712,195	13,284	20,898	1.168	15.055	9.570	0.000	0.000	0.000
Intra-Hawaii Carriers	0	0	0	0	118,926	467	108	0.000	0.000	0.000	0.000	0.000	0.000
Total Domestic	2	0	1	1	30,391,041	135,342	78.528	0.065	1.477	2.546	0.000	0.000	0.000
2. International/Terr'l Carriers													
Passenger/Cargo Carriers	2	1	1	0	10,401,375	31,076	8,126	0.192	6.435	24.612	0.096	3.217	12.306
All Cargo Carriers	0	0	0	0	6,733,551	24,904	3,840	0.000	0.000	0.000	0.000	0.000	0.000
Total International/Terr'l.	2	1	1	0	17,134,926	55.980	11,966	0.116	3.572	16.714	0.058	1.786	8.357
TOTAL-NONSCHEDULED SERVICE	4	1	2	1	47,525,967	191,322	90.494	0.084	2.090	4.420	0.021	0.522	1.105
GRAND TOTAL	70	7	10	53	1,017,182,349	3,845,825	3,840,858	0.068	1.820	1.822	0.006	0.182	0.182

ACCIDENT SUMMARY - VITAL STATISTICS
ALL U. S. AIR CARRIERS - ALL OPERATIONS - 1961

ITEMS	CERTIFICATED ROUTE CARRIERS					SUPPLEMENTAL CARRIERS				GRAND TOTAL
	Scheduled Passenger Service	All Scheduled Services	Nonsched. Revenue Operations	Nonrevenue Operations	All Operations	Public Passenger/Cargo Operations	Military Contract Operations	Nonrevenue Operations	All Operations	
Accidents-Injury Index										
Fatal	5	6	1	1	8	1	2	0	3	11
Serious	6	8	2	0	0	0	0	0	0	10
Minor/None	47	52	1	7	0	0	1	2	3	63
Total	58	66	4	8	8	1	3	2	6	84
Aircraft Damage										
Destroyed	6	8	2	1	11	1	2	0	3	14
Substantial	45	51	2	7	60	0	1	2	3	63
Minor/None	7	7	0	0	7	0	0	0	0	7
Total	58	66	4	8	78	1	3	2	6	84
Fatalities										
Captain	3	4	1	1	6	1	1	0	2	8
Copilot	2	2	1	1	4	1	2	0	3	7
Flight Engineer	2	2	2	2	6	1	0	0	1	7
Cabin Attendants	4	4	0	0	4	3	1	0	4	8
Other Crew	0	0	2	2	4	0	1	0	1	5
Passengers	124	124	0	0	124	77	74	0	151	275
Non-Occupants	1	1	0	0	1	0	0	0	0	1
Total	136	137	6	6	149	83	79	0	162	311
Serious Injuries										
Captain	0	1	1	0	2	0	0	0	0	2
Copilot	0	1	0	0	1	0	0	0	0	1
Flight Engineer	0	0	0	0	0	0	0	0	0	0
Cabin Attendants	4	4	0	0	4	0	0	0	0	4
Other Crew	0	0	0	0	0	0	0	0	0	0
Passengers	15	15	2	0	17	0	0	0	0	17
Non-Occupants	0	0	0	0	0	0	0	0	0	0
Total	19	21	3	0	24	0	0	0	0	24

RECORD OF INDIVIDUAL TRUNK CARRIERS
SCHEDULED PASSENGER SERVICE

1961

Operators	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Others	Revenue Passengers Carried	Passenger-miles 1/ (000)	Revenue Plane-miles	Departures
Trunk									
American Airlines.....	5	0	0	0	0	7,575,703	6,240,573	109,766,128	264,938
Braniff Airways.....	3	0	0	0	0	2,227,133	1,096,981	29,497,365	125,833
Capital Airlines.....2/	3	0	0	0	0	1,373,427	624,633	21,096,107	81,617
Continental Air Lines..	1	0	0	0	0	1,332,470	954,464	24,419,778	85,293
Delta Air Lines.....	6	0	0	0	0	3,638,049	2,271,383	49,578,549	178,036
Eastern Air Lines.....	3	0	0	0	0	7,758,269	4,166,534	108,709,024	456,802
National Airlines.....	2	0	0	0	0	1,628,767	1,173,163	23,782,437	83,115
Northeast Airlines.....	1	0	0	0	0	1,644,583	782,160	21,248,592	86,592
Northwest Airlines.....	2	1	32	5	0	1,438,037	1,061,133	23,570,037	66,655
Trans World Airlines...	3	1	73	5	0	4,651,386	4,502,469	81,371,349	166,241
United Air Lines.....	4	1	17	0	1	9,951,448	7,183,945	140,709,615	404,980
Western Air Lines.....	0	0	0	0	0	1,458,956	889,537	18,623,280	63,822
Total.....	33	3	122	10	1	44,678,228	30,946,975	652,372,261	2,063,924

1/ Both revenue and nonrevenue.

2/ Merged with United June 1,1961

RECORD OF INDIVIDUAL LOCAL SERVICE (INCLUDING HELICOPTER CARRIERS)
SCHEDULED PASSENGER SERVICE

1961

Operators	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Others	Revenue Passengers Carried	Passenger-Miles 1/ (000)	Revenue Plane-Miles	Departures
Local Service									
Allegheny Airlines.....	0	0	0	0	0	324,443	176,735	9,772,976	39,506
Bonanza Airlines.....	0	0	0	0	0	316,040	84,623	4,390,038	34,651
Central Airlines.....	0	0	0	0	0	240,364	49,832	5,690,846	68,192
Frontier Air Lines.....	2	0	0	0	0	355,442	105,667	9,397,276	90,799
Lake Central Airlines.....	1	0	0	0	0	396,817	66,115	6,621,620	87,371
Mohawk Airlines.....	1	0	0	0	0	767,102	161,858	8,273,355	79,164
North Central Airlines.....	1	0	0	0	0	1,005,584	197,204	15,162,193	136,698
Ozark Airlines.....	1	0	0	0	0	558,839	104,627	8,734,407	99,224
Pacific Air Lines.....	1	0	0	0	0	424,319	101,476	5,010,206	49,992
Piedmont Aviation.....	2	0	0	0	0	494,543	108,552	7,636,961	91,033
Southern Airways.....	1	0	0	0	0	391,020	73,695	8,136,233	96,358
Trans-Texas Airways.....	0	0	0	0	0	318,990	76,226	7,645,699	78,384
West Coast Airlines.....	0	0	0	0	0	376,879	101,235	6,736,363	73,094
Subtotal.....	10	0	0	0	0	6,470,382	1,407,845	103,203,673	1,124,965
Helicopter Service									
Chicago Helicopter Airways..	2	0	0	0	0	245,462	4,451	1,017,657	72,581
Los Angeles Airways.....	1	0	0	0	0	41,452	1,554	668,624	38,493
New York Airways.....	0	0	0	0	0	144,310	2,994	469,888	36,990
Subtotal.....	3	0	0	0	0	431,224	8,999	2,156,169	147,064

1/ Both revenue and nonrevenue.

RECORD OF INDIVIDUAL INTRA-ALASKA AND INTRA-HAWAII
AIR CARRIERS IN SCHEDULED PASSENGER SERVICE

1961

Operators	Accidents		Fatalities			Revenue Passengers Carried	Passenger-miles 1/ (000)	Revenue Plane Miles	Departures
	Total	Fatal	Passg.	Crew	Other				
Intra-Alaska									
Alaska Coastal Airlines.....	1	0	0	0	0	56,151	5,943	1,014,279	17,017
Cordova Airlines.....	1	0	0	0	0	17,468	2,761	512,674	6,502
Ellis Air Lines.....	1	0	0	0	0	53,798	3,544	736,489	16,575
Kodiak Airways.....	1	1	1	0	0	10,498	551	224,945	8,036
Northern Consolidated.....	1	0	0	0	0	26,371	9,121	1,616,783	18,534
Reeve Aleutian Airways.....	0	0	0	0	0	13,384	14,233	988,451	4,571
Western Alaska Airlines.....	1	0	0	0	0	7,921	353	244,529	7,356
Wien Alaska Airlines.....	3	1	1	1	0	31,661	12,721	2,064,833	20,800
Total.....	9	2	2	1	0	217,252	49,227	7,402,983	99,391
Intra-Hawaii									
Hawaiian Airlines.....	0	0	0	0	0	355,884	56,313	2,096,993	18,623
Aloha Airlines.....	0	0	0	0	0	481,567	75,047	2,565,823	23,113
Total.....	0	0	0	0	0	837,451	131,360	4,662,816	41,736
Other									
Avalon.....	1	0	0	0	0	78,019	3,592	390,109	9,340

1/ Both revenue and nonrevenue.

RECORD OF U. S. INTERNATIONAL/TERRITORIAL CARRIERS

SCHEDULED PASSENGER SERVICE

1961

Operators	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Others	Revenue Passengers Carried	Passenger-miles 1/ (000)	Revenue Plane-Miles	Departures
Alaska Airlines.....	0	0	0	0	0	63,383	51,966	1,979,437	6,253
American Airlines.....	0	0	0	0	0	85,525	107,111	1,927,915	2,265
Braniff Airways.....	0	0	0	0	0	96,416	153,922	3,499,458	3,256
Caribbean Atlantic Airlines.....	0	0	0	0	0	433,225	30,900	1,582,944	23,148
Delta Air Lines.....	0	0	0	0	0	17,056	23,870	797,064	1,172
Eastern Air Lines.....	0	0	0	0	0	506,927	764,747	11,566,033	8,588
Mackey Air Transport.....	0	0	0	0	0	120,401	20,559	833,986	9,609
National Air Lines.....	0	0	0	0	0	1,613	867	20,354	46
Northwest Airlines.....	0	0	0	0	0	174,540	356,065	7,316,937	5,939
Pacific Northern Airlines.....	0	0	0	0	0	129,465	127,237	4,601,742	11,496
Pan American World Airways.....	2	0	0	0	0	3,316,294	5,587,550	81,284,271	89,737
Pan American Grace Airways.....	0	0	0	0	0	130,187	241,373	4,115,452	4,845
South Pacific Air Lines.....	0	0	0	0	0	2,470	7,975	295,156	108
Trans World Airlines.....	0	0	0	0	0	284,278	966,387	15,019,264	9,971
Transportation Corp. of America....	0	0	0	0	0	98,547	156,046	2,182,694	1,569
United Air Lines.....	0	0	0	0	0	185,232	470,816	6,336,597	2,544
Western Air Lines.....	0	0	0	0	0	53,862	86,171	1,720,632	1,106
Total.....	2	0	0	0	0	5,699,421	9,153,562	145,079,936	181,552

1/ Both revenue and nonrevenue

RECORD OF INDIVIDUAL SUPPLEMENTAL AIR CARRIERS
PASSENGER OPERATIONS (CIVIL AND MILITARY)

1961

OPERATORS	CIVILIAN SERVICES						MILITARY-CONTRACT OPERATIONS						Aggregate[2] Number of Passengers Carried	Total[3] Hours Flown
	Accidents		Revenue Passenger-miles (000)	Revenue Plane-miles[1]	Fatalities		Accidents		Revenue Passenger-miles (000)	Revenue Plane-miles[1]	Fatalities			
	Total	Fatal			Passg.	Crew	Total	Fatal			Passg.	Crew		
Airline Transport Carriers, d/b/a														
California Hawaiian.....			20,787	362,753					25,173	287,469			31,431	3,385
American Flyers Airlines.....			24,102	471,382					14,674	411,151			48,357	4,187
Argonaut Airways.....			-	201,934					-	-			-	1,106
Associated Air Transport.....			25,717	502,243					4,484	97,939			29,148	2,805
Blatz Airlines.....			13,862	531,992					1,080	38,502			57,090	4,048
Capitol Airways.....			80,400	1,811,604					55,044	11,965,147			48,301	72,139
Currey Air Transport.....			81,167	990,276					2,802	12,104			50,128	4,069
Great Lakes Airlines.....			75,804	863,997					169	2,542			39,362	3,328
Imperial Airlines.....			15,577	643,892			1	1	12,664	234,838	74	3	24,931	3,235
Johnson Flying Service.....			863	92,057					-	-			1,355	1,571
Modern Air Transport.....			7,665	188,264					430	15,520			8,555	1,157
Overseas National Airways.....			12,229	148,321					178,866	2,408,664			84,472	11,273
Paramount.....			77,133	935,593					114	1,499			47,557	3,776
President Airlines.....	1	1	34,997	506,839	77	6			2,978	56,619			16,552	3,080
Purdue.....			365	19,480					-	-			692	212
Quaker City Airways.....			65,721	883,808					-	-			58,509	5,153
Saturn Airways.....			20,435	315,675					15,595	257,101			28,256	2,812
Sourdough Air Transport.....			582	38,570					-	-			698	250
Southern Air Transport.....			2,291	825,427					73,303	1,591,197			54,055	11,604
Standard Airways.....			49,019	686,604					1,142	21,942			19,712	2,781
Stewart Air Service.....			7,649	386,644					-	-			81,016	2,616
Trans-Alaskan Airlines.....			84,068	1,048,188					82	2,371			55,319	4,524
Trans International Airlines.....			47,339	583,991					41,048	1,627,220			31,251	8,271
U. S. Overseas Airlines.....			118,194	1,787,295					75,697	3,220,001			101,396	17,967
World Airways.....			25,758	657,447					131,187	7,701,419			47,512	37,037
World Wide Airlines.....			7,166	212,407					7,605	74,039			12,516	1,172
Total.....	1	1	898,890	15,696,683	77	6	1	1	644,137	30,027,284	74	3	978,171	213,558

1/ Includes miles flown in cargo operations.
2/ Breakdown between civil and military-contract operations not available.
3/ Total hours flown in all operations.

ACCIDENT TYPES

Accidents are classified for statistical purposes according to certain established types. These accident types describe the general circumstances of the occurrence but they do not necessarily indicate the cause or the conditions that contributed to the cause.

The table on page 14 shows the types of all the accidents during 1961 in relation to the operational phase in which they occurred.

The causal factors found to exist in these accidents are presented beginning on page 16 of this report.

Frequency - Accidents/Phase of Operation - 1961

PHASE OF OPERATION	No.	PERCENT
Ground (Static)	3	3
Taxi	11	13
Takeoff	10	12
Enroute	20	24
Landing	40	48
Total	84	100

Frequency - Accident Types - 1961

Following is a listing of accident types having an occurrence frequency of 5 or more in 1961.

TYPE	No.	PERCENT
Collision Ground/Water	8	10
Turbulence	6	7
Gear Collapse	6	7
Landed Wheels-up	6	7
Undershoot	6	7
Gear Retracted	6	7
Airframe Failure - Air	5	6
Hard Landing	5	6

ACCIDENT TYPES

The following items are enumerated in view of their possible general interest.

MIDAIR COLLISION

There were no midair collisions in 1961 involving Air Carrier aircraft.

EVASIVE ACTION

There was one accident in which personal injury occurred as a result of evasive maneuvers to avoid what appeared to be an imminent collision.

LANDING AND TAKE-OFF PHASE

Sixty percent of all Air Carrier accidents for 1961 occurred during take-off and landing. Seventy three percent of the 1961 fatal Air Carrier accidents occurred during these two phases of flight.

FIRE IN-FLIGHT

Four accidents occurred in this category, one of which was fatal. The fatal accident involved a C-46 aircraft while flying at an altitude of 2,500 feet. An uncontrollable fire occurred in the left engine during climb and increased in intensity to the point of the engine falling off the wing. The left wing separated shortly thereafter and the aircraft crashed.

ACCIDENTS IN TRAINING OPERATIONS

Five accidents, one fatal, occurred in crew training operations during 1961. Two of these, including the one fatal accident, occurred in turbojet aircraft.

TURBULENCE ACCIDENTS

There were six accidents in which there was serious injury to a person or persons which resulted from turbulence in flight. One of the six aircraft received minor damage while there was no damage to the other aircraft.

TYPE OF ACCIDENT VS. OPERATIONAL PHASE
U. S. AIR CARRIERS-ALL OPERATIONS
1961

OPERATIONAL PHASE ———	GROUND			TAXIING			TAKEOFF				ENROUTE				LANDING				
TYPE OF ACCIDENT	STARTING ENGINE/S	IDLING ENGINE/S	OTHER	TO TAKEOFF	FROM LANDING	OTHER	RUN	INITIAL CLIMB	DISCONTINUED	OTHER	CLIMB	CRUISE	DESCENT	INITIAL APPROACH	FINAL APPROACH	LEVEL-OFF AND TOUCHDOWN	ROLL	GO-AROUND	TOTAL
GROUND (WATER) LOOP																	4		4
LANDED WHEELS-UP																6			6
GEAR COLLAPSED			1		1	1										2	1		6
GEAR RETRACTED	1		1														4		6
HARD LANDING																5			5
UNDERSHOOT															4	2			6
OVERSHOOT															1	2	1		4
COLLISION - AIRCRAFT - INFLIGHT																			0
COLLISION - AIRCRAFT - ON GROUND				2															2
COLLISION - GROUND/WATER								2				2	2	1		1			8
COLLISION - OBJECTS																			
TREES										1					2				3
BUILDINGS					1														1
AIRPORT HAZARD																			0
BIRD											1								1
ELECTRONIC TOWERS																			0
OTHER															1		1		2
STALL								1				1						1	3
FIRE IN FLIGHT											1	2	1						4
AIRFRAME-AIR								3				2							5
AIRFRAME-GROUND				1															1
ENGINE TEARAWAY																			0
PROPELLER ASSEMBLY/SYSTEM																			0
FIRE ON GROUND				1			1									1			3
TURBULENCE												4	2						6
EVASIVE MANEUVER												1							1
OTHER				1	1	2	1	1				1							7
UNDETERMINED																			0
TOTAL	1	0	2	5	3	3	2	7	0	1	2	13	5	1	8	19	11	1	84

ACCIDENTS BY TYPE OF AIRCRAFT
CERTIFICATED ROUTE AIR CARRIERS
- 1961 -

Following is a resume of the accident involvement of the different categories of aircraft. Accident rates per 100,000 hours of revenue flight operations are also presented. These figures are shown for purposes of general information. As the accident figures are related to all types of accidents they do not provide any significant basis for a comparative analysis between types of aircraft.

Helicopters: There were 6 accidents, one fatal, involving helicopters.

Single Engine Aircraft: There were 2 accidents, all in Alaskan operations, involving small fixed-wing aircraft. One of these was a fatal accident.

Piston Aircraft: The various makes and models of this category were involved in 35 accidents. Three of these were fatal.

Turboprop Aircraft: There were 9 accidents in which turboprop aircraft were involved. One of these was a fatal accident.

Turbojet Aircraft: The turbojet aircraft was involved in 18 accidents, one of which was fatal.

Aircraft Category	Revenue Hours Flown	Accidents Total	Accidents Fatal	Accident Rates Per 100,000 Hours Total	Accident Rates Per 100,000 Hours Fatal
Helicopters	30,258	6	1	19.829	3.304
Single Engine Acft.	20,377	2	1	9.814	4.907
Piston Engine Acft. *	2,519,323	35	3	1.389	0.119
Turboprop Aircraft *	548,840	9	1	1.639	0.182
Turbojet Aircraft *	727,027	18	1	2.475	0.137
Total	3,845,825	70	7	1.820	0.182

* 2 or more engines.

CAUSAL FACTORS

In determining the cause of an accident, all contributing factors are considered. These factors are classified according to appropriate categories such as: Pilot, Powerplant, Weather, etc. For statistical purposes where two or more causal factors exist in one accident, each is recorded and no attempt is made to establish a primary cause.

Number of Accidents in Relation to the Different Categories of Causal Factors

There were 84 accidents in the overall operations of the air carriers in 1961. As noted above, more than 1 causal factor can exist in a single accident. The figures shown below indicate the frequency of occurrence of each of the different causal categories in the 84 accidents.

Broad Categories of Causal Factors	Number of Accidents in Which Each Category was Involved	
	Total Number Accidents	Number in Which No Other Causal Factor was Involved
Pilot Personnel.....	42	19
Other Personnel.....	18	2
Weather.....	15	5
Powerplant.....	8	8
Landing Gear.....	13	4
Airframe.....	1	1
Rotor Installation.....	3	0
Airport Facilities/Terrain.....	9	0
Miscellaneous.....	6	2
Undetermined.....	1	1

DETAILED LISTING OF INDIVIDUAL CAUSAL FACTORS

All of the separate, individual causal factors found to exist in Air Carrier accidents are listed as follows:

PILOT:

Became lost/disorientated on VFR flight	1
Continued VFR into adverse weather conditions	4
Failed to extend landing gear	3
Inadvertent retraction of gear on ground	3
Failed to observe other aircraft	2
Failed to observe objects or obstructions	1
Failed to maintain adequate flying speed	2
Misjudged distance, speed, altitude or clearance	7
Failed to use or incorrectly used miscellaneous equipment	1
Failed to follow approved procedures, directives, instructions, etc	5
Improper operation powerplant and powerplant controls (includes propeller controls)	3
Improper operation brakes and/or flight controls on ground	1
Improper operation flight controls in air	1
Premature lift-off	1
Improper level-off	3
Improper IFR operation	2
Improper in-flight decisions or planning	4
Inadequate or incorrect compensation for wind conditions	2
Inadequate or improper preflight preparation and/or planning	3
Inadequate supervision of flight (Pilot)	5
Selected unsuitable terrain	1

COPILOT:

Failed to observe objects or obstructions	3
Misjudged distance, speed, altitude or clearance	4
Failed to use or incorrectly used miscellaneous equipment	1
Inadequate or improper preflight preparation and/or planning	1

OTHER PERSONNEL:

Inadequate maintenance - inspection	11
Improper operation ground facilities	2
Improper training, supervision, ground	1
Other	6

POWERPLANT:

Engine structure	2
Exhaust system	1
Turbine assembly	1
Accessory drive assembly	1
Fuel system	3
Thrust reverser	2

AIRFRAME:

Elevator	1

LANDING GEAR:

Main gear	7
Nose gear	2
Seaplane floats - attachments	1
Brakes	2
Other	1

ROTOR INSTALLATION:

Stabilizing surfaces - dampers	1
Main rotor brake assembly	1
Cyclic pitch control assembly	1

WEATHER

Low ceiling	1
Rain	1
Fog	1
Snow	2
Conditions conducive to carburetor (induction) icing	1
Unfavorable wind conditions; parked, holding on ground, taxiing	2
Unfavorable wind conditions; takeoff and landing (includes crosswind conditions)	2
Turbulence in flight, clear air	2
Turbulence in flight, in clouds, including thunderstorms, etc.	1
Downdrafts, updrafts - (includes mountain wave)	1
Obstructions to vision (smoke, haze, sand, dust)	1
Other	2

AIRPORTS/AIRWAYS FACILITIES:

Approach lighting	2
Airport facilities - other	1
Wet runway	3
Snow on runway	1
Rough water (seaplane landing area)	1
Poorly maintained ramp/taxiway surface	1

MISCELLANEOUS:

Bird collision	1
Evasive maneuver to avoid collision	1
Sunglare	1
Foreign object damage (other than powerplant)	1
Vertigo/disorientation	1
Undetermined	1

TABLE 1

ACCIDENTS, ACCIDENT RATES AND FATALITIES
U. S. AIR CARRIERS
ALL OPERATIONS
1949 - 1961

Year	Number of Accidents		Aircraft Miles Flown	Accident Rate Per 1 Million Miles Flown		Fatalities			
	Total	Fatal		Total Accidents	Fatal Accidents	Passg.	Crew	Others	Total
1949.....	93	19	506,180,000	0.183	0.035	204	35	10	249
1950.....	90	11	535,891,000	.167	.020	177	26	2	205
1951.....	107	23	601,495,000	.177	.038	264	58	1	323
1952.....	104	13	670,720,000	.155	.019	202	26	18	246
1953.....	90	18	734,894,000	.122	.024	255	54	3	312
1954.....	93	8	758,654,000	.122	.010	25	13	2	40
1955.....	93	17	862,787,000	.106	.018	224	42	5	271
1956.....	103	9	993,055,000	.103	.009	156	18	0	174
1957.....	112	13	1,089,727,000	.101	.011	73	20	5	98
1958.....	91	14	1,084,652,000	.083	.012	128	29	3	160
1959.....	101	18	1,155,520,000	.087	.015	271	61	8	340
1960.....	90	17	1,130,069,000	.078	.011	429	57	13	499
1961.....	84	11	1,104,134,000	.076	.009	275	35	1	311

TABLE 2

ACCIDENTS, ACCIDENT RATES AND FATALITIES
CERTIFICATED ROUTE AIR CARRIERS
ALL OPERATIONS

1949 - 1961

Year	Number of Accidents		Aircraft Miles Flown	Accident Rate Per 1 Million Miles Flown		Fatalities			
	Total	Fatal		Total Accidents	Fatal Accidents	Passg.	Crew	Others	Total
1949.....	73	10	482,707,000	0.151	0.018	100	19	4	123
1950.....	72	8	501,778,000	.143	.015	148	25	2	175
1951.....	83	18	556,763,000	.149	.032	186	46	1	233
1952.....	94	11	618,960,000	.151	.017	176	21	18	215
1953.....	69	11	685,957,000	.100	.016	113	27	3	143
1954.....	80	7	719,550,000	.111	.009	16	12	2	30
1955.....	80	14	819,581,000	.096	.015	197	37	4	238
1956.....	94	9	948,183,000	.099	.009	156	18	0	174
1957.....	104	12	1,054,241,000	.097	.010	73	18	5	96
1958.....	85	13	1,045,439,000	.081	.012	128	27	3	158
1959.....	93	17	1,112,703,000	.083	.015	270	59	8	337
1960.....	82	13	1,077,745,000	.075	.009	336	46	11	393
1961.....	78	8	1,056,151,000	.073	.007	124	24	1	149

Table 3

ACCIDENTS, ACCIDENT RATES
CERTIFICATED ROUTE AIR CARRIERS
ALL SCHEDULED SERVICE
1949 - 1961

Year	Number of Accidents		Miles Flown	Hours Flown	Number of Departures	Accident Rates					
						Per 1 Million Miles		Per 100,000 Hours		Per 100,000 Departures	
	Total	Fatal				Total Accidents	Fatal Accidents	Total Accidents	Fatal Accidents	Total Accidents	Fatal Accidents
1949.....	64	9	463,198,000	2,520,000	2,280,271	0.138	0.019	2.539	0.357	2.806	0.394
1950.....	59	6	477,463,000	2,561,900	2,481,928	.123	.012	2.302	.234	2.377	.241
1951.....	69	14	526,589,500	2,799,900	2,713,118	.131	.026	2.482	.503	2.543	.516
1952.....	77	9	589,430,300	3,030,800	2,847,157	.130	.015	2.540	.296	2.704	.316
1953.....	61	7	657,093,300	3,271,900	3,070,412	.092	.010	1.864	.213	1.986	.227
1954.....	67	6	689,782,700	3,294,100	3,093,672	.097	.008	2.033	.182	2.165	.193
1955.....	64	11	779,921,000	3,672,500	3,276,386	.080	.012	1.715	.272	1.922	.305
1956.....	70	7	869,315,000	4,031,000	3,502,790	.080	.008	1.736	.173	1.998	.199
1957.....	73	7	976,168,000	4,443,500	3,768,861	.073	.006	1.620	.135	1.910	.159
1958.....	67	8	972,988,000	4,338,900	3,633,348	.068	.008	1.544	.184	1.846	.220
1959.....	78	14	1,030,252,000	4,503,000	3,912,178	.075	.013	1.732	.310	1.993	.357
1960.....	72	12	997,923,699	4,088,650	3,856,477	.071	.009	1.736	.220	1.841	.233
1961.....	66	6	969,656,382	3,654,503	3,750,364	.068	.006	1.805	.016	1.759	.159

Table 4

ACCIDENTS, FATALITIES, FATALITY RATES
U. S. CERTIFICATED ROUTE AIR CARRIERS
SCHEDULED PASSENGER SERVICE
1949 - 1961

Year	Accidents		Fatalities			Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles
	Total	Fatal	Passg.	Crew	Total			
1949.....	50	8	97	13	110	16,719,518	9,256,345,000	1.04
1950.....	48	6	144	21	165	19,220,086	10,725,642,000	1.34
1951.....	61	12	185	35	220	24,851,125	13,724,717,000	1.34
1952.....	61	8	140	15	155	27,569,902	16,251,243,000	0.86
1953.....	50	6	88	15	103	31,645,567	19,003,087,000	0.46
1954.....	58	5	17	7	24	35,447,523	21,388,518,000	0.07
1955.....	56	9	197	28	225	41,707,543	25,270,012,000	0.62
1956.....	61	6	152	15	167	46,004,528	28,608,285,000	0.53
1957.....	58	6	70	13	83	49,423,170	32,395,675,000	0.21
1958.....	62	8	125	16	141	49,165,720	32,671,848,000	0.38
1959.....	67	10	268	42	310	56,002,094	37,765,609,000	0.70
1960.....	67	12	336	42	378	57,886,566	40,484,908,000	0.75
1961.....	58	5	124	11	135	58,411,977	41,701,560,000	0.29

TABLE 5

ACCIDENTS, FATALITIES, FATALITY RATES
U. S. CERTIFICATED ROUTE AIR CARRIERS
SCHEDULED DOMESTIC PASSENGER SERVICE
1938-1961

Date	Accidents		Fatalities			Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles Flown
	Total	Fatal	Passg.	Crew	Total			
1938.....	22	5	25	10	35	1,365,706	560,660,000	4.45
1939.....	27	2	9	3	12	1,895,793	755,118,000	1.19
1940.....	29	3	35	10	45	3,038,619	1,157,900,000	3.02
1941.....	26	4	35	9	44	4,141,748	1,506,303,000	2.32
1942.....	23	5	55	16	71	3,325,726	1,501,279,000	3.66
1943.....	14	2	22	8	30	3,115,972	1,670,935,000	1.31
1944.....	24	3	48	8	56	4,132,114	2,211,905,000	2.17
1945.....	33	7	76	11	87	6,687,968	3,408,290,000	2.22
1946.....	31	9	75	22	97	12,465,695	6,068,315,000	1.23
1947.....	36	5	199	17	216	12,890,208	6,313,312,000	3.15
1948.....	53	5	83	15	98	13,168,095	6,245,745,000	1.32
1949.....	29	5	93	11	104	15,120,015	7,071,042,000	1.31
1950.....	36	4	96	13	109	17,424,414	8,363,379,000	1.14
1951.....	37	8	142	24	166	22,652,179	10,949,903,000	1.29
1952.....	36	5	46	6	52	25,009,815	12,996,657,000	0.35
1953.....	32	4	86	15	101	28,722,743	15,337,760,000	0.56
1954.....	44	4	16	7	23	32,343,867	17,389,817,000	0.09
1955.....	41	8	195	26	221	38,027,120	20,550,940,000	0.75
1956.....	47	4	143	13	156	41,738,569	23,155,153,000	0.61
1957.....	44	4	32	2	34	44,972,334	26,252,338,000	0.11
1958.....	42	4	114	15	129	44,580,984	26,266,401,000	0.43
1959.....	61	9	209	33	242	51,002,218	30,435,495,000	0.68
1960.....	62	10	326	37	363	52,391,708	31,851,753,000	0.93
1961.....	56	5	124	11	135	52,712,556	32,547,998,000	0.38

TABLE 6

ACCIDENTS, FATALITIES, FATALITY RATES
U. S. CERTIFICATED ROUTE AIR CARRIERS
SCHEDULED INTERNATIONAL/TERRITORIAL PASSENGER SERVICE
1938 - 1961

Year	Accidents		Fatalities			Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles Flown
	Total	Fatal	Passg.	Crew	Total			
1938.....	7	2	7	12	19	109,416	53,799,000	13.01
1939.....	6	1	10	4	14	136,090	78,271,000	12.77
1940.....	6	0	0	0	0	170,179	104,495,000	0
1941.....	4	1	2	0	2	235,802	165,950,000	1.20
1942.....	2	0	0	0	0	276,200	240,314,000	0
1943.....	2	1	10	4	14	292,888	254,374,000	3.93
1944.....	7	1	17	0	17	356,662	322,123,000	5.27
1945.....	5	2	17	10	27	493,498	462,180,000	3.67
1946.....	12	2	40	12	52	1,066,414	1,130,196,000	3.53
1947.....	9	3	20	13	33	1,359,712	1,863,268,000	1.07
1948.....	11	1	20	10	30	1,372,856	1,961,794,000	1.01
1949.....	8	1	0	0	0	1,520,067	2,168,780,000	0
1950.....	5	2	48	8	56	1,678,491	2,338,232,000	2.05
1951.....	10	1	31	9	40	2,041,833	2,734,846,000	1.13
1952.....	9	3	94	9	103	2,366,451	3,176,784,000	2.95
1953.....	5	2	2	0	2	2,702,678	3,565,420,000	0.05
1954.....	4	0	0	0	0	2,878,800	3,904,459,000	0
1955.....	5	1	2	2	4	3,416,652	4,601,273,000	0.04
1956.....	1	0	0	0	0	3,950,671	5,307,543,000	0
1957.....	7	1	36	8	44	4,147,937	5,981,841,000	0.60
1958.....	12	2	10	0	10	4,272,340	6,230,732,000	0.16
1959.....	6	1	59	9	68	4,999,876	7,330,114,000	0.80
1960.....	5	2	10	5	15	5,494,858	8,633,155,000	0.11
1961.....	2	0	0	0	0	5,699,421	9,153,562,000	0

TABLE 7

ACCIDENTS, ACCIDENT RATES AND FATALITIES
SUPPLEMENTAL AIR CARRIERS
ALL OPERATIONS

1949 - 1961

Year	Number of Accidents		Aircraft Miles Flown	Accident Rate Per 1 Million Miles Flown		Fatalities			
	Total	Fatal		Total Accidents	Fatal Accidents	Passg.	Crew	Others	Total
1949.....	20	9	23,473,000	0.852	0.383	104	16	6	126
1950.....	18	3	34,113,000	.527	.087	29	1	0	30
1951.....	24	5	44,732,000	.536	.111	78	12	0	90
1952.....	10	2	51,760,000	.193	.038	26	5	0	31
1953.....	21	7	48,937,000	.429	.143	142	27	0	169
1954.....	13	1	39,104,000	.332	.025	9	1	0	10
1955.....	13	3	43,206,000	.301	.069	27	5	1	33
1956.....	9	0	44,822,000	.201	.0	0	0	0	0
1957.....	8	1	35,486,000	.225	.028	0	2	0	2
1958.....	6	1	39,213,000	.153	.025	0	2	0	2
1959.....	8	1	42,817,000	.186	.023	1	2	0	3
1960.....	8	4	52,324,000	.152	.057	93	11	2	106
1961.....	6	3	47,983,000	.125	.062	151	11	0	162

TABLE 8

ACCIDENTS, FATALITIES, FATALITY RATES
U. S. SUPPLEMENTAL AIR CARRIERS
PASSENGER OPERATIONS (CIVIL AND MILITARY)
1949 - 1961

Year	Accidents		Fatalities			Revenue Passengers Carried	Revenue Passenger-Miles Flown	Passenger Fatality Rat Per 100 Million Passenger-Miles
	Total	Fatal	Passg.	Crew	Total			
1949.....	11	6	104	9	113	NA	581,708,000	17.87
1950.....	13	2	29	0	29	NA	769,765,000	3.76
1951.....	17	3	76	7	83	630,590	1,069,497,000	7.10
1952.....	3	1	26	3	29	695,335	1,251,685,000	2.07
1953.....	13	5	141	20	161	724,014	1,256,911,000	11.21
1954.....	4	1	9	1	10	695,152	1,243,030,000	0.72
1955.....	5	2	27	3	30	788,783	1,395,682,000	1.93
1956.....	0	0	0	0	0	663,603	1,003,261,000	0
1957.....	2	0	0	0	0	535,248	767,287,000	0
1958.....	2	0	0	0	0	676,072	1,152,988,000	0
1959.....	5	1	1	2	3	895,518	1,629,556,000	0.06
1960.....	3	2	93	9	102	1,057,933	2,207,595,000	4.21
1961.....	2	2	151	9	160	978,171	1,543,027,000	9.7

Section II

RÉSUMÉ OF ACCIDENTS

DESCRIPTION OF AIR CARRIER ACCIDENTS

Domestic Operators - Certificated Passenger Carriers - Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
1/6/61	1121 PST	Whittier, Calif.	Los Angeles, Airways	S-55	Substantial	None	3	0	0	1	0	0	2			

As the helicopter passed over a fence surrounding the heliport during landing, the pilot felt a jolt but it did not prevent a safe landing. Examination following the landing revealed that the aircraft had hit the top of the fence.

PROBABLE CAUSE: Pilot misjudged clearance distance during landing.

1/9/61	0945 CST	Over Rockford, Ill.	Continental	B-707	Substantial	None	24	0	0	8	0	0	16			

During a routine descent, a fire warning for the No. 1 jet engine occurred. The engine was immediately shut down and the emergency fire procedure was executed. The two Freon charges were released and the fire was extinguished. The plane was landed safely. Investigation revealed that a material failure of the No. 1 engine fuel manifold had occurred in the brazed area of the No. 6 nozzle cluster. Leaking fuel was ignited in the diffuser section causing extensive fire damage to the engine.

PROBABLE CAUSE: In-flight engine fire caused by material failure of the No. 1 fuel manifold.

1/24/61	1135 EST	Pittsburgh, Pa.	Capital	Viscount	Substantial	None	47	0	0	3	0	0	44			

During a landing at Pittsburgh the aircraft, flown by the First Officer under the supervision of the Captain, touched down 110 feet short of the runway. The aircraft struck the runway fill with sufficient force to fail and tear away the main landing gear.

PROBABLE CAUSE: (1) First officer misjudged and undershot during the landing approach. (2) Inadequate supervision by the captain.

1/28/61	2038 EST	Knoxville, Tenn.	Capital	Viscount	Substantial	None	31	0	0	4	0	0	27

When the landing gear was extended, the warning light for the left main landing gear failed to show a "safe for landing" indication. The pilot cycled the gear several times with the same light indication; however, the manual gear position indicator showed the gear was extended and locked. After about 1,500 feet of landing roll, the left main gear collapsed and the plane veered off the runway. Examination of the landing gear system revealed marks on the left down lock components indicating interference by a foreign object with the down lock mechanism. Examination of the mechanical gear position indicating system showed one of the Bowden cable clamps was loose on the left gear portion of the system. This condition could result in a safe gear indication regardless of the position of the left main gear. The warning light system worked normally.

PROBABLE CAUSE: (1) Failure of the left main gear down lock mechanism caused by the interference of foreign material.
(2) Malfunction of the left main gear manual indicator caused by improper maintenance and inspection.

2/6/61	1911 CST	Dallas, Tex.	Delta	DC-8	Substantial	None	109	0	0	7	0	0	102

A night ILS instrument landing approach was made in instrument weather conditions of ceiling 300 feet, visibility 3/4 mile, light snow and sleet, to land on runway 13. At the time of landing the surface wind was downwind at 8 knots and the runway was covered by water and slush which varied between 1 and 3 inches deep. Touchdown according to flight recorder information, occurred at 161 knots compared to the operational data for the aircraft calling for 134 knots under existing conditions. After touchdown maximum braking and maximum reverse thrust from Nos. 2 and 3 jets with some reverse from the outboard jets were used. In addition, flaps were retracted and the nosewheel was held on the runway with forward yoke pressure. Despite these actions the aircraft slid, went off the right side of the runway and stopped in deep mud. Investigation showed the right main gear truck was off the runway 1,220 feet past the runway threshold. The plane then continued approximately parallel to the runway 2,680 feet farther where it veered right about 30 degrees and stopped 7,200 feet from the runway threshold. Examination of the aircraft and its systems revealed no evidence that malfunction or failure of the aircraft or its systems caused or contributed to the cause of the accident.

PROBABLE CAUSE: (1) Loss of directional control during the landing roll.
(2) Excessive speed at touchdown combined with runway conditions causing hydroplaning and a reduction of effective braking.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
2/17/61	1105 EST	Goldsboro, N. C.	Piedmont	F-27	Substantial	None	24	0	0	3	0	0	21			

When the pilot determined that the right main landing gear could not be extended for landing, he diverted the flight to an Air Force Base and made a wheels-up landing on a foamed section of the runway. Investigation revealed that the right main upper drag strut hinge pin bolt had separated. The bolt was not recovered; however, a high number of fatigue failure indications on this bolt from other aircraft with comparable flight times indicated the subject bolt had separated because of fatigue failure

PROBABLE CAUSE: Fatigue failure of the upper drag strut hinge pin bolt.

2/25/61	2200 CST	Houston, Tex.	Braniff	B-720	Substantial	None	31	0	0	7	0	0	24			

During a night landing approach, the aircraft touched down short of the runway with sufficient impact force to separate the right main landing gear.

PROBABLE CAUSE: Pilot misjudged during the approach resulting in a hard landing short of the runway.

3/9/61	2032 CST	Nr. Elgin, Ill.	United	DC-6	Substantial	None	46	0	0	5	0	0	41			

During climb from 4,000 to 5,000 feet following takeoff from O'Hare Field, the aircraft struck four geese. Two struck the plane glancing blows and caused little damage; however, the others hit the plane directly and caused substantial aircraft damage and a potentially serious situation. One shattered the copilot's windshield but did not penetrate it. The other penetrated the nose section of the plane at fuselage station 47, and penetrated the pressure bulkhead at station 64 causing immediate depressurization. Damage to instrument static and pressure lines affected the Captain's flight instruments. Seriously hampered by obstructed visibility, the pilots landed the plane without further incident.

PROBABLE CAUSE: In-flight bird strike.

3/13/61	2125 EST	Cleveland, Ohio	United	DC-7	Substantial	None	51	0	0	5	0	0	[illegible]

During the takeoff roll a fire warning for the No. 4 engine occurred. The pilot discontinued the takeoff and while the aircraft was decelerating, both banks of CO_2 were discharged. The fire did not go out until extinguished by ground fire and rescue equipment. Investigation revealed the No. 2 position PRT (power recovery turbine) shaft had failed in shear force. The turbine wheel consequently separated and, spinning at about 19,000 r.p.m., hit the armor hood. Sheared turbine blades caused substantial damage when they struck the No. 4 propeller, No. 3 engine, fuselage and the No. 4 oil cooler and air scoop.

PROBABLE CAUSE: Material failure of the No. 2 power recovery turbine shaft of the No. 4 engine during the takeoff roll.

3/20/61	1533 CST	Chicago, Ill.	Chicago Helicopter Airways	S-58C	Substantial	None	2	0	0	2			

During the preflight inspection runup incident to a regular flight, the pilot noted that one main rotor blade was out of track and the helicopter rocked severely. The pilot immediately reduced power and made a smooth application of rotor braking. At about 30 r.p.m., one blade dropped from the root to the extent that the tip struck the ground. Investigation revealed the lock between the rotor blade horn and sleeves was unlocked. This allowed the blade to droop under aerodynamic and centrifugal loads. Investigation further disclosed that the preflight inspection prior to runup required releasing the blade horn lock, rotating the blade 180 degrees, relock the horn and safety the lock. Although these items were signed off as completed it was evident the last two were not.

PROBABLE CAUSE: Improper maintenance and inspection during preflight inspection.

3/26/61	1730 CST	St. Louis, Mo.	Trans World	B-707	Substantial	None	125	[illegible]	0	[illegible]	0	0	[illegible]

The flight was routine from Miami, Florida to St. Louis, Missouri, where during the landing approach, a higher than normal rate of descent was used and a hard landing occurred short of the runway.

PROBABLE CAUSE: Pilot misjudged flare-out and failed to maintain adequate airspeed resulting in hard landing short of the runway.

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
4/9/61	1650 EST	Jacksonville, Fla.	Eastern	CV-440	Minor	None	45	0	1	2	0	1	41			

After a period of holding, the flight was cleared to the airport for landing. With the "fasten seat belt" sign reportedly on, the aircraft entered an area of extreme turbulence which apparently forced persons to slip from under loosely positioned seat belts. Several persons were injured when thrown from their seats. Investigation revealed the accident occurred in an area of thunderstorms where turbulence was forecast for light aircraft and could have been expected. Thunderstorm activity was the subject of a Jacksonville flash advisory which expired before the accident and was not reissued or extended although Miami had extended its flash advisory for nothern Florida.

PROBABLE CAUSE: (1) In-flight turbulence.
(2) Inadequate weather forecast.
(3) Failure of the flight crew to ascertain seat belts were properly used.

4/11/61	2034 CST	New Orleans, La.	National	L-188A	Substantial	None	53	0	0	5	0	0	53			

The pilot reported that during propeller reversal, following a landing in rain and a slight crosswind, the nose gear collapsed. As a result the aircraft veered off the runway. Investigation revealed the aircraft touched down about 3,500 feet past the runway threshold. Information from the flight recorder showed that during the ILS approach a high rate of descent, 1,200 feet per minute, had occurred. The aircraft had accelerated from 163 knots to 172 knots and touched down at 141 knots. Evidence also revealed the nose gear collapsed after the plane rolled off the runway and the nose wheels hit the raised edge of an intersecting runway. Water standing on the runway would have reduced the effectiveness of braking.

PROBABLE CAUSE: (1) Improper instrument approach procedures and a loss of directional control during the landing roll.
(2) Reduced braking caused by water on the runway.
(3) Failure of the pilot to discontinue an unsatisfactory instrument approach.

4/12/61	1525 CST	Chicago, Ill.	Delta	DC-8	Substantial	None	124	0	0	7	0	0	117

During the landing approach, a high rate of sink developed which was not sufficiently arrested to prevent a hard landing. Impact forces caused deformation damage to the No. 2 engine pylon.

PROBABLE CAUSE: An improperly executed landing approach.

4/16/61	0520 EST	Detroit, Mich.	Delta	DC-8	Substantial	None	107	0	0	7	0	0	100

When the flight arrived in the Detroit area after a nonstop trip from Miami, Florida an ILS instrument landing approach was initiated in weather conditions of clouds 700 feet, scattered ceiling 1500 feet broken, visibility 1½ miles, light rain and fog. During the approach the aircraft struck the tops of two trees below the approach zone. Impact substantially damaged the aircraft but did not prevent the execution of a missed approach, a second ILS, and a safe landing. Investigation revealed the right wing of the aircraft had hit the two trees. The trees were located about 6000 feet short of the threshold of the ILS runway, 03, and 290 feet to the right of the extended runway centerline. The trees were hit about 48 feet above their bases. The terrain elevation where the trees were located was 3 feet higher than the runway elevation. Examination and tests of the ground and aircraft equipment necessary to the execution of the ILS approach showed these facilities and equipment were capable of normal operation. The pilot reported that during the approach the descent was a little steeper than normal and upon reaching 1150 feet he established visual reference with the lights of the approach light system. The instrument approach was discontinued at this time. He said that thereafter, heavy rain and glare from the landing lights in the rain, hampered the approach.

PROBABLE CAUSE: An improperly executed instrument landing approach resulting in descent below terrain obstructions.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
4/17/61	1505 CST	Chicago, Ill.	North Central	DC-3	Substantial	None	27	0	0	3	0	0	24			

During the time the aircraft was being taxied to the gate, there was considerable congestion and movement in the area. A snow removal truck, which had been observed approaching on a converging course, was observed by the pilots to stop. Having ascertained that the truck was no longer in motion, the Captain concentrated his vigilance upon the turning rotor blades of a helicopter on the left while the First Officer observed the proximity of an airliner parked to the right. In the meantime, the truck resumed movement on its original convergent heading and collided with the aircraft. The truck driver said he did not see the aircraft until just before the collision.

PROBABLE CAUSE: Failure of the truck driver to see, and yield the right of way, to the aircraft.

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
5/9/61	1425 EST	Nr. Vero Beach, Florida	Capital	DC-6B	None	None	20	0	1	4	0	0	15			

During climb through 10,000 feet, turbulence was encountered during which one stewardess was thrown to the cabin floor and seriously injured. Investigation revealed that the turbulence encountered was expected and the "fasten seat belt" sign was on. The stewardess, in the course of her duties, had been checking the passengers to assure compliance with the seat belt sign. She was returning to her own seat after completing the check when the accident occurred.

PROBABLE CAUSE: In-flight turbulence.

5/17/61	1228 CST	Over Springfield, Ill.	Delta	CV-880	Substantial	None	73	0	0	6	0	0	67

While cruising at 26,000 feet, the crew heard an explosive like sound and observed that portions of the nose cowling of the No. 2 jet engine had separated. The plane was landed safely. Investigation showed that a low order explosion had occurred in the area of the starter of the No. 2 engine. Investigation further indicated that following ground start of the engine, the No. 2 starter valve did not completely close and the starter continued to operate. Thereafter, the starter turbine bearing failed exploding a volatile mixture of lubricants.

PROBABLE CAUSE: Malfunction of the No. 2 engine starter system for an undetermined reason.

6/6/61	1958 CST	St. Louis, Mo.	Ozark	DC-3	Substantial	None	16	0	0	3	0	0	13

During taxi immediately after a night landing, the brakes of the aircraft functioned normally; however, when braking action was applied about 91 feet from the terminal building, the brakes failed to respond. The aircraft rolled slowly into the side of the terminal building. Investigation showed a split "O" ring seal in the landing gear compensating cylinder which allowed a loss of hydraulic fluid at the rate of about two ounces each four minutes. Following the accident there was no hydraulic fluid visible in the cockpit sight gauge and the hydraulic pressure gauges indicated zero.

PROBABLE CAUSE:
(1) Brakes failure caused by a loss of hydraulic fluid resulting from a defective "O" ring seal.
(2) Failure of the crew to detect the sight gauges indication of an inadequate level of hydraulic fluid.
(3) The lack of crew training in emergency procedures for use in the event of brake failure.

6/17/61	2055 EST	Durango, Colo.	Frontier	CV-340	Substantial	None	18	0	0	3	0	0	15

During the night landing approach in VFR weather conditions, the pilots forgot the landing gear and made a wheels-up landing. The landing gear warning horn had purposely been silenced earlier before the approach. Examination of the landing gear actuating and warning system disclosed no evidence of malfunction or failure.

PROBABLE CAUSE: Pilots failed to extend the landing gear prior to landing

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
7/5/61	1122 CST	Bismarck, N. D.	Frontier	DC-3	Substantial	None	4	0	0	4	0	0	0	0	0	0

During the final portion of a landing approach being made by the First Officer seated in the left pilot's seat, to runway 02 of the Bismarck, N. D. Airport, the right landing gear of the aircraft struck the bed of a gravel truck. Impact failed the right landing gear, and after touchdown on the runway from the continued approach the gear collapsed and the aircraft groundlooped. Investigation revealed the impact between the truck and aircraft occurred while the truck was being operated on a highway, which intersects the runway extended centerline at an angle of about 20 degrees and about 315 feet short of the threshold of the 4,060-ft. long, hard surfaced runway. Signs cautioning motorists of low flying aircraft are posted on the highway. At the time of the accident visual weather conditions existed and the runway was dry. The approach was being made with a 10-knot crosswind, the angle of which created an 8-knot right component. Both pilots were of the opinion that a downdraft had been encountered; however, wind information and other pertinent factors revealed if a downdraft existed it would not have had a significant effect on the height of the plane. The Captain reported he saw the truck on the highway but felt there would be no conflict between the plane and truck. The truckdriver had not seen the aircraft, and until sometime after the accident did not know what had struck his truck.

PROBABLE CAUSE: (1) First Officer misjudged distance, resulting in an excessively low landing approach. (2) Inadequate supervision and precautionary action by the Captain. (3) Failure of the truckdriver to heed the caution sign with appropriate action.

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
7/11/61	1156 MST	Denver, Colo.	United	DC-8	Destroyed	After Impact	122	0	0	7	17	12	86	1	0	0

Following takeoff from Omaha, Nebraska, hydraulic difficulties were experienced. The flight was continued to Denver, using procedures set forth in the flight manual for abnormal hydraulic situations. When the flight arrived in Denver area, preparations were made for landing. The ejectors were extended hydraulically; however, when an attempt was made to extend flaps to 25 degrees the hydraulic pressure dropped to zero. The hydraulic system selector was then placed in the No. 3 position (flap and gear downlock), and the approach was continued. After touchdown, the throttles were placed in the idle reverse thrust position and power was applied. An uncontrollable deviation from the runway occurred and the aircraft crashed into new taxiway construction. The landing gear was torn off and the aircraft caught fire and burned.

PROBABLE CAUSE: The Board determines the probable cause of this accident was the asymmetric thrust which, during a hydraulic emergency, resulted from failure of the thrust reversers on engines Nos. 1 and 2 when reverse thrust was selected. A contributing factor was the failure of the first officer to monitor the thrust reverse indicator lights when applying reverse thrust.

7/19/61	1600 EST	Orlando, Florida	Eastern	DC-7	Substantial	None	29	0	0	5	0	0	24

Following an instrument flight segment, an instrument approach was made to land at Orlando, Florida. The approach and landing were made in heavy rain associated with a thunderstorm over the airport. The crew reported that during the landing roll, following a normal approach and touchdown, the plane veered uncontrollably off the left side of the runway with the nose gear collapsing during the latter part of the ground path. Witnesses stated that touchdown occurred following a runway alignment correction to the right. Witnesses described the touchdown as hard with the aircraft touching down simultaneously on all three gear components. The plane then bounced with the nose wheel leaving the surface after the main wheels. Qualified witnesses said the nose gear collapsed at the second runway contact. Examination of the various failures of the nose gear structure indicated they were the result of overloads exerted on the structure from touchdown of the aircraft in a right crab attitude with high vertical velocity. This was further supported by the nature of the tire marks made on the runway following touchdown. From the examination there was no evidence found of malfunction or failure prior to the landing which caused the nose gear failure.

PROBABLE CAUSE: (1) Overload failure of the nose gear caused by an improperly executed level off and touchdown during landing.
(2) Unfavorable wind condition and heavy rain associated with a known thunderstorm during landing.

7/24/61	1630 EST	Chicago, Ill.	United	DC-8	Substantial	None	102	0	0	7	0	0	95

During climb through 8,000 feet following takeoff, a fire warning occurred for the No. 2 jet engine. Fire procedures were executed which included the use of one charge of extinguishant and the engine was shut down. The fire was out and the flight returned for a safe landing. Investigation revealed a crack in the copper brazed fuel manifold cluster of the No. 2 engine. The crack was .25 of an inch in length allowing fuel leakage at a rate of 200 cubic centimeters per minute. Evidence showed the leaking fuel ignited in the diffuser case, burned through the case webbing, the 16th stage bleed air duct and high pressure fuel line between the fuel pump and fuel flow transmitter. The resultant severe fire caused additional major engine damage.

PROBABLE CAUSE: In-flight engine fire caused by material failure of the No. 2 copper brazed joint of the fuel manifold cluster.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
7/29/61	0017 PDT	Los Angeles, Calif.	American	B-707	Substantial	After Impact	52	0	0	8	0	0	44			

Following a routine flight from San Diego to Los Angeles, the First Officer made a night ILS instrument approach in visibility limited to 5 miles in smog. Touchdown for the landing occurred with excessive force and the plane rebounded to an estimated height of 15 feet. The Captain took control and applied nosedown elevator and trim control. Second runway contact occurred on the nose gear and the aircraft porpoised until the nose gear failed. A friction and electrical fire occurred. This was quickly extinguished. Examination of the aircraft revealed no evidence of malfunction or failure which caused or contributed to the cause of the accident.

PROBABLE CAUSE: (1) Improperly executed approach and level off by the First Officer and improper recovery from the resultant bounced landing by the Captain.
(2) Inadequate supervision by the Captain.

8/4/61	1800 CST	Nr. Mason City, Iowa	Northwest	B-720B	None	None	49	0	0	7	0	1	41			

Shortly before 1705 CDT the flight from New York to Seattle, Washington was over an area about 70 miles east of Mason City, Iowa. At this time, because of thunderstorm activity affecting the intended route, the flight level was changed from 35,000 feet to 39,000 feet. About 1705, the aircraft entered an area of moderate turbulence which threw two passengers and one cabin attendant to the cabin floor reportedly injuring one of the passengers. Investigation showed that at the time of the accident the flight was flying parallel to the leading edge line of thunderstorm about 25 miles away. The flight Captain stated that the proximity of the thunderstorms did not warrant turning on the "fasten seat belt" sign and it was off until the turbulence was encountered. Forecasts and SIGMETS called for turbulence in the area. The latter, as near as could be determined had not been passed to the crew by appropriate company ground personnel over company radio.

PROBABLE CAUSE: (1) In-flight turbulence. (2) Inadequate caution by the pilot relative to turbulence. (3) Inadequate company flight advisory procedures.

9/1/61		Chicago, Ill.	Trans World	L-049	Destroyed	After Impact	78	5	0	0	73	0	0

The flight originated at Boston, Massachusetts, destination San Francisco, California, with intermediate stops scheduled at New York, New York; Pittsburgh, Pennsylvania; Chicago, Illinois; Las Vegas, Nevada; and Los Angeles, California. The flight to Chicago was routine. A scheduled crew change was made at Chicago and the flight departed there at 0200 c.d.t. Approximately five minutes later, during good weather, while climbing on the intended course, the aircraft experienced loss of longitudinal control and crashed. All occupants died instantly and the aircraft was completely destroyed. Investigation disclosed that a 5/16 inch AN-175-21 nickel steel bolt from the elevator boost mechanism was missing. There was evidence that the bolt was not in place at the time of impact. The proper positioning of this bolt is vital to the control of the aircraft and must therefore have been in place until immediately prior to the loss of control.

PROBABLE CAUSE: Was the loss of an AN-175-21 nickel steel bolt from the parallelogram linkage of the elevator boost system, resulting in loss of control of the aircraft.

9/4/61	1700 CST	San Antonio, Texas	Eastern	DC-7	Substantial	None	25	0	0	5	0	0	20

During an ILS approach, although good weather conditions existed, the copilot flew the aircraft from his right seat position while the Captain monitored the approach and performed the duties of the copilot from the left seat. The crew reported that approximately over the outer marker, the gear had been extended and the landing gear warning lights indicated all three gear components were extended and locked. During the landing roll, as propeller reversal was initiated, the nose gear collapsed. The plane stopped while sliding on the nose section and rolling on the main landing gear. The landing gear cockpit control was found in the down position as was the flap control and the crew stated the landing gear control had not been actuated during the landing roll. A thorough and complete examination of the landing gear actuating and locking system showed that the gear was capable of normal function prior to the nose gear collapse. The examination further revealed that, except for damage occurring during the accident, the gear was capable of normal operation after the accident.

PROBABLE CAUSE: Inadvertent actuation of the landing gear control to the up position during the landing roll.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
9/4/61	1508 EST	Baltimore, Md.	Northeast	Viscount	Substantial	None	23	0	0	4	0	0	19			

Upon arrival for landing at Washington, D. C., the left main landing gear failed to extend and all efforts to correct the condition failed. Because of bad weather at Washington, the aircraft was flown to the Baltimore-Friendship Airport where it was landed wheels up on a foamed section of the runway. Examination of the left landing gear up lock assembly revealed the up lock jaws would not open. It further revealed that one of the securing pins in the clevis attachment to the lock had shifted outboard and lodged in an inspection hole. This movement made it mechanically impossible to unlatch the latching jaws. There was no evidence indicating that a cotter pin normally securing the securing pin had been installed. The up lock mechanism had been worked on May 10, 1961.

PROBABLE CAUSE: Malfunction of the left landing gear up lock caused by an improperly secured clevis pin.

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
9/17/61	0857 CDT	Chicago, Ill.	Northwest	L-188C	Destroyed	After Impact	37	5	0	0	32	0	0			

Flight 706 originated in Milwaukee, Wisconsin, and was a regularly scheduled flight from Milwaukee to Miami, Florida, with intermediate stops at Chicago, Illinois, Tampa, and Fort Lauderdale, Florida. While at O'Hare Airport the aircraft was routinely serviced and checked, and a scheduled crew change was made. At approximately 0855, while taxiing from the ramp, the flight was cleared for takeoff, and shortly thereafter the aircraft departed. Takeoff and initial climb appeared to be normal, but at approximately 200 feet a shallow turn to the right continued into a gradually increasing bank of about 85 to 90 degrees. While in the turn, the crew made a short, garbled transmission indicating alarm. During the latter part of the turn a gradual descent began and, two minutes after takeoff, the aircraft struck the ground.

PROBABLE CAUSE: Mechanical failure in the aileron primary control system due to an improper replacement of the aileron boost assembly, resulting in a loss of lateral control of the aircraft at an altitude too low to effect recovery.

9/23/61	2101 CST	Kansas City, Mo.	Delta	CV-340	Substantial	None	12	0	0	3	0	0	9

During a night landing in heavy rain associated with a thunderstorm, the aircraft touched down and bounced. A series of porpoising bounces followed until a severe nose-low touchdown crushed the nose gear. The plane veered off the runway and stopped. The crew stated that ILS was initiated and continued although visual contact with the approach and runway lights was established in the vicinity of the outer marker. They stated that approach and landing were normal until heavy rain and turbulence was encountered during flareout. The bounced landing then occurred in visibility sharply reduced by the intense rain.

PROBABLE CAUSE: (1) Pilot misjudged level off and failed to make proper recovery from a bounced landing.
(2) Unfavorable wind condition and limited visibility in heavy rain during a critical phase of landing.

9/24/61	1105 EDT	Boston, Mass.	American	B-720B	Substantial	None	71	0	0	8	0	0	63

The aircraft, while making a precision radar approach and landing, overshot and slid into Winthrop Bay approximately 420 feet beyond the end of the runway. Prior to the initiation of the final approach, Flight 44 was given the Boston weather as follows: Partial obscuration, measured ceiling 300 feet overcast, visibility one mile in fog, runway visual range more than 6000 feet. During the approach visibility deteriorated rapidly in the approach area from more than 6000 feet to as low as 2200 feet, as shown by the RVR transmissometer record.

PROBABLE CAUSE: The Board determined that the probable cause of this accident was the captain's decision to land in variable weather conditions precluding adequate orientation relative to location along the runway. A contributing factor was the failure to provide the flight with information concerning the deterioration of runway visual range values.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
10/8/61	1645 PST	Avalon, Calif.	Avalon Air Transport	Grumman-21	Destroyed	None	10	0	0	1	0	0	9			

During a water take-off in a 71 degree cross wind of 25 to 30 m.p.h., the amphibian struck a "fairly large swell" and bounced. This resulted in a premature lift off. The cross wind then raised the right wing causing the left wing float to strike the water. As a result, the aircraft cartwheeled and crashed.

PROBABLE CAUSE: Failure of the pilot to make the take-off into the wind under adverse weather conditions.

10/10/61	1916 CST	Des Moines, Ia.	Braniff	CV-340	Substantial	None	34	0	0	3	0	0	31			

The pilots reported that a normal back course ILS approach was made in rain and moderate turbulence and was followed by a normal touchdown. They stated that as the propellers were being reversed using override, the aircraft ballooned, touched down the second time and bounced. At the apex of the bounce the plane nosed down and struck the runway failing the nose and left main landing gears. The plane then slid off the runway. Examination of the aircraft revealed severe damage caused by excessive impact forces. The left main shock strut trunnions were sheared off and driven up through the lower wing panel. Marks on the propeller shim plates showed the propeller blades were moving from reverse pitch to positive pitch as they struck the runway surface.

PROBABLE CAUSE: Improper landing technique which included premature propeller reversal causing a hard bounced landing.

10/16/61	0710 CST	Fort Worth, Tex.	Braniff	L-188	Substantial	None	49	0	0	5	0	0	44

Following a night takeoff, at 0142 c.s.t., the crew noted that the right main landing gear intransit warning light stayed on. It was then learned that the right main gear had not fully retracted and the wheel well doors had closed against the wheel. The other gear components cycled normally; however, every possible measure failed to move the right gear. After morning light the aircraft was landed wheels up on a foamed runway. Investigation revealed that the clearance adjustment between the landing gear operating roller and gear door hook of the right gear door actuating mechanism was .104 inches. The proper clearance specified in the Manufacturer's Maintenance Manual is .015 to .045. The right gear had been replaced on the aircraft July 26, 1961. Further investigation indicated the maintenance personnel of the carrier were not aware of the necessity of checking the above described clearance between the roller and hook. There was no company procedure for it at the time of the accident.

PROBABLE CAUSE: Improper adjustment of the right landing gear door actuating mechanism caused by inadequate maintenance and maintenance procedures.

10/16/61	2247 EST	Windsor Locks, Conn.	Mohawk	CV-240	Substantial	None	16	0	0	3	0	0	13

Approaching destination at 6,500 feet, m.s.l., the flight was given clearance to make a straight-in landing approach. The copilot, who was flying the aircraft, reduced power, silenced the landing gear position warning horn, lowered the flaps and proceeded to dissipate altitude for the approach. When the copilot started to extend the landing gear, the Captain stopped his action because the airspeed was excessive for gear extension. In the events which followed, both pilots assumed the other had extended the gear; however, neither had done so and a wheels-up landing resulted. Investigation showed the scroll type checklist was stopped on "Landing Gear Extended" item of the before landing check.

PROBABLE CAUSE: (1) Failure of both pilots to extend the landing gear prior to landing.
(2) Improper use of the checklist.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passenger F	Passenger S	Passenger M/N	Other F	Other S	Other M/N
10/20/61	1337 CST	Chicago, Ill.	American	B-707	Substantial	None	99	0	0	8	0	0	91			

Following a normal landing, the aircraft was taxied to the terminal where a short radius turn was made and the plane was parked. While the jet engines were being shut down, fire broke out in the Nos. seven and eight (right rear) wheel assemblies. The fire caused substantial damage to the right wheel assemblies and adjacent areas before it could be extinguished. Investigation revealed that qualified witnesses had seen hydraulic fluid being discharged from the right landing gear oleo strut onto the brake assemblies when the fire started. The brakes obvisously were still very hot from ground operation. Examination and testing of the oleo strut failed to reveal a condition causing the leakage or to produce further leakage. It was considered possible, however, that under heavy loads of the parking turn, the packing rings of the right strut were temporarily deformed, permitting the leakage.

PROBABLE CAUSE: Temporary deformation of the oleo strut packing rings permitting a discharge of hydraulic fluid on the right brake assemblies.

11/1/61	1041 EST	Tuscaloosa, Ala.	Southern	DC-3 Cessna 172	Substantial	None	23	0	0	3	0	0	20			

During taxi to takeoff position, the left wing tip of the DC-3 struck the tail of a parked Cessna 172. The wing of the DC-3 received little damage; however, there was substantial damage to the vertical stabilizer of the Cessna. It was reported that sufficient room existed for the DC-3 to have passed betwwen two aircraft, one of which was the Cessna.

PROBABLE CAUSE: Captain misjudged clearance distance during taxi.

11/5/61	1536 EST	Nr. Albany, N. Y.	Trans World	B-720B	Substantial	After Impact	42	0	0	8	0	0	34

The aircraft was cruising normally at 25,000 feet when the No. 1 engine failed because of the disintegration of the low-pressure turbine section. Fragments from the turbine section penetrated the left wing, No. 2 engine pylon and the fuselage, resulting in a ruptured wing fuel cell and loss of cabin pressurization. An emergency was declared and a let-down to a lower altitude was affected. The flight continued to Boston and landed without further incident.

PROBABLE CAUSE: The Board has determined that the probable cause of this accident was oil starvation of the No. 2 bearing which caused its failure. This precipitated the fracture of the low-pressure rear hub and the overspeeding and subsequent disintegration of the low-pressure turbine section.

11/15/61	1710 EST	Boston, Mass.	National	DC-6B	Substantial	None	30	0	0	5	0	0	25
			Northeast	Viscount	Substantial	None	45	0	0	8	0	0	37

On November 15, 1961, at approximately 1710 e.s.t., 47 minutes after sunset, a ground collision occurred at Logan International Airport, Boston, Massachusetts, between a National Airlines DC-6B, N-8228H, attempting a takeoff on runway 9 and a Northeast Airlines Viscount N-6592C, during its landing roll on runway 4R. National Airlines Flight 429 originated at Boston. Its destination was Norfolk, Virginia, with five intermediate stops. Northeast Airlines Flight 120 originated at Washington, D. C. Its destination was Boston, Massachusetts, with an intermediate stop at LaGuardia Airport, New York. There were no serious injuries to either the crew or passengers of the DC-6, however, four passengers of the Viscount received minor cuts and abrasions while deplaning. There was major damage to both aircraft.

PROBABLE CAUSE: The Board finds that this ground collision accident occurred as the result of commencement of takeoff by National 429 without clearance. Contributing factors were the failure of tower personnel to provide adequate surveillance of the active runway and to issue an appropriate warning message to the pilot of National 429 alerting him to the impending traffic confliction.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Other F	Other S	Other M
11/19/61	2346 EST	Nr. Bristol, Tenn.	Piedmont	DC-3	Substantial	None	9	0	0	3	0	0	6			

In preparation for a night IFR approach to Tri-City Airport, Tennessee, the flight was cleared from the Gate City Intersection to the Tri-City outer marker to maintain 6,000 ft. En route to the marker the flight was cleared for an ILS approach. The crew said they reached 4,500 ft. just prior to arriving over the outer marker outbound. A normal rate of descent was then made to 4,100 feet by the First Officer who was flying the aircraft from his right seat position. A procedure turn was completed at this time and upon passing through the localizer beam, a right turn was initiated to establish the localizer inbound. At this time the aircraft struck ground objects with a loud noise. The captain assumed control at this point, climbed to 6,500 feet immediately, then subsequently made a successful ILS approach. Investigation revealed that the right wing and nose of the aircraft had struck the top of trees on top of a 3,700-foot mountain range, 16 3/4 miles east of the Tri-City Airport, 10 miles east of the ILS outer marker and 3 miles east of the Emmett Airway Intersection. The trees were approximately on the localizer course. The frequency of the ILS outer marker is 239KC and Emmett Intersection is 320KC. The instrument approach procedure turn allows a descent to 3,100 feet within 5 miles of the outer marker. An alternate procedure turn east of Emmett Intersection allows descent below 5,500 feet only after passing the intersection inbound. No malfunction was found in either the aircraft instruments or the ground radio facilities. The above information indicated that the pilots erroneously tuned the aircraft radio to Emmett Intersection instead of the ILS outer marker and failed to recognize the error when passing over the fix, even though no light nor audio signal was received. Then the instrument descent and procedure turn requirements called for under the outer marker procedure were erroneously made on the Emmett facility.

PROBABLE CAUSE: (1) Pilot descended to an altitude below obstructing terrain caused by an improperly executed instrument approach.
(2) Lack of attention by the pilots and inadequate supervision by the captain.

11/23/61	1538	EST	Morgantown, W. Va.,	Lake Central	DC-3	Substantial	None	14	0	0	3	0	0	11

The landing was made in a calm wind and moderate rain on runway 35 which is 3,578 feet in length. The macadam surface was described as worn with numerous depressions. The touchdown was described as smooth and within the first $\frac{1}{4}$ of the runway length. The pilots reported that flaps were retracted and braking was applied as the tailwheel was settling to the surface. The pilots said that with each application of braking the tires slid and there was little or no deceleration of the plane. On at least one occasion the plane turned slightly, requiring power to straighten it directionally. The Captain said that near the end of the runway he tried to groundloop the aircraft to the left; however, it slid off the right side of the runway and went over an embankment. Witnesses said the left wheel lifted off the runway several times during the landing roll and both wheels were off the runway about 2,700 feet down the runway. Tire marks made by the left wheel showed the plane deviated directionally to the left side of the runway. Marks showed the plane then turned back to the right in an increasing turn and then slid off the right side of the runway near the end. Marks from both tires were visible over the last 300 feet before the plane left the runway.

PROBABLE CAUSE: Loss of directional control during the landing roll caused by touchdown at excessive speed and reduced braking resulting from the wet runway condition.

11/25/61	1448	PST	Las Vegas, Nev.	Pacific	F-27	Substantial	None	27	0	0	3	0	0	24

When the landing gear was extended for landing at an intermediate stop, the pilot received an unsafe for landing nose gear indication. After all efforts were taken to correct the condition and it was learned the gear appeared to be down, a landing was made. The nose gear collapsed during the landing roll and the plane slid to a stop on the bottom of the nose section of the aircraft. Examination of the aircraft, immediately after the accident, revealed a gray shop rag tangled in the nose gear cable of the gear extension mechanism. Binding of the rag prevented the gear from extending to the full down and locked position. An exhaustive effort to determine how the rag got into the gear actuating system was unsuccessful.

PROBABLE CAUSE: Jamming of the nose gear actuating mechanism caused by a rag left in the nosewheel compartment.

Scheduled Passenger Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
12/2/61	0983 EST	Jacksonville, Fla.	Delta	DC-7B	Substantial	None	20	0	0	5	0	0	15			

During the execution of a surveillance radar instrument landing approach, in visibility limited to reported 3 miles, ground fog and smoke, the aircraft struck trees located about 8/10 of a mile short of the runway. Impact damaged the No. 2 engine, necessitating the feathering of it's propeller, and damaged the left wing flap, however, the pilot applied full power to the operating engines, circled the airport and made a safe landing. Investigation showed the trees struck were located 4000 feet short of the threshold of the runway and 1300 feet left of the runway extended centerline. The height of the impact point of the trees was 19 feet higher than the elevation of the runway. Examination and test of the ground and aircraft equipment pertinent to the satisfactory execution of the instrument approach attempted, revealed it capable of normal operation.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was the pilot's improper execution of an instrument approach.

12/5/61	0905 EST	New Castle, Del.	American	L-188	None	None	50	0	1	4	0	0	45			

The flight was proceeding normally at cruise altitude when it briefly encountered the cloud tops. At this same time one severe jolt of turbulence occurred. The jolt threw the cabin attendants off balance and one sustained a broken ankle.

PROBABLE CAUSE: In-flight turbulence.

12/20/61	1852 EST	Nr. Pittsburgh, Pa.	American	B-707	None	None	114	0	1	7	0	0	106

About 1851 est. the Boeing 707 flight was en route from New York, N. Y. to St. Louis, Missouri at 28,000 feet on an approximate course of 250 degrees. At the same time, an Air Force B-47 flight was cruising on a northeast heading at 27,500 feet. Both flights were in radio communication with a Cleveland Radar controller who advised each pilot of the other aircraft when the planes were about 20 miles apart. He advised also that the aircraft were 20 miles apart and they would pass each other on the left. At this time both pilots saw the other plane and blinked their respective aircraft landing lights to so indicate, and the radar controller was advised. The Air Carrier crew stated lateral separation appeared adequate and they then lost visual contact with the B-47 momentarily. At this point the Cleveland radar controller was relieved and his position was taken by another controller. Apparently while the above position change took place, the Boeing 707 pilots suddenly saw the B-47 on an apparent collision course. At approximately the same time the B-47 pilot must have also seen the Boeing 707. The 707 flight evaded with a left pullup and the B-47 made a left descending turn. The planes passed with each on the other's right at an estimated distance of 200 feet. According to the pilots of the Boeing 707 the B-47 pilot must have made a left turn after the initial sighting. The B-47 pilot did not give a statement concerning the events. The evasive maneuver of the Boeing 707 threw one stewardess off balance and she fell, breaking her ankle.

PROBABLE CAUSE: Failure of the pilots of each aircraft to maintain sufficient visual reference to the other's aircraft and alter course to assure the avoidance of near collision.

Domestic Operators - Cargo Service

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
3/9/61	1140 CST	Nr. Joliet, Ill.	Chicago Helicopter	Bell 47G2	Substantial	None	1	0	0	1						

The regularly scheduled air mail flight was without incident until in-flight turbulence was encountered, at which time the pilot detected a metallic sound and a bump in the rudder pedals. He stated he suspected a tail boom problem and he elected to make a power off autorotational precautionary landing in a plowed field. The helicopter was landed with a forward velocity of 5 to 10 m.p.h. in a cross wind from the right, velocity 25 knots with gusts to 35. After touchdown, the helicopter traveled about 35 feet when the left skid failed on contact with an area of frozen ground. The helicopter then nosed down causing additional damage. There was no mechanical failure or malfunction prior to the landing.

PROBABLE CAUSE: (1) Failure to properly compensate for adverse in-flight turbulence and for wind conditions during a precautionary landing.
(2) Adverse wind conditions.

4/17/61	0804 CST	Chicago, Ill.	Chicago Helicopter	Bell 47G	Substantial	None	1	0	0	1						

After reaching the proper unloading spot following a normal landing, the pilot attempted to maneuver the helicopter closer to the gate. He did this to facilitate unloading under snow-covered ramp conditions. During the maneuver, the helicopter was rotated clockwise and the tail rotor struck a mail cart. The pilot had not seen the cart.

PROBABLE CAUSE: (1) Pilot failed to see and avoid an obstruction.
(2) Judgment of the pilot in maneuvering beyond established limits.

4/21/61	1112 CST	Downers Grove, Ill.	Chicago Helicopter	Bell 47G	Substantial	None	1	0	0	1

During the initial portion of the takeoff climb initiated from hover, the helicopter reached about 25 feet when it veered laterally from a northwest to a southwest heading and descended. To avoid spectators and an occupied school bus, the pilot applied full power and rotor pitch. The rotor r.p.m. fell off and the aircraft settled. Just as touchdown occurred the main rotor blades hit a utility pole. Examination and tests of the stabilizer dampers from the aircraft revealed one had a period of 12 degrees. The other had a period of 23 degrees. The normal setting is 17 degrees plus or minus 1 degree. One damper was found to be erratic in operation.

PROBABLE CAUSE: Loss of control caused by erratic stabilizer damper operation.

10/4/61	1219 CST	Lemont, Ill.	Chicago Helicopter	Bell 47G2	Destroyed	After Impact	1	1	0	0

The daily flight, which originated and terminated at Midway Airport with six intermediate stops, had just departed the last stop when the crash occurred. According to witnesses, the helicopter was about 600 feet above the ground when the engine suddenly stopped. The aircraft then rolled or pitched to an inverted position and crashed. Through exhaustive investigation it was possible to determine that all damage found could be associated with impact or in-flight resultant damage except a failure of the bearing end fitting of the blue rotor blade pitch control link. This failure occurred through the outer race of the self-centering bearing. The fracture exhibited no evidence of fatigue but was predominately tensile with some evidence of bending. Both rows of balls had statically brinelled the outer race. The brinelling marks showed the bearing balls were properly positioned in their races but were cocked 12 degrees to the centered position, the approximate travel limit.

PROBABLE CAUSE: In-flight failure of the bearing end fitting of the blue rotor blade pitch control link caused by improper bearing alignment at installation.

Nonrevenue Operations

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
1/14/61	1340 CST	Chicago, Ill.	United	DC-7	Substantial	None	3	0	0	3						

The crew reported that the landing gear was actuated to the down position for landing at the O'Hare Airport and all indications were that the landing gear extended and was safe for landing. Despite this, when the aircraft decelerated during the landing roll and the nose wheel lowered to the runway, the nose gear collapsed. Exhaustive examination and testing of the landing gear extension and retraction system revealed that it was capable of normal operation without alteration or repair. Examination of the landing gear control down lock solenoid revealed it had malfunctioned. The effect of this would permit the landing gear control handle to be moved from the down position with weight of the plane on the gear. Properly operating the device would prevent such action. The flight engineer reported that when the nose gear collapsed he had his hand on the flap control ready to retract the flaps.

PROBABLE CAUSE: (1) Inadvertent retraction of the landing gear by the flight engineer during the landing roll.
(2) Malfunction of the landing gear control down lock device permitting inadvertent retraction of the landing gear control.

1/28/61	1225 EST	Montauk Point, L. I. New York	American	B-707	Destroyed	None	6	6	0	0						

About 1100 e.s.t., Flight 1502, a Boeing 707, departed the New York International Airport for the purpose of pilot training utilizing the area over the vicinity of Montauk Point. The pilots made various radio reports concerning the activity, progress, and location of the operation. One report and the last transmission from the plane was at 1157 which referred to position. In clear weather about 23 minutes later the plane was seen in a left-wing low steep dive. This continued until the plane crashed in the ocean just off Montauk Point. The investigation work recovered about 15 percent of the aircraft structure and all 4 powerplants. From this evidence it was learned that 1 powerplant, number 1, had separated in flight from forces exceeding the strength of the securing structure. From the engine examination it was concluded that powerplant malfunction or failure had not occurred. From the structural examination it was concluded that in flight explosion, fire or structural failure had not preceded the engine separation and steep dive. It was reliably indicated the wing flaps were extended about 30 degrees at the time of water impact. The flight recorder was not recovered and only pieces of the tape were (Continued on next page)

1/28/61 (Cont'd)

found. These were from the unused end of the reel. By correlating the time of the accident, the normal sequence of maneuvers in the training curriculum and the normal time required for each, it was indicated that engine shut down and air start, the canyon approach and en route 2 engine climb maneuvers would bracket the time the accident occurred. Of the above maneuvers, the canyon approach utilizes the 30 degree flap extension.

PROBABLE CAUSE: A loss of control for an undetermined reason.

2/14/61	1330 EST	Atlanta, Ga.	Delta	C-46	Substantial	None	3	0	0	3

During a training flight, a wheel landing was made after which the plane was lifted off and relanded in a three point position. Both landings were normal and intended in the manner performed. As the flaps were retracted and the tail wheel was unlocked to turn off the runway, both main landing gears collapsed at the same time. Investigation disclosed no evidence of malfunction or failure of the landing gear components or system prior to the gear collapse. The crew members reported the landing gear indications indicated the gear was down and locked prior to landing and the gear handle was down when the accident occurred.

PROBABLE CAUSE: Inadvertent actuation of the landing gear control from the down position.

3/30/61	1823 PST	Las Vegas, Nev.	Trans World	L-049	Substantial	None	3	0	0	3

Before landing at Las Vegas on a scheduled flight, the landing gear was of necessity extended by the emergency system. Thereafter, it was decided to ferry the aircraft to Los Angeles for repairs with the gear down. The right main gear retracted when the No. 4 engine was being started. Investigation revealed a steel chip about 1/16 inch thick lodged under the down return poppet of the landing gear selector valve.

PROBABLE CAUSE: Retraction of the right main landing gear caused by a foreign particle in the landing gear selector valve.

1/28/61 (Cont'd)

found. These were from the unused end of the reel. By correlating the time of the accident, the normal sequence of maneuvers in the training curriculum and the normal time required for each, it was indicated that engine shut down and air start, the canyon approach and en route 2 engine climb maneuvers would bracket the time the accident occurred. Of the above maneuvers, the canyon approach utilizes the 30 degree flap extension.

PROBABLE CAUSE: A loss of control for an undetermined reason.

2/14/61	1330 EST	Atlanta, Ga.	Delta	C-46	Substantial	None	3	0	0	3

During a training flight, a wheel landing was made after which the plane was lifted off and relanded in a three point position. Both landings were normal and intended in the manner performed. As the flaps were retracted and the tail wheel was unlocked to turn off the runway, both main landing gears collapsed at the same time. Investigation disclosed no evidence of malfunction or failure of the landing gear components or system prior to the gear collapse. The crew members reported the landing gear indications indicated the gear was down and locked prior to landing and the gear handle was down when the accident occurred.

PROBABLE CAUSE: Inadvertent actuation of the landing gear control from the down position.

3/30/61	1823 PST	Las Vegas, Nev.	Trans World	L-049	Substantial	None	3	0	0	3

Before landing at Las Vegas on a scheduled flight, the landing gear was of necessity extended by the emergency system. Thereafter, it was decided to ferry the aircraft to Los Angeles for repairs with the gear down. The right main gear retracted when the No. 4 engine was being started. Investigation revealed a steel chip about 1/16 inch thick lodged under the down return poppet of the landing gear selector valve.

PROBABLE CAUSE: Retraction of the right main landing gear caused by a foreign particle in the landing gear selector valve.

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
4/25/61	1522 MST	Denver, Colo.	United	DC-6	Substantial	None	3	0	0	3						

At the conclusion of an engine-out, missed approach, a circling approach was initiated. Just before turning onto final approach a second throttle was retarded and pilot was told to make a simulated two-engine-out approach and landing. The landing gear was extended during the approach and the crew members noted safe indications on all three gears. The landing gear warning horn had been silenced because of the maneuver. The aircraft touched down normally. During the landing roll, however, the gear warning horn sounded and the nose gear collapsed. A student Captain acting as Flight Engineer said the flap control was not actuated nor was the gear control. Examination of the landing gear and landing gear warning systems disclosed no evidence of malfunction or failure. The landing gear control lever was found in the neutral position with the safety pin retracted.

PROBABLE CAUSE: Inadvertent actuation of the landing gear control during the landing roll causing collapse of the nose gear.

6/16/61	0940 EST	Jacksonville, Fla.	Delta	CV-880	Substantial	None	5	0	0	5						

During a training flight a hydraulic emergency condition was simulated necessitating free fall of the landing gear. This was accomplished and it was reported that the emergency gear extension lever was returned to the stowed position. Thereafter the aircraft was landed to deplane observers. The aircraft was then taxied for takeoff. As the plane was aligned on the runway, the gear warning horn sounded, the gear unsafe warning light came on and the nose gear collapsed. Investigation and tests revealed the gear collapse was caused by malfunction of the emergency side of the nose gear emergency extension valve. The valve did not seat properly and when the emergency gear extension lever was moved to the stowed position hydraulic pressure would drop on the extended side of the extend-retract cylinder to 100 pounds and surge from zero to 250 pounds on the up side. Further examination revealed the "O" ring service packing on the emergency side of the nose gear selector exceeded allowable tolerance. Tests showed the leakage problem occurred only when the emergency gear extension lever was moved to the stowed position.

PROBABLE CAUSE: Malfunction of the emergency side of the nose gear emergency extension valve caused by an out of tolerance "O" ring packing.

All-Cargo Carriers

7/13/61	1846	EST	Albany, Ga.	Riddle	C-46	Substantial	None	2	0	1	1

As the flight was preparing for takeoff, several thunderstorms were observed in the immediate vicinity of the airport and a light rain was falling while the aircraft was taxied out. A thunderstorm was over the field during the takeoff, and after the gear had been retracted on the climb out, the aircraft entered an area of severe turbulence, heavy rain and downdrafts. Despite the use of full power the aircraft settled and touched down on the runway in a flat attitude.

PROBABLE CAUSE: (1) Loss of flying speed and control caused by an adverse wind condition.
(2) Judgment of the pilot in initiating takeoff in existing condition.

9/20/61	2324	PDT	Portland, Oregon	Flying Tiger	L-1049	None	None	3	0	0	0

A ground crewman gave the signal to start the No. 3 engine prior to initiating a night flight. The engine started and was emitting a large amount of smoke when witnesses saw the ground crewman hurry toward the engine. At this time, he was struck by the No. 3 propeller.

PROBABLE CAUSE: Inattention of the ground crewman to the rotating propeller and failure to follow established walk patterns.

12/1/61	1134	CST	Grand Island, Neb.	Flying Tiger	L-1049H	Substantial	None	4	0	0	4

The aircraft was being taxied on the concrete ramp of the Grand Island Airport prior to takeoff when the right main landing gear broke through the concrete. The failed ramp area was about eight feet long and six feet wide. Examination showed the nine inch thick concrete was not reinforced. It further revealed erosion cavities under the failed concrete slabs. Expansion cracks between the slabs were unsealed.

PROBABLE CAUSE: Unsuitable ramp condition caused by inadequate inspection and maintenance.

Intra-Alaska Carriers

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Other F	Other S	Other M/N
Scheduled Passenger Service																
4/8/61	1253 AST	Shishmarf, Alaska	Wien	Beech C-18S	Substantial	None	1	0	0	1						

When the pilot attempted to land an approximately 1,000 foot clear area of the 1,500 ft. strip, the aircraft overran the cleared area, struck a snowdrift and nosed up. Investigation revealed it was difficult to obtain information on the landing conditions at the strip. Deeper snow and drifts had accumulated unknown to the pilot and the operations department of the air carrier.

PROBABLE CAUSE: (1) Unsuitable landing conditions for landing.
(2) Lack of information on field conditions necessary to flight operations.

6/30/61	1815 AST	Aleknuk, Alaska	Northern Consolidated	Cessna T-50	Substantial	None	3	0	0	1	0	0	2			

While taxiing to the seaplane ramp after being forced to abandon the takeoff because of rough water and a strong surface wind gusting to 30 m.p.h., the seaplane nosed over and came to rest in an inverted position.

PROBABLE CAUSE: (1) Judgment of the pilot in initiating flight operations in adverse wind conditions.
(2) Unfavorable wind and water conditions.

7/21/61	1058 AST	Dillingham, Alaska	Western Alaska	L-12	Substantial	None	5	0	0	1	0	0	4			

During the en route phase of flight, the pilot and passengers detected gasoline fumes but experienced no difficulty with engine operation. During the landing roll at the completion of the flight, fire broke out of the left engine nacelle. When fire procedures failed to extinguish the fire, the pilot quickly got out of the plane and assisted ground personnel in putting out the fire with hand extinguishers. Investigation revealed that the fire was caused by the ignition of gasoline being sprayed out of a cracked fuel inlet line connection at the carburetor.

PROBABLE CAUSE: Fire caused by failure of a fuel inlet line connection at the carburetor.

Scheduled Passenger Service

8/14/61	1240 AST	Hinchinbrook Island, Alaska	Cordova	Grumman G-44	Substantial	None	2	0	0	1	0	0	1

After making a slow speed, low altitude inspection pass over the intended landing area, the pilot retracted the wing flap prior to the intended climb-out. As the flaps retracted the aircraft settled to the beach with the landing gear retracted.

PROBABLE CAUSE: Premature flap retraction.

10/24/61	1600 AST	Prince of Wales Island, Alaska	Ellis	Grumman G-21	Substantial	None	6	0	0	1	0	0	5

While the aircraft was decelerating after a water landing, it struck a submerged hummock or "dead head". The plane stopped abruptly and nosed up. Impact tore open the hull of the plane which partially filled with water.

PROBABLE CAUSE: Hidden hazard in the landing area.

11/11/61	1451 AST	Nr. Wrangell, Alaska	Alaska Coastal	Grumman G-21A	Substantial	None	8	0	0	1	0	0	7

The pilot was approaching Wrangell, Alaska at an altitude of about 1,500 feet when the right engine lost power momentarily and then failed completely. He then saw flames coming from the ring cowl and made an immediate emergency descent and landed the amphibious aircraft on Zimovia Straits. During the descent the right engine fire extinguisher was used and the fire was out after the landing. Investigation revealed that the rivets in the cam reduction gear assembly had failed causing the gear to fail. Fire ignited by backfires when the gear failed was apparently blown through the partially open hot air valve where it impinged upon and burned through the No. 6 exhaust shroud and collector. Time on the part was unknown; however, the engine had operated 1,276 hours since overhaul. A service bulletin, dated December 13, 1957, authorized strengthening of the cam shaft gear by adding 6 rivets. Because of the accident the operator was considering this action, even though it was the only cam reduction gear failure over a 15 year period of operations.

PROBABLE CAUSE: Material failure of the cam reduction gear assembly.

Intra-Alaska Carriers

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
Scheduled Passenger Service																
11/14/61	1328 AST	Nr. Galena, Alaska	Wien	Cessna 180B	Substantial	None	2	0	0	1	0	0	1			

About 8 minutes from destination, en route from Ruby to Galena, Alaska the pilot encountered an area of low visibility and ceiling. Using partial carburetor heat he descended to about 500 feet to follow the Yukon River to Galena. He said that about this time he obtained a special VFR clearance to enter the control area and then the aircraft entered a area of heavy snow which limited visibility to between 1 and 2 miles. Shortly thereafter, the engine began to run rough and lose power which the pilot tried to correct by manipulating the carburetor heat on and off and changing the mixture to various positions. His actions were unsuccessful, and a forced landing was made on the rough ice and snow-covered frozen surface of the river. Impact of the rough area failed the landing gear. Investigation failed to confirm the pilot had received clearance to enter the control area. It also indicated that visibility and ceiling conditions were much worse than estimated by the pilot. Examination of the aircraft disclosed no evidence of malfunction or failure of the engine or other mechanical reason for the power failure. Conditions were highly conducive to carburetor icing.

PROBABLE CAUSE: (1) Power failure caused by improper use of carburetor heat.
(2) Judgment of the pilot in attempting continued visual flight under existing condition of weather and aircraft equipment.

Scheduled Passenger Service

12/8/61	1058	BST	Nr. Nome, Alaska	Wien	Cessna 180B	Destroyed	None	2	1	0	0	1	0	0

Prior to the intended flight which was to originate and terminate at Nome, Alaska, with numerous intermediate stops, the pilot obtained a weather briefing. Available weather information indicated visual conditions existed but that deteriorating conditions were expected with ceilings as low as 800 feet, sky obscured; visibility to ½ mile with light sleet, light and blowing snow. Before returning to Nome the pilot landed at White Mountain where he picked up a seriously injured woman to bring her to Nome. At 1053 b.s.t. during the return segment to Nome, the pilot reported 3 miles east of Solomon, located 20 miles east of Nome. The pilot was advised the Nome weather was sky partially obscured, ceiling 2,500 feet overcast; visibility ¼ mile in light and blowing snow; wind east-northeast 32 m.p.h. gusting to 42. The pilot responded he had good visibility. At 1055 the pilot reported over Solomon requesting a clearance to enter the Nome Control Zone. The pilot was advised that because of weather the request could not be approved unless an emergency was declared. Thereafter the pilot could not be contacted. Investigation revealed the aircraft had crashed about 1058 on Safety Lagoon, located about halfway between Solomon and Nome and left of the direct course. Examination of the wreckage showed the plane crashed in a very steep, nosedown, right-wing-down, rotating descent.

PROBABLE CAUSE: (1) Loss of control caused by attempted continued flight in adverse weather conditions.
(2) Judgment of the pilot in continuing the flight into known adverse weather conditions.
(3) Desire of the pilot to complete the flight because of the emergency condition of the passenger.

12/24/61	1050	AST	Old Harbor, Kodiak Island, Alaska	Kodiak	Grumman 21-A	Destroyed	None	5	0	0	1	1	0	3

The twin engine, six-place amphibian crashed shortly after initial lift-off while making a water takeoff. One passenger seated in the cockpit was thrown into the water and drowned. The pilot, who was also thrown from the cockpit, and the remaining three cabin passengers, who exited through the main cabin door, were rescued within a few minutes. The aircraft was totally destroyed at impact and sank in 75 feet of water. Witnesses stated that the initial takeoff appeared to be normal, but immediately after lift-off the aircraft was observed to descend, strike the water, and climb steeply. The aircraft then pitched down abruptly and crashed, with the nose and tail breaking off at impact.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was an improperly executed takeoff which resulted in an inadvertent descent into the water. This produced a high-speed, low angle porpoise from which the pilot was unable to recover.

Intra-Alaskan Carriers

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
Nonscheduled Revenue Operations																
6/21/61	1813 BST	Kotzebue, Alaska	Wien	C-46A	Substantial	None	2	0	0	2						

The pilot reported that during a landing approach, sun glare and reflection from a body of water located between the aircraft and the runway resulted in decreased visual perception. As a result, he was unable to accurately judge the end of the runway. The aircraft touched down with a severe damaging impact. It then bounced onto the runway and stopped without further incident.

PROBABLE CAUSE: (1) Pilot misjudged the landing approach because of sun glare and reflection. (2) Judgment of the pilot in continuing the approach under known adverse visual conditions.

12/6/61	1512 AST	Port Wakefield, Alaska	Kodiak	Grumman G-44	None	None	1	0	0	1				0	1	0

While attempting to taxi into the water, the pilot experienced some difficulty because the left wheel of the aircraft was stuck in the soft gravel of the beach. As he opened the left window to check the difficulty, he observed a man running toward the aircraft in line with the left propeller. Despite shouts and waves of warning, the man continued and was struck by the propeller.

PROBABLE CAUSE: Inattention of the bystander to the rotating propeller.

3/31/61	1430 AST	Crown Mt. Kodiak Island, Alaska	Kodiak Airways	Grumman G-44	Destroyed	None	1	0	1	0						

During the return portion of a VFR charter flight from Kodiak to Larsen Bay, Alaska, the aircraft struck the snow-covered terrain of Crown Mountain, located about seven miles south of the direct course between the two locations. Investigation of the accident indicated that the pilot had made an unsuccessful attempt to avoid adverse en route weather and had encountered snow squalls below a low broken cloud layer. This caused poor visibility and conditions conducive to "white out". In these conditions the aircraft, in a nose up wings level attitude, crashed against sharply rising snow covered terrain. Examination of the aircraft revealed it was capable of normal operation prior to impact. It further showed that power had been reduced to idle before impact. The seriously injured pilot suffered amnesia relative to the accident.

PROBABLE CAUSE: (1) Pilot attempted to continue VFR flight in adverse weather conditions at an altitude too low to clear the terrain. (2) Adverse weather and conditions conducive to white out.

Nonrevenue Operations

6/21/61	1715 AST	Kodiak, Alaska	Kodiak Airways	Aeronca 7GCB	Substantial	None	2	0	0	2

While the float equipped plane was being taxied to the night storage area, the right float filled with water and the plane overturned and sank. Inspection revealed a puncture in the right float, the source of which was not determined.

PROBABLE CAUSE: Puncture of the right float in an undetermined manner.

International/Territorial Operators

Date	Time of Accidents	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M
Scheduled Passenger Service																
2/15/61	1635 HST	Nr. Honolulu, Hawaii	PAWA	B-707	None	None	111	0	0	11	0	1	99			

During descent from 27,000 feet about 128 miles from Honolulu, the aircraft encountered turbulence during which three passengers and two of the stewardess were injured. Investigation revealed that prior to the accident the flight had encountered air roughness sufficient to cause the pilots to turn on the "fasten seat belt" sign. The sign had been on for about 20 minutes. It was reported that none of the injured persons had their seat belts fastened and all but one was out of their seats when the severe, unexpected turbulence was encountered.

PROBABLE CAUSE: (1) Failure of the injured persons to comply with the "fasten seat belt" request.
(2) In-flight turbulence.

9/16/61	1301 PST	New York, N. Y.	PAWA	DC-8	Substantial	After Impact	133	0	0	9	0	0	124			

While in cruising flight to Bermuda from New York, the crew noted a loss of hydraulic pressure and fluid quantity. Adverse weather at destination prompted the decision to return and land at New York. During the landing roll after a normal approach and touchdown, the Captain applied reverse thrust. The aircraft immediately veered to the left off the runway. The Captain attempted directional corrective action with forward thrust from the left engine; however, the plane slid sideways shearing off the right main landing gear. Investigation revealed that the plane had veered off the runway because the Nos. 3 and 4 thrust reversers had not functioned properly resulting in forward thrust instead of reverse thrust. Examination disclosed this was caused by a deteriorated condition of the "O" ring seals in the Nos. 3 and 4 ejector systems which permitted the pressures to bleed off after the ejectors extended. The loss of pressure permitted the ejectors to slide forward disconnecting the bleed air connectors to the reverse thrust clamshell actuating mechanism. As a result the clamshells did not function and forward thrust occurred instead of reverse. Investigation also revealed that in executing the hydraulic failure checklist, the crew determined that the auxiliary hydraulic system pressure was within normal limits with no loss of fluid. Under this condition the emergency checklist called for return to the normal landing preparation checklist, discontinuing the

9/16/61 New York, N. Y. (Cont'd)

emergency items. This was not done and as indicated the emergency ejector extension system, which incorporated the faulty seals, was used. It was considered that the checklist could have been more definite as to where to pick up in the normal landing checklist; however, full knowledge of the systems should have prevented any difficulty. Examination showed that a leaking hydraulic pressure hose of the No. 3 jet engine caused the initial hydraulic pressure and fluid loss. Corrective measures taken in several respects should prevent recurrence of a similar accident.

PROBABLE CAUSE: (1) Unwanted asymmetrical reverse thrust resulting from malfunction of the Nos. 3 and 4 reversers caused by the deteriorated condition of the "O" ring seal in the Nos. 3 and 4 reverse ejector valves.
(2) Improper crew execution of the checklist established for the existing emergency condition.
(3) Faulty design features of the aircraft hydraulic systems.

10/11/61	0900	PST	Seattle, Wash.	Western	B-720B	Substantial	None	28	0	0	7	0	0	21

Shortly after the aircraft was airborne during takeoff, the tower controller noted an object fall from the aircraft. It was then determined that a section of cowling from the No. 1 engine had fallen off. The engine was shut down and the flight returned and landed. Investigation disclosed that prior to the flight, an inspection had been performed on the plane during which the subject cowling had been removed. Evidence indicated that when it was put back on, it had not been properly secured in that four of six latches were not securing the "U" bolt.

PROBABLE CAUSE: Improper security of the cowling attachments following maintenance inspection.

International/Territorial Operations

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
Scheduled Cargo Service																
2/18/61	0900 Local	Stuttgart and Nuremberg West Germany	PAA	DC-7C	Substantial	None	3	0	0	3						

When the flight arrived over Stuttgart, Germany from Frankfort, weather conditions at Stuttgart were as forecasted at the time of departure. These were; surface and vertical visibility 100 meters, fog. In addition, as reflected by current NOTAMS 1, 3, 4 and 5 crossbars of the approach lights were inoperative and the glide slop of the ILS was listed as unreliable because of airport construction. Under these conditions an ILS instrument approach was initiated to see if minima for the aircraft, ceiling 200 feet, visibility ½ mile, existed. The First Officer made the approach from his right seat position under supervision of the Captain who occupied the left seat. According to the crew when minima was reached the decision was made to discontinue the approach. As the missed approach procedures were started the aircraft hit a 10-foot high mound of earth located 66 feet short of the runway threshold and 149 feet north of the north edge of the runway. Impact tore off the landing gear and tore out the number 3 powerplant, however, control was maintained and the aircraft was flown to another airport and landed on the bottom of its fuselage on a foamed runway. Investigation of the accident revealed that the aircraft and ground instruments systems necessary to the proper execution and discontinuance of the instrument approach were capable of normal operation.

PROBABLE CAUSE: (1) Improperly executed instrument approach during which the aircraft was permitted to descend below obstructing terrain before initiating a missed approach.
(2) Inadequate supervision by the Captain.

8/3/61	2245 EST	New York, N. Y.	Eastern	L-1049C	Destroyed	After Impact	3	0	1	2						

While the aircraft was being taxied prior to takeoff, the right main landing gear suddenly collapsed. Fire broke out in the damaged side of the aircraft and the plane was burned beyond economical repair. Examination of the right landing gear assembly disclosed that the landing gear cylinder end cap assembly had failed. Laboratory examination of the failure showed it was caused by a fatigue crack that started at the root of the weld which joins the upper extension cap to the top of the main landing gear shock strut cylinder.

8/3/61 (Continued)

PROBABLE CAUSE: Fatigue failure of the upper cap weld of the right landing gear shock strut cylinder.

Nonscheduled Revenue - Military Contract

7/21/61	0211 BST	Shemya, Alaska	Alaska	DC-6	Destroyed	After Impact	6	6	0	0

At 0211, Bering Standard Time, on July 21, 1961, during the approach to a landing at Shemya, Alaska, an en route refueling stop, after descending through minimum weather conditions under the guidance of GCA, the aircraft crashed and burned approximately 200 feet short of the runway threshold on a course aligned with the runway. All six persons aboard the aircraft were crew members and all received fatal injuries. The red runway approach lights, the first four pairs of runway lights, and two of four green threshold lights were inoperative. This lighting deficiency was not observed or reported to the aircraft by those in charge of field lighting or by the GCA controller. The single strobe light, 152 feet short of the threshold, two of the green threshold lights, and the remainder of the runway lights were operating.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was the absence of approach and runway lights, and the failure of the GCA controller to give more positive guidance to the pilot during the last stages of his approach.

International/Territorial Operators

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
Nonscheduled Revenue - Military Contract																
11/13/61	1159 PST	Nr. Annette, Alaska	Northwest	DC-7C	None	None	101	0	0	6	0	2	93			

Over an area near Domestic Annette, Alaska during a flight from McCord AFB, Washington to Elmendorf AFB, Alaska the flight was cruising at 16,000 feet and about 1500 feet above a smooth top cloud cover. Under these circumstances the aircraft suddenly dropped to a lower altitude, bottomed with great force and then rose with equal suddenness to an altitude greater than before the occurrence. The sudden descent, abrupt deceleration and vertical ascent injured 5 passengers and two stewardesses. It did no damage to the aircraft. According to the crew the air was smooth before and after the occurrence. No existing synoptic weather condition was found to exist which would explain the occurrence.

PROBABLE CAUSE: Sudden adverse air condition.

Nonrevenue Operations

6/26/61	1601 EST	Miami, Florida	PAA	DC-6B	Substantial	None	5	0	0	5						

During the course of a crew training flight the crew was unable to extend the landing gear by either the normal or emergency methods. The plane was landed wheels up on a foamed runway. Investigation showed the normal gear extension had failed to function because of a fatigue failure of the shank portion of the turnbuckle of the uplock release cable. The emergency extension system would not function because a steel bolt was installed in the up latch assembly instead of an aluminum shear bolt.

PROBABLE CAUSE: (1) Fatigue failure of the landing gear up latch release cable.
(2) Installation of an improper bolt in the emergency landing gear system.

Supplemental Air Carriers

Passenger Service - Public

9/10/61	0252 GMT	Shannon, Ireland	President	DC-6	Destroyed	None	83	6	0	0	77	0	0

Approximately 1 and ½ minutes after takeoff, the aircraft crashed in the Shannon River. Heavy fog conditions existed during takeoff.

PROBABLE CAUSE: Investigation conducted by the Irish Government.

Passenger - Service - Military Contract

11/8/61	2124 EST	Richmond, Va.,	Imperial	L-049	Destroyed	After Impact	79	2	0	3	74	0	0

Over the vicinity of Richmond, Virginia during a flight from Baltimore, Maryland to Columbia, South Carolina the crew, as a result of fuel mismanagement allowed the Nos. 3 and 4 engines to run the No. 4 fuel tank dry. When they were unable to restart the two engines, they feathered the propellers and initiated landing at Richmond. As the flight approached the airport for an intended landing on runway 33, the Captain who was acting as copilot, without warning to the Captain in command, turned the aircraft to attempt a landing on runway 02 and put the landing gear selector in the down position. When the landing gear did not extend because of mismanagement of the hydraulic system under the existing conditions, a go-around, was attempted with only the Nos. 1 and 2 engines operating. During the go-around, which was poorly executed, the No. 1 engine failed as a result of overboosting. With one operating engine it was thereafter impossible to maintain flight. In the attempt to reach runway 33 the aircraft crashed and burned one-half mile to the left of the extended runway centerline and one mile short of the runway threshold.

PROBABLE CAUSE: The Board determines the probable cause of this accident was the lack of command coordination and decision, lack of judgment, and lack of knowledge of the equipment resulting in loss of power in three engines creating an emergency situation which the crew could not handle.

Supplemental Air Carriers

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
Cargo Service - Military Contract																
1/22/61	1509 CST	Nr. Katy, Texas	Capitol	C-46F	Destroyed	In Flight	2	2	0	0						

At an altitude of 2,500 feet during the en route phase of flight from San Antonio, Texas to Mobile, Alabama, an uncontrollable fire occurred in the left engine and nacelle. Eye witnesses reported the fire increased in intensity and the left engine burned off. Shortly thereafter, the left wing separated and the plane crashed. Investigation showed that the No. 8 cylinder of the left engine had separated because of fatigue failures of the hold down studs of the cylinder pad. Oil released from the engine was ignited and fire flowing rearward entered the wheel well. It burned through oil and fuel lines in this area greatly increasing the intensity of the fire. The fire burned off the engine and the wing. Evidence indicated emergency fire procedures had been used unsuccessfully.

PROBABLE CAUSE: Fatigue failure of the No. 8 cylinder hold down studs causing an uncontrollable in-flight fire.

6/25/61	2300 EST	Patrick AFB, Florida	U. S. Overseas	DC-4	Subst.	None	2	0	0	2						

During a left taxi turn following a normal landing, the pilots experienced a severe nosewheel shimmy and immediately thereafter the nose gear collapsed. Investigation revealed that nose gear trunnion attach castings had been torn out of the aircraft structure at each attach position. Failure occurred under inward and downward forces. Each of the two attach castings remained attached to the trunnion. Investigation further revealed that the attach bolt normally securing the nose gear right diagonal brace was missing. There was clear indication that the bolt had been out for an extended period. On this evidence it was reasoned that the missing bolt caused a lack of side load support permitting side movement to the right, eventually resulting in a shimmy which failed the structure to which the attach castings were secured.

PROBABLE CAUSE: The undetected loss of nose gear side brace attach bolt caused by inadequate maintenance and inspection.

Supplemental Air Carriers - Nonrevenue Operations

1/31/61	0030 EST	Miami, Florida	Associated Air Transport, Inc.	C-46N	Substantial	None	3	0	0	3

During a night landing simulating a hydraulic failure, the aircraft was landed wheels-up. Investigation disclosed that the landing gear functioned normally; the landing gear warning horn and lights were inoperative.

PROBABLE CAUSE: (1) Pilot failed to extend the landing gear prior to landing.
(2) Inadequate supervision by the check pilot.
(3) Inoperative condition of the landing gear warning system.

9/26/61	0308 EST	Norfolk, Va.,	Overseas National	DC-7	Substantial	After Impact	5	0	0	5

The aircraft was being ferried from New York to the Norfolk NAS for a troop movement flight from the Norfolk base. The trip was routine except both landing lights burned out after takeoff on preparation for landing, the crew found the flaps would not extend, the normal hydraulic pressure had been lost and the hydraulic quantity gauge indicated refill. The above indicated a normal system hydraulic failure. The flight held in the vicinity of the airport while the crew prepared for landing with a normal system hydraulic failure. The Captain, however, did not brief his crew on the technique he intended to use. Gear and flaps were extended using alternate means. Touchdown for landing on the 200-foot wide and 7,385-foot long runway occurred at 110 knots about 275 feet past the threshold lighted by emergency vehicles. Touchdown occurred near the runway centerline with the left main gear first. Within the next 1,400 feet, or about 10 seconds, the aircraft veered off the left side of the runway where it hit an embankment, shearing the nose and left main gears. The Captain reported that he had no brakes or nosewheel steering after touchdown and had used immediate reversal off all four propellers and maximum reversal of the Nos. 3 and 4 in an attempt to control the left swerve. Investigation revealed marks on the runway evidencing heavy left braking. It further revealed that nosewheel steering could not be expected under the emergency hydraulic configuration used. The company procedures for propeller reversal with hydraulic failure was to use Nos. 2 and 3 propellers with engines 1 and 4 at idle. It further specified that ample time, 9 seconds, be allowed for the propellers to move to reverse pitch and that the nosewheel be firmly on the ground when reverse power is applied. Investigation indicated these procedural conditions were not met. Investigation showed that extreme damage to the hydraulic system resulting from impact with the embankment precluded determination of the failure which caused the normal system hydraulic failure.

Supplemental Air Carriers - Nonrevenue Operations (Cont'd)

Date	Time of Accident	Location	Airline	Aircraft	Aircraft Damage	Fire	Total Aboard	Division of Injury: Crew F	Crew S	Crew M/N	Passengers F	Passengers S	Passengers M/N	Others F	Others S	Others M/N
9/26/61	(Cont'd)															

PROBABLE CAUSE: (1) Loss of directional control during the landing roll caused by improper use of propeller reversing and braking.
(2) The Captain's inadequate familiarity with the aircraft systems and procedures under normal system hydraulic failure.
(3) Failure of the hydraulic system for an undetermined reason.