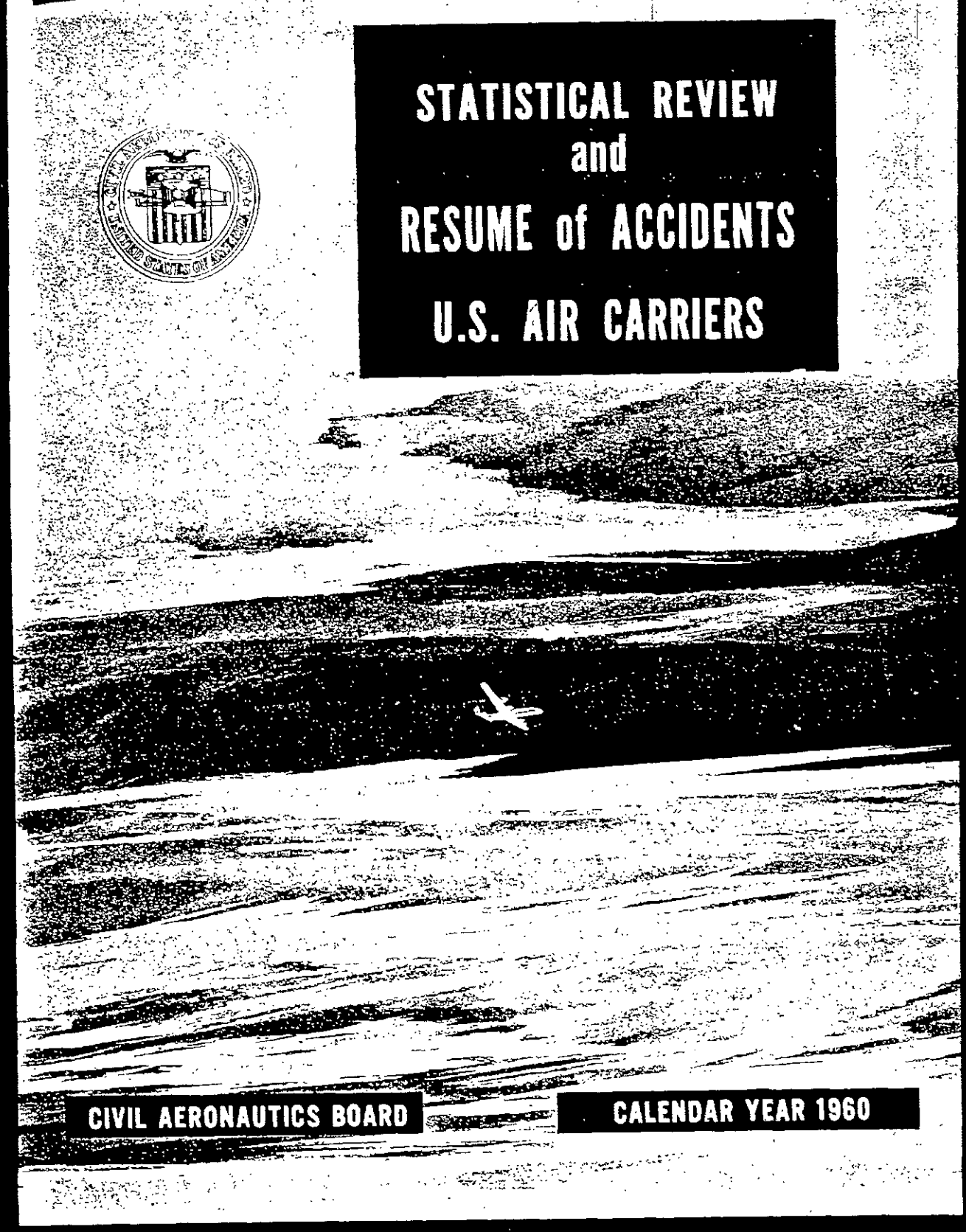
NOT REPRODUCIBLE

STATISTICAL REVIEW and RESUME of ACCIDENTS U.S. AIR CARRIERS



CIVIL AERONAUTICS BOARD

CALENDAR YEAR 1960

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 1960. 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.

In prior years the information contained in this publication has been furnished in two separate compilations. Statistical data was provided by the "Statistical Review, U. S. Air Carrier Accidents" while the descriptions of the various accidents were contained in a second publication titled "Resume of Accidents, U. S. Air Carriers, Rotorcraft and Large General Aviation Aircraft."

It is believed that the public would be better served by presenting all Air Carrier information in one single publication.

The General Aviation accident record which includes all accidents involving large and small fixed wing aircraft and rotorcraft is now published as a separate report, entitled "General Aviation Accidents, A Statistical Review".

Certain revisions and corrections have been incorporated in data dealing with years prior to 1960 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 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 1960.

9/7/60 Accra Ghana, Africa (fatal)
5/8/60 Lubbock, Texas (nonfatal)

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

This page intentionally left blank.

TABLE OF CONTENTS

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 result 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 cruising 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: Air carriers holding certificates of public convenience and necessity issued by the Civil Aeronautics Board to perform scheduled operations over specified routes. 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.

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 Sates 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 under International and Territorial.

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 - 1960

The 1960 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 Carrier during 1960 there were 90 aircraft accidents incident to flight, 17 of which were fatal accidents resulting in 499 fatalities. Following is a comparison of salient points with the previous year's record.

	1960	1959
TOTAL ACCIDENTS	90	101
Fatal Accidents	17	18
Involving Serious Injury Only	13	17
Involving Minor or No Injury	60	66
NUMBER AIRCRAFT DESTROYED	20	24
SUBSTANTIAL DAMAGE	56	64
FATALITIES - TOTAL	499	340
Passengers	429	271
Crew Members	57	61
Other Persons	13	8
MILES FLOWN - (Billions)	1.13	1.15
HOURS FLOWN - (Millions)	4.66	5.06
ACCIDENT RATES		
Per 1 Million Aircraft Miles	0.078	0.087
Per 100 Thousand Aircraft Hours	1.909	2.014

CERTIFICATED ROUTE CARRIERS

ALL OPERATIONS OF CERTIFICATED ROUTE CARRIERS

In 1960 the Certificated Route Carriers had 82 accidents in their total revenue and nonrevenue operations. Thirteen of these were fatal accidents resulting in 393 fatalities. The distrubution of accidents by type of operations was as follows:

Operation	Number Accidents Total	Number Accidents Fatal	Fatalities
Scheduled Passenger Service....	67	12	389
Scheduled Cargo Service.....	5	0	0
Nonscheduled Revenue Operations	3	0	0
Nonrevenue Operations			
Training.....	2	1	4
Other.....	5	0	0
Total All Operations.....	82	13	393

Miles - Hours Flown	
Miles Flown.....	1,077,745,000
Hours Flown.....	4,419,496

Accident Rates	Total Accidents	Fatal Accidents
Per 1 Million Aircraft Miles...	0.075	0.009
Per 100 thousand aircraft hours	1.832	0.226

SCHEDULED PASSENGER SERVICE

Revenue Passengers Carried.....	57.88 Million
Passenger Miles (revenue & nonrevenue)	40.48 Billion
Aircraft Miles Flown.....	946.38 Million
Passenger Fatality Rate:	
Per 100 Million Passenger Miles Flown	0.75
Accident Rate Per 1 Million Aircraft Miles	
Total Accidents.....	0.069
Fatal Accidents.....	0.009
Miles Flown Per Accidents.....	14.33 Million
Miles Flown Per Fatal Accident.....	105.15 Million

SUPPLEMENTAL AIR CARRIERS

ALL OPERATIONS OF SUPPLEMENTAL CARRIERS

In 1960, the Supplemental Air Carriers had 8 aircraft accidents. Four were fatal accidents resulting in 106 fatalities. These accidents occurred in the following types of operation.

Operation	Number Accidents Total	Number Accidents Fatal	Fatalities
Civil Operations:			
Passengers.....	1	1	22
Cargo.....	2	1	2
Military Operations:			
Passengers.....	2	1	80
Cargo.....	1	1	2
Training.....	1	0	0
Test.....	1	0	0
Total - All Operations.....	8	4	106

Miles - Hours Flown

Revenue Aircraft Miles Flown.....	49,668,039
Hours Flown.....	241,922

Accident Rates	Total Accidents	Fatal Accidents
Per 1 Million Aircraft Miles....	0.161	0.060
Per 100 Thousand Aircraft Hours.	3.306	1.240

PASSENGER OPERATIONS

The Supplemental Carriers had one fatal accident in their Civil passenger operations during 1960 which resulted in the death of 20 passengers and two crew members.

In their Military passenger operations, the Supplemental Carriers had 2 accidents. One was a fatal accident, resulting in the death of 73 passengers and 7 crew members.

Other pertinent statistics relating to passenger operations:

Type Operation	Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles
Civil.....	NA	671,094,000	2.98
Military....	NA	1,536,501,000	4.75
Total.....	1,057,933	2,207,595,000	4.21

ACCIDENT RATES
U. S. AIR CARRIERS
ALL OPERATIONS
1960

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.....	51	8	11	32	8	33	740,643,195	2,880,803	0.067	0.008	1.735	0.208
Local Service.....	10	2	1	7	1	7	97,826,789	622,871	0.102	0.010	1.605	0.160
Helicopter Carriers.....	4	1	0	3	1	3	2,337,159	32,476	1.711	0.427	12.316	3.079
All-Cargo Carriers.....	1	0	0	1	0	1	31,109,895	143,477	0.032	0.0	0.696	0.0
Subtotal.....	66	11	12	43	10	44	871,917,038	3,679,627	0.076	0.009	1.766	0.217
Intra-Alaska Carriers....	10	0	1	9	4	5	8,458,702	61,958	1.182	0.0	16.139	0.0
Intra-Hawaii Carriers....	0	0	0	0	0	0	7,523,430	40,361	0.0	0.0	0.0	0.0
Other Carrier	0	0	0	0	0	0	277,170	2,129	0.0	0.0	0.0	0.0
TOTAL DOMESTIC CARRIERS..	76	11	13	52	14	49	888,176,340	3,784,075	0.084	0.009	1.981	0.211
2. International/Territorial Carriers												
Passenger/Cargo Carriers..	6	2	0	4	3	3	180,556,753	597,513	0.033	0.011	1.004	0.334
All-Cargo Carriers.....	0	0	0	0	0	0	9,012,485	37,908	0.0	0.0	0.0	0.0
TOTAL INTERNATIONAL/TERR. CARRIERS	6	2	0	4	3	3	189,569,238	635,421	0.031	0.010	0.944	0.314
TOTAL-CERTIFICATED ROUTE AIR CARRIERS	82	13	13	56	17	52	1,077,745,578	4,419,496	0.075	0.009	1.832	0.226
SUPPLEMENTAL AIR CARRIERS												
1. Domestic												
Civil Operations.....	4	1	0	3	1	3	NA	NA	-	-	-	-
Military Contract.....	3	2	0	1	1	1	NA	NA	-	-	-	-
Subtotal.....	7	3	0	4	2	4	31,634,215	160,782	0.221	0.063	4.353	1.243
2. International												
Civil Operations.....	0	0	0	0	0	0	NA	NA	-	-	-	-
Military Contract.....	1	1	0	0	1	0	NA	NA	-	-	-	-
Subtotal.....	1	1	0	0	1	0	20,689,684	81,140	0.048	0.048	1.232	1.232
TOTAL-SUPPLEMENTAL AIR CARRIERS..	8	4	0	4	3	4	52,323,899	241,922	0.152	0.057	3.306	1.240
TOTAL-ALL OPERATIONS.....	90 a/	17 b/	13	60	20	56	1,130,069,477	4,661,418	0.078	0.011	1.909	0.278

NA - Not available.
a/ Includes 1 dynamite accident.
b/ Includes 1 dynamite accident and 3 midair collisions nonfatal to Air Carrier occupants.

ACCIDENT RATES
CERTIFICATED ROUTE AIR CARRIERS
REVENUE OPERATIONS
1960

CLASS OF CARRIER	Number of Accidents: Total	Injury Index: Fatal	Injury Index: Serious	Injury Index: Minor None	Aircraft Miles Flown	Aircraft Hours Flown	Number of Departures	Accident Rates: Total Accidents: 1 Million Miles	Total Accidents: 100,000 Hours	Total Accidents: 100,000 Departures	Fatal Accidents: 1 Million Miles	Fatal Accidents: 100,000 Hours	Fatal Accidents: 100,000 Departures
SCHEDULED SERVICE													
1. Domestic Carriers													
Trunk	48	7	10	31	712,787,341	2,784,941	2,303,053	0.065	1.687	2.040	0.007	0.179	0.217
Local Service	9	2	1	6	93,287,529	597,161	1,023,727	0.096	1.507	0.879	0.010	0.167	0.097
Helicopter Carriers	4	1	0	3	2,218,723	30,872	157,734	1.802	12.956	2.535	0.450	3.239	0.633
All-Cargo	1	0	0	1	8,726,746	38,947	14,010	0.114	2.567	7.137	0	0	0
Subtotal	62	10	11	41	817,020,339	3,451,921	3,498,524	0.074	1.767	1.743	0.008	0.202	0.200
Intra-Alaskan Carriers	4	0	0	4	6,630,110	47,596	82,571	0.603	8.404	4.844	0	0	0
Intra-Hawaii	0	0	0	0	5,614,109	31,693	49,158	0	0	0	0	0	0
Other	0	0	0	0	218,543	1,664	6,708	0	0	0	0	0	0
TOTAL DOMESTIC CARRIERS	66	10	11	45	829,483,101	3,532,874	3,636,961	0.078	1.839	1.787	0.008	0.198	0.192
2. International/Territorial Carr.													
Passenger/Cargo Carriers	5	2	0	3	162,582,943	530,511	211,590	0.030	0.942	2.363	0.012	0.376	0.945
All-Cargo Carriers	0	0	0	0	5,857,655	25,265	7,926	0	0	0	0	0	0
TOTAL INTERNATIONAL/TERR. CARR.	5	2	0	3	168,440,598	555,776	219,516	0.029	0.899	2.277	0.011	0.359	0.911
TOTAL- SCHEDULED SERVICE	71	12	11	48	997,923,699	4,088,650	3,856,477	0.070	1.712	1.815	0.009	0.220	0.233
NONSCHEDULED REVENUE SERVICE													
1. Domestic Carriers													
Trunk	0	0	0	0	4,175,500	17,376	7,330	0	0	0	0	0	0
Local Service	0	0	0	0	1,504,640	8,950	6,499	0	0	0	0	0	0
Helicopter Carriers	0	0	0	0	30,031	488	1,719	0	0	0	0	0	0
All-Cargo Carriers	0	0	0	0	20,787,160	98,273	30,154	0	0	0	0	0	0
Subtotal	0	0	0	0	26,497,331	125,087	45,702	0	0	0	0	0	0
Intra-Alaskan Carriers	4	0	1	3	1,346,408	10,362	14,412	2.970	38.602	27.754	0	0	0
Intra-Hawaii	0	0	0	0	1,065,811	4,100	778	0	0	0	0	0	0
Other	0	0	0	0	56,913	442	824	0	0	0	0	0	0
TOTAL DOMESTIC CARRIERS	4	0	1	3	28,966,463	139,991	61,716	0.138	2.857	6.481	0	0	0
2. International/Territorial Carr.													
Passenger/Cargo Carriers	0	0	0	0	10,233,843	41,838	14,773	0	0	0	0	0	0
All-Cargo Carriers	0	0	0	0	2,883,689	11,415	1,947	0	0	0	0	0	0
TOTAL INTERNATIONAL/TERR. CARR.	0	0	0	0	13,117,532	53,253	16,720	0	0	0	0	0	0
TOTAL-NONSCHEDULED SERVICE	4	0	1	3	42,083,995	193,244	78,436	0.095	2.069	5.099	0	0	0
GRAND TOTAL	75 a/	12 b/	12	51	1,040,007,694	4,281,894	3,934,913	0.071	1.728	1.880	0.008	0.210	0.228

Notes: a/ Includes 1 dynamite accident.
b/ Includes 2 midair collisions nonfatal to Air Carrier occupants.

ACCIDENT SUMMARY - VITAL STATISTICS
ALL U. S. AIR CARRIERS - ALL OPERATIONS - 1960

ITEMS	CERTIFICATED ROUTE CARRIERS					SUPPLEMENTAL CARRIERS				GRAND TOTAL
	Scheduled Passenger Service 1/	All Scheduled Services	Nonscheduled Revenue Operations	Nonrevenue Operations	All Operations	Public Passg./Cargo Operations	Military Contract Operations	Nonrevenue Operations	All Operations	
Accidents - Injury Index										
Fatal	12	12	0	1	13	1	3	0	4	17
Serious	11	12	1	0	13	0	0	0	0	13
Minor/None	44	48	2	6	56	1	1	2	4	60
Total	67	72	3	7	82	2	4	2	8	90
Aircraft Damage										
Destroyed	13	13	2	2	17	1	2	0	3	20
Substantial	41	46	1	5	52	1	1	2	4	56
Minor/None	13	13	0	0	13	0	1	0	1	14
Total	67	72	3	7	82	2	4	2	8	90
Fatalities										
Captain	10	10	0	1	11	1	2	0	3	14
Copilot	9	9	0	1	10	1	2	0	3	13
Flight Engineer	6	6	0	1	7	0	1	0	1	8
Cabin Attendants	17	17	0	0	17	0	3	0	3	20
Other Crew	0	0	0	1	1	0	1	0	1	2
Passengers	336	336	0	0	336	20	73	0	93	429
Non-occupants	11	11	0	0	11	0	2	0	2	13
Total	389	389	0	4	393	22	84	0	106	499
Serious Injuries										
Captain	0	0	1	0	1	0	0	0	0	1
Copilot	0	0	1	0	1	0	0	0	0	1
Flight Engineer	0	0	0	0	0	0	0	0	0	0
Cabin Attendants	5	5	0	0	5	0	0	0	0	5
Other Crew	0	0	0	0	0	0	1	0	1	1
Passengers	19	19	8	0	27	10	9	0	19	46
Non-occupants	0	0	0	0	0	0	0	0	0	0
Total	24	24	10	0	34	10	10	0	20	54

RECORD OF INDIVIDUAL TRUNK CARRIERS
SCHEDULED PASSENGER SERVICE

1960

Operators	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Other	Revenue Passengers Carried	Passenger-Miles 1/ (000)	Revenue Plane Miles	Departures
Trunk									
American Airlines.....	12	0	0	0	0	8,080,028	6,557,048	122,508,283	312,012
Braniff Airways.....	0	0	0	0	0	2,215,843	1,090,851	31,877,328	138,031
Capital Airlines.....	3	1	46	4	0	3,580,035	1,544,901	57,559,483	226,266
Continental Air Lines....	1	0	0	0	0	1,331,028	936,402	24,108,425	92,162
Delta Air Lines.....	2	0	0	0	0	3,347,084	1,898,302	45,447,423	179,436
Eastern Air Lines.....	10	2	59	3	1	7,642,288	4,170,504	113,812,958	478,785
National Airlines.....	1	1	29	5	0	1,610,725	1,055,905	24,137,914	91,719
Northeast Airlines.....	0	0	0	0	0	1,437,587	588,642	18,381,943	83,450
Northwest Airlines.....	5	2	65	10	0	1,842,257	1,389,628	33,267,519	92,345
Trans World Airlines.....	6 2/	1	39	5	6	4,931,975	4,685,510	87,197,245	195,898
United Air Lines.....	7 2/	1	77	7	0	7,524,623	5,556,393	109,054,949	293,878
Western Air Lines.....	0	0	0	0	0	1,656,920	986,927	23,504,659	80,216
Total.....	46	7	315	34	7	45,200,393	30,461,013	690,858,129	2,264,198

1/ Both revenue and nonrevenue.
2/ Includes midair collision 12/16/60 counted as one accident in total.

RECORD OF INDIVIDUAL LOCAL SERVICE (INCLUDING HELICOPTER CARRIERS)

SCHEDULED PASSENGER SERVICE

1960

Operator	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	2					668,146	134,958	8,517,346	86,673
Bonanza Airlines	0					257,719	68,298	4,554,843	35,473
Central Airlines	0					165,849	34,519	3,981,495	49,969
Frontier Airlines	0					335,092	96,020	9,260,612	92,947
Lake Central Airlines	0					226,172	36,985	3,685,556	52,335
Mohawk Airlines	1					576,923	118,804	6,240,172	60,763
North Central Airlines	1					959,080	180,027	14,389,774	175,208
Ozark Airlines	1					553,382	101,551	9,007,585	102,668
Pacific Airlines	0					451,472	106,906	6,117,367	58,946
Piedmont Aviation	1	1			4	451,100	98,383	7,046,096	83,712
Southern Airways	1					256,680	49,104	5,660,557	64,997
Trans-Texas Airways	2	1		1		302,961	72,510	8,006,409	85,656
West Coast Airlines	0					386,711	101,409	6,819,717	74,380
Subtotal	9	2	0	1	4	5,591,287	1,199,474	93,287,529	1,023,727
Helicopter Service									
Chicago Helicopter Airways.	1	1	11	2		309,107	5,400	905,520	61,261
Los Angeles Airways	2					39,140	1,388	493,531	28,147
New York Airways	0					142,021	3,042	423,450	32,948
Subtotal	3	1	11	2		490,268	9,830	1,822,501	122,356

1/ Both Revenue and Nonrevenue.

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

1960

Operators	Accidents		Fatalities			Revenue Passengers Carried	Passenger-miles 1/ (000)	Revenue Plane Miles	Departures
	Total	Fatal	Passg.	Crew	Other				
Intra-Alaska									
Alaska Coastal Airlines....	0	0	0	0	0	59,028	6,092	1,097,691	18,330
Cordova Airlines.....	0	0	0	0	0	10,941	2,085	355,846	4,136
Ellis Airlines.....	1	0	0	0	0	58,528	3,739	823,091	19,699
Kodiak Airways.....	1	0	0	0	0	513	21	9,286	374
Munz Airways (Howard J. May)	1	0	0	0	0	NA	NA	NA	NA
Northern Consolidated Airlines	1	0	0	0	0	22,270	7,697	1,254,393	12,550
Reeve Aleutian Airways.....	0	0	0	0	0	13,622	13,917	988,036	4,441
Western Alaska.....	0	0	0	0	0	5,305	264	195,570	5,679
Wein Alaska Airlines.....	0	0	0	0	0	30,426	11,887	1,906,197	17,362
Total.....	4	0	0	0	0	200,633	45,702	6,630,110	82,571
Intra-Hawaii									
Aloah Airlines.....	0	0	0	0	0	499,156	56,370	2,416,029	20,699
Hawaiian Airlines.....	0	0	0	0	0	357,903	77,504	2,657,162	23,917
Total.....	0	0	0	0	0	857,059	133,874	5,073,191	44,616

1/ Both revenue and nonrevenue.

RECORD U. S. INTERNATIONAL/TERRITORIAL CARRIERS
SCHEDULED PASSENGER SERVICE

1960

Operators	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Others	Revenue Passengers Carried	Passenger Miles 1/ (000)	Revenue Plane Miles	Departure
Alaska Airlines.....	2					51,193	37,593	2,161,229	12,386
American Airlines.....						111,088	125,489	2,589,111	3,357
Braniff Airways.....						65,307	141,255	3,257,148	3,278
Caribbean Atlantic Airlines						384,865	27,270	1,469,988	21,612
Delta Air Lines.....						27,573	40,737	1,363,870	2,059
Eastern Air Lines.....						489,493	731,922	11,819,130	8,236
Mackey Air Transport.....						122,723	22,019	786,109	9,505
National Air Lines.....						29,773	24,981	597,190	979
Northwest Airlines.....	1	1	1			183,896	334,476	11,612,543	9,601
Pacific Northern Airlines..	1	1	9	5	0	119,019	120,461	4,390,894	10,568
PAWA (All Divisions).....	1					3,085,891	5,007,142	76,969,338	90,812
Pan American Grace Airways.						124,335	210,600	4,679,308	6,326
South Pacific.....						1,688	5,215	209,360	78
Trans World Airlines.....						347,921	1,094,216	16,320,985	11,442
Transportation Corp. of America						134,305	209,083	2,763,431	1,837
United Air Lines.....						162,402	414,126	5,192,354	2,091
Western Air Lines.....						53,386	86,570	2,308,632	1,483
Total.....	5	2	10	5	0	5,494,858	8,633,155	148,490,620	195,650

1/ Both revenue and nonrevenue.

RECORD OF INDIVIDUAL SUPPLEMENTAL AIR CARRIERS
PASSENGER OPERATIONS (CIVIL AND MILITARY)
1960

OPERATORS	CIVILIAN SERVICES						MILITARY-CONTRACT OPERATIONS						Aggregate 2/ Number of Passengers Carried	3/ Total 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			20,098	258,129	-				13,481	306,595			24,688	3,061
American Flyers			7,440	230,115					20,358	449,740			31,719	3,313
Arctic-Pacific	1	1	4,713	148,824	20	2			3,178	113,881			9,614	1,591
Argonaut Airways			-	101,443					-	-			-	574
Associated Air Transport, Inc.			3,034	167,456			1	0	19,714	570,348			26,330	4,207
Aviation Corp. of Seattle, d/b/a Westair Transport			7,846	42,324									529	271
Blatz Airlines			6,490	243,695					523	21,915			28,748	2,167
Capitol Airways			70,985	953,588					85,089	13,408,015			67,627	73,656
Central Air Transport			3,017	66,878					9,791	221,202			13,990	1,682
Coastal Air Lines			-	5,197					-	-			-	27
Conner Air Lines			-	-					-	-			-	-
Currey Air Transport			106,908	1,243,566					408	8,635			62,778	5,036
Great Lakes Airlines			97,727	1,077,663					-	-			53,880	4,121
Imperial Airlines			9,285	255,300					7,480	245,288			17,972	3,201
Johnson Flying Service			1,086	630,382					-	-			5,339	4,787
Mantz Air Services, Paul			-	1,200					-	-			-	9
Miami Airlines			799	36,686					5,489	141,046			8,726	1,361
Modern Air Transport			15,707	468,252					6,970	247.160			22,092	4,207
Overseas National Airways			10,269	69,788					1,101,665	12,221,427			213,064	48,699
President Airlines			2,018	39,290					2,791	82,888			5,218	797
Quaker City Airways			-	33,240					-	-			-	169
Roberts, Vance d/b/a Vance Int. Airways			-	-					-	-			-	-
Saturn Airways			20,072	539,521					10,375	342,586			28,466	5,681
Sourdough Air Transport			545	40,810					-	-			1,739	265
Southern Air Transport			2,735	640,271					19,042	438,141			20,366	5,886
S. S. W., Inc. d/b/a Universal			-	-					-	-			-	-
Standard Airways			6,263	132,828					-	-			2,522	530
Stewart Air Service			10,706	331,804					-	-			119,275	2,541
Trans-Alaskan Airlines			124,564	1,661,918					5,378	112,060			86,660	8,132
Trans-International			41,420	580,102					54,387	658,275			32,797	5,361
Transocean Air Lines			4,602	175,711					-	-			3,362	1,049
United States Overseas			83,185	2,042,221					107.258	4,358,369			149,755	33,132
World Airways			343	7,356			1	1	61,306	3,325.276	73	7	13,989	15,767
World Wide			9,237	140,884					1,813	28,750			6,688	642
Total	1	1	671,094	12,366,442	20	2	2	1	1,536,501	37,301,597	73	7	1,057,933	241,922

1/ Includes miles flown in cargo operations.
2/ Breakdown between civil and military-contract services 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 causes nor the conditions that contributed thereto.

The table on page 14 shows the types of all the accidents during 1960 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 - 1960

PHASE OF OPERATION	NO.	PERCENT
Ground (Static).....	5	5
Taxi.....	10	11
Takeoff.....	15	16
Enroute.....	19	21
Landing.....	43	47
Total.....	92 a/	

Frequency - Accident Types - 1960

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

TYPE	NO.	PERCENT
Collision Objects.....	14	15
Gear Collapse.....	9	10
Turbulence.....	9	10
Ground/Waterloop.....	7	8
Collision Aircraft - Both Airborne	5	5
Stall.....	5	5
Gear Retracted.....	5	5

a/ Includes 2 propeller to person accidents.

ACCIDENT TYPES

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

Midair Collisions

There were 5 midair collisions in 1960 involving Air Carrier aircraft, 3 of which were fatal. Only one of the three fatal accidents was fatal to Air Carrier occupants.

Turbojets

There were 11 accidents involving turbojet aircraft during 1960. Two of these accidents were fatal. One involved a midair collision with another air carrier and the other occurred during training operations.

Dynamite Explosion

There was one fatal accident caused by a dynamite explosion. This accident resulted in the death of 29 passengers and 5 crew.

Ditching

There was one fatal accident involving a ditching. One passenger died as a result of shock and/or exposure, while the other 57 occupants escaped with minor or no injury.

Helicopter Accidents

There was one fatal helicopter accident in scheduled passenger operations in which 11 passengers were fatally injured.

Training Operations

Three accidents, one fatal, occurred in crew training operations. Two fatal accidents occurred in a turbojet aircraft and the remaining two, nonfatal, occurred in piston aircraft.

Turbulence/Evasive Maneuver

There were ten accidents in this category. This type of accident usually involves serious injury to passengers and/or crew with little or no damage to aircraft.

NOT REPRODUCIBLE

TYPE OF ACCIDENT VS. OPERATIONAL PHASE
U.S. AIR CARRIERS
ALL OPERATIONS
1960

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	TOUCHDOWN	ROLL	GO-AROUND	TOTAL
Ground (water) Loop							1		1									5		7
Wing Tip Landing																				0
Landed Wheels-Up																		2	1	3
Landed Wheels Down (water)																		1		1
Gear Collapsed				2	1												1	5		9
Gear Retracted																		4	1	5
Hard Landing															1	2				3
Nose down																		1		1
Nose Over (inverted)																		2		2
Undershoot														1						1
Overshoot																				0
COLLISION AIRCRAFT																				
Both Airborne													2	3						5
One Airborne																				0
On Ground					3															3
Collision - Ground							1				2									3
Collision - Rising Terrain								1			1	1								3
Collision - Water														1						1
COLLISION OBJECTS																				
Wires-Poles					1								1							2
Runway or Approach Lights																				0
Trees																			1	1
Fences																	1	1		2
Residences																				0
Other Buildings																		1		1
Electronic Towers																				0
Airport Hazards																		2		2
Other					3		2											1		6
Evasive Maneuver											1									1
Stall								4						1						5
Mush																				0
Fire on Ground	2																			2
Fire In Flight								2		1	1									4
Airframe - Ground							2	0												2
Airframe - Air											2		1							3
Engine Tearaway																				0
Turbulence										1	6	2								9
Hail																				0
Lightning																				0
Decompression																				0
Main Rotor Hit Tail		1																		1
Propeller Accident To Person		1	1																	2
Propeller Failure																				0
Other										1	1									2
TOTAL	2	2	1	2	8	0	6	7	1	1	2	14	3	4	6	1	4	25	3	92

ACCIDENTS BY TYPE OF AIRCRAFT

CERTIFICATED ROUTE AIR CARRIERS

Following is a resume of the accident involvement of the different categories of aircraft in revenue operations. Accident rates per 100,000 hours of 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 4 accidents involving helicopters, one of which was fatal.

Single Engine Aircraft: There were 4 nonfatal accidents, all in Intra-Alaskan operations, involving small fixed-wing aircraft.

Piston Type Aircraft: The various makes and models of this category were involved in 45 accidents. Seven of these were fatal.

Turboprop Aircraft: There were 13 accidents in which turboprop aircraft were involved. Four of these were fatal accidents.

Turbojet Aircraft: The turbojet aircraft were involved in 10 accidents, one of which was fatal. The fatal accident was a midair collision involving another Air Carrier.

Aircraft Category	Revenue Hours Flown	Accidents		Accident Rates Per 100,000 Hours	
		Total	Fatal	Total	Fatal
Helicopters.....	31,360	4	1	12.755	3.188
Piston Engine - Single Engine	23,296	4	0	17.170	0
Piston Engine*.....	3,244,399	45	7	1.356	0.154
Turboprop Aircraft*.....	589,129	13	4	2.206	0.509
Turbojet Aircraft*.....	393,710	10	1	2.539	0.253
Total.....	4,281,894	75	13	1.728	0.233

* Two or more engines.

27

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 90 accidents in the overall operations of the air carriers in 1960. 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 90 accidents.

Broad Categories of Causal Factors	Number of Accidents in Which Each Category was Involved	
	Total Number Accidents	Number in Which No Other Causal Category was Involved
Pilot Personnel.....	47	10
Other Personnel.....	24	6
Weather.....	25	11
Powerplant.....	11	5
Landing Gear.....	11	7
Equipment/Accessories.....	2	0
Airframe.....	1	1
Rotor - Main.....	1	1
Airport/Terrain.....	14	2
Miscellaneous:		
Evasive maneuver.....	1	0
Collision birds.....	1	1
Other.....	1	0

DETAILED LISTING OF INDIVIDUAL CAUSAL FACTORS

All of the separate, individual causal factors found to exist in Air Carrier accidents are detailed below:

PILOT

Misuse, engine controls	4
Misuse, propeller controls	3
Misuse, brakes, ground	1
Misuse, flight controls, ground	3
Premature gear retraction	3
Failed to extend gear	1
Failed to retract gear	1
Inadvertent gear retraction	3
Misjudged distance	5
Levelled off to high	1
Failed to observe aircraft	1
Failed to observe objects	2
Failed to maintain flying speed	2
Selected unsuitable terrain	3
Not aligned with runway	3
Improper IFR operation	4
Improper pre-flight planning	2
Inadequate pre-flight inspection	1
Improper in-flight planning	6
Cont'd VFR into unfavorable weather	2
Cont'd IFR below minimums	1
Improper training, supervision	5
Misuse, cyclic pitch controls, ground	1
Inattentive fuel supply	1
Other	2

OTHER PERSONNEL:

Inadequate maintenance-inspection	1
Improper operation ground facilities	1
Improper training, supervision, ground	2
Co-pilot	8
Other	13

POWERPLANT

Fuel system	1
Engine structure	3
Prop. and prop. accessories	2
Engine accessories	3
Thrust reverse doors	1
Ignition system	1

AIRFRAME

Wings	1

LANDING GEAR

Main gear	8
Nose gear	1
Brakes	1
Tires	1

EQUIPMENT AND ACCESSORIES

Electrical equipment	1
Hydraulic system	1

ROTOR

Main	1

WEATHER

Low ceiling	6
Fog	2
Snow	4
Icing conditions	2
Unfavorable wind conditions, takeoff and landing	2
Turbulence in flight	10
Other	2

AIRPORT TERRAIN

Wet	3
Snow	4
Rough - rolling	1
Hidden hazard	2
Other	4

MISCELLANEOUS

Bird collision	1
Evasive maneuver	1
Other	1

TABLE I

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

1949 - 1960

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 a/	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 b/	1,130,069,000	.078	.011	429	57	13	499

a/ Includes 1 midair collision nonfatal to Air Carrier occupants.
b/ Includes 3 midair collisions nonfatal to Air Carrier occupants.
These accidents (footnotes a/and b/ are excluded in computation of fatal accident rates.
Accident rates exclude dynamite accidents; 11/1/55, 7/25/57, 1/6/60.

TABLE 2

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

1949 - 1960

Year	Number of Accidents		Aircraft Miles Flown	Accident Rates Per 1 Million Miles Flown		Fatalities			
	Total	Fatal		Total Accidents	Fatal Accidents	Passg.	Crew	Other	Total
1949.....	73	10[a]	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[b]	1,077,745,000	.075	.009	336	46	11	393

a/ Includes 1 midair collision nonfatal to Air Carrier occupants.
b/ Includes 2 midair collisions nonfatal to Air Carrier occupants.
These accidents (footnotes a/and b/) are excluded in computation of fatal accident rates.
Accident rates exclude dynamite accidents; 11/1/55, 7/25/57, 1/6/60.

TABLE 3

ACCIDENTS, ACCIDENT RATES
CERTIFICATED ROUTE AIR CARRIERS
ALL SCHEDULED SERVICE
1949 - 1960

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	463,198,100	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	2.464	.500	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 a/	997,923,699	4,088,650	3,856,477	.071	.009	1.736	.220	1.841	.233

NOTE: Fatality rates exclude passenger deaths occurring in dynamite accidents:
11/1/55 - Longmont, Colo. - 39 passengers and 5 crew fatalities.
7/25/57 - Daggett, Calif. - involving suicide of 1 passenger.
1/6/60 - Bolivia, N. C. - 29 passengers and 5 crew fatalities.

a/ Includes 2 midair collisions nonfatal to air carrier occupants. These 2 accidents excluded in computation of fatal accident rates.

TABLE 4

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

1949 - 1960

Year	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Total	Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles
1949.....	50	8 a/	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 b/	336	42	378	57,886,566	40,484,908,000	0.75

Fatality rates exclude passenger deaths occurring in dynamite accidents. 11/1/55 - 39 passengers, 7/25/57 - 1 passenger, 1/6/60 - 29 passengers.

a/ Includes 1 midair collision nonfatal to Air Carrier occupants.

b/ Includes 2 midair collisions nonfatal to Air Carrier occupants.

TABLE 5

ACCIDENTS, FATALITIES, FATALITY RATES
U. S. CERTIFICATED ROUTE AIR CARRIERS
SCHEDULED DOMESTIC PASSENGER SERVICE
1938 - 1960

Year	Accidents Total	Accidents Fatal	Fatalities Passg.	Fatalities Crew	Fatalities Total	Passengers Carried	Passenger-Miles Flown	Passenger Fatality Rate Per 100 Million Passenger-Miles Flown
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 a/	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 b/	326	37	363	52,391,708	31,851,753,000	0.93

Fatality rates exclude passenger deaths occurring in dynamite accidents. 11/1/55 - 39 passengers, 7/25/57 - 1 passenger, 1/6/60 - 29 passengers.

Note: Effective 1959, Intra-Alaska operations are carried under Domestic operations.
a/ Includes 1 midair collision nonfatal to Air Carrier occupants.
b/ Includes 2 midair collisions nonfatal to Air Carrier occupants.

TABLE 6

ACCIDENTS, FATALITIES, FATALITY RATES
U.S. CERTIFICATED ROUTE AIR CARRIERS
SCHEDULED INTERNATIONAL/TERRITORIAL PASSENGER SERVICE
1938 - 1960

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 a/	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

Effective 1959, all States-Alaska operations of the Alaskan Air Carriers are carried as International/Territorial operations.

a/ Midair collision, nonfatal to Air Carrier occupants.

TABLE 7

ACCIDENTS, ACCIDENT RATES AND FATALITIES
SUPPLEMENTAL AIR CARRIERS
ALL OPERATIONS

1949 - 1960

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 b/	0.852	0.383	104	16	6	126
1950.....	18	3	34,113,000 b/	.527	.087	29	1	0	30
1951.....	24	5	44,732,000 b/	.536	.111	78	12	0	90
1952.....	10	2	51,760,000 b/	.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 a/	52,324,000	.172	.057	93	11	2	106

a/ Includes 1 midair collision nonfatal to Air Carrier occupants. This accident excluded in computation of fatal accident rate.
b/ Revenue miles only.

TABLE 8

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

1949 - 1960

Year	Accidents		Fatalities				Revenue Passengers Carried	Revenue Passenger Miles (000)	Passenger Fatality Rate Per 100 Million Passenger Miles
	Total	Fatal	Passg.	Crew	Other	Total			
1949.....	15	6	104	9	5	118	NA	581,708	17.87
1950.....	13	2	29	0	0	29	NA	769,765	3.76
1951.....	17	3	76	7	0	83	630,590	1,069,497	7.10
1952.....	3	1	26	3	0	29	695,335	1,251,685	2.07
1953.....	13	5	141	20	0	161	724,014	1,256,911	11.21
1954.....	4	1	9	1	0	10	695,152	1,243,030	0.72
1955.....	5	2	27	3	1	31	788,783	1,395,682	1.93
1956.....	0	0	0	0	0	0	663,603	1,003,261	0
1957.....	2	0	0	0	0	0	535,248	767,287	0
1958.....	2	0	0	0	0	0	676,072	1,152,988	0
1959.....	5	1	1	2	0	3	895,518	1,629,556	0.06
1960.....	3	2	93	9	0	102	1,057,933	2,207,595	4.21

Section II

RÉSUMÉ OF ACCIDENTS

DESCRIPTION OF AIR CARRIER ACCIDENTS

Domestic Operators - Certificated Route Air 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	Other F	Other S	Other M
1/3/60	0143 EST	Philadelphia, Pa.	Eastern	L-749	Substantial	None	51	0	0	5	0	0	46			

While on a regularly scheduled flight from Boston, Mass., to Washington, D. C., with several en route stops including Philadelphia and Baltimore, weather conditions at Baltimore, and wind conditions at Washington, precluded landings at either airport and the flight returned to Philadelphia. The landing at Philadelphia was without incident; however, during a turn while taxiing to the terminal the right main landing gear collapsed. Examination of the right landing gear disclosed a material failure of the gear strut cylinder.

PROBABLE CAUSE: Fatigue failure of landing gear strut cylinder.

1/4/60	0418 EST	Washington, D. C.	Eastern	L-749	Substantial	None	65	0	0	5	0	0	60			

While cruising over the vicinity of Wilmington, N. C. on a scheduled flight from Miami to New York with an en route stop at Washington, the crew experienced a loss of secondary hydraulic pressure and fluid. The Nos. 3 and 4 hydraulic pumps were promptly disconnected and the flight continued to Washington, D. C. Before reaching Washington the landing gear and flap were extended manually and all warning devices indicated the gear was down and locked. Emergency precautions were taken in the aircraft and ground rescue facilities were alerted. The right main landing gear collapsed shortly after touchdown. There were no reported injuries. Investigation indicated a fatigue failure of the right landing gear strut cylinder. The secondary hydraulic system failure was not related to the cause of the accident.

PROBABLE CAUSE: Fatigue failure of the right landing gear strut cylinder causing collapse of the right gear.

1/6/60	0238 EST	Bolivia, N. C.	National	DC-6B	Destroyed	None	34	5	0	0	29	0	0

N-8225H departed New York for Miami, Florida as one of two aircraft substituted for a Boeing 707 aircraft which was regularly assigned to the flight but incurred mechanical difficulty. The DC-6B flight was uneventful until it reached the vicinity of Bolivia, North Carolina, where the aircraft disintegrated in flight. Portions of the aircraft fell near Kure Beach and the major wreckage fell about 13 miles west of Kure Beach. Investigation of the accident revealed the in-flight breakup was initiated by a dynamite explosion which was detonated by means of dry cell batteries. The explosion occurred in the vicinity of the right seat of seat row 7.

PROBABLE CAUSE: The detonation of dynamite within the passenger cabin.

1/18/60	2219 EST	Mr. Charles City, Virginia	Capital	Viscount	Destroyed	After Impact	50	4	0	0	46	0	0

While enroute from Washington, D. C. to Norfolk Virginia, the aircraft crashed and burned near Charles City, Virginia. Investigation indicated a delayed arming of the engine ice protection systems while flying through icing conditions, causing eventual power failure of the four engines. Successful attempts had been made to relight Nos. 3 and 4 engines when the aircraft crashed.

PROBABLE CAUSE: The delayed arming of the engine ice protection systems while flying in icy conditions, resulting in the loss of engine power and attendant electrical energy required to unfeather propellers and relight sufficient engines to maintain flight.

1/25/60	0925 MST	Boulder, Colo.	United	DC-7	None	None	26	0	0	5	0	1	20

While cruising at 20,000 feet in clear air, a sharp sudden gust was encountered. A passenger seated in the aft lounge with his seat belt unfastened was thrown about suffering a fractured vertebra. He was hospitalized upon arrival at Salt Lake City.

PROBABLE CAUSE: Turbulence in flight.

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
2/4/60	0450 CST	New Orleans, La.	Eastern	L-188A	Substantial	None	67	0	0	5	0	0	62			

On arrival over New Orleans, a scheduled en route stop, the flight was cleared to hold at 4,000 feet until surface visibility which was restricted by fog increased to the ½ mile minimum for landing; visibility at flight altitude was unlimited. The flight was subsequently advised that visibility had increased to ½ mile and it was cleared for an ILS localizer approach to runway 10. The crew indicated that a straight-in ILS approach was commenced and the approach was VFR with the runway lights along the full length of the runway in sight until just before touchdown. At this time visibility decreased in ground fog, although enough runway lights remained visible to align with the runway. The crew stated the touchdown was to the left of the runway center line after which the aircraft started to veer to the left although brakes, nose wheel steering and differential reversing were used in an unsuccessful attempt to regain the center of the runway. The aircraft veered off runway 10, crossed runway 5-23 and came to rest mired in mud just off the right side of the latter runway. The location was also approximately 260 feet north of runway 10-28. An examination of the runway and adjacent areas indicated the aircraft touched down with the right main landing gear on the runway and the left main landing gear on the soft muddy ground approximately 3 feet off the left side of the runway. The left main gear tire track showed the left gear only was off the runway until about 230 feet from the intersection of runways 10-28 and 5-23 where the nose gear also left the runway.

PROBABLE CAUSE: The pilot failed to properly align the aircraft with the runway prior to landing in fog-restricted visibility.

2/9/60	1504 CST	Tulsa, Okla.	Continental	Viscount - 812	Substantial	None	32	0	0	3	0	0	9

The flight between Oklahoma City, Oklahoma, and Denver, Colorado, was routine until landing at Tulsa, Oklahoma, an en route stop. The pilots indicated that a severe gust or series of gusts caused the right wing to drop and the aircraft to yaw abruptly to the left. With only partial control the aircraft then veered off the left side of the runway with resultant damage to the No. 4 propeller, the nose wheel and one left main tire. Surface winds at the time of the accident were southwest at 20 knots with gusts to 30 knots.

PROBABLE CAUSE: Loss of directional control during landing in a gusty surface wind condition.

2/13/60	1408 EST	Washington, D. C.	Eastern	L-1049C	Substantial	None	38	0	0	5	0	0	33

The pilots initiated the take-off roll and the aircraft had reached about 90 knots, 2,500 feet down the wet and slushy runway when the zone one and master fire warning indicators actuated. The pilots aborted the take-off but because of poor braking on the wet and slushy runway the plane could not be stopped on the remaining runway without a ground loop. Side loads during the right ground loop failed the left main landing gear. Investigation disclosed the exhaust manifold was broken loose at the "Y" connection for Nos. 13 and 15 cylinders at the swivel ball joint leading to the No. 2 power recovery turbine. Exhaust deposits were found on the fire seal and fire detector unit aft of the No. 2 power recovery turbine.

PROBABLE CAUSE: Failure of the exhaust manifold causing a fire warning necessitating an aborted take-off on a wet and slushy runway which afforded inadequate braking to stop the aircraft in the remaining distance.

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
2/19/60	0117 EST	Utica, N. Y.	Mohawk	CV-440	Substantial	None	27	0	0	3	0	0	24			

The regularly scheduled flight from Newark, New Jersey, to Utica, New York, was routine until the landing at Utica. There, following touchdown slightly left of the runway centerline, the aircraft veered to the left side of the runway where the No. 1 propeller struck a snowbank of plowed snow about four feet high. Impact tore the propeller and nose section from the engine. Investigation showed the landing was made after an instrument approach in weather conditions which were: ceiling, 400 feet; visibility, one and one-half miles in rain, snow and fog; and a surface cross wind of 11 knots. Also there was about one inch of snow covering the wet runway. The pilot indicated that reverse thrust was used after touchdown at which time the aircraft began to slide to the left and weather-cock to the right. The pilot attempted to correct the condition with right reverse, rudder, brake and nose wheel steering; however, the action was not effective before the propeller struck the snowbank.

PROBABLE CAUSE: (1) Pilot lost directional control during landing in adverse weather and runway condition.
(2) Questionable judgment of the pilot in using right reverse as the aircraft was sliding to the left and weather-cocked to the right.

2/25/60	2125 CST	Chicago, Ill.	American	L-188	Substantial	None	27	0	0	5	0	0	22			

The flight was a first class passenger flight from LaGuardia Field, New York to Lambert Field, St. Louis, Missouri with an intermediate stop at Midway Airport, Chicago. Immediately after becoming airborne at Midway Airport a severe jolt or thud was felt which was of sufficient magnitude to open the galley aprons. The gear and flaps operated normally and there was no unusual vibration. Investigation at St. Louis revealed that the aircraft had incurred substantial structural damage. Further investigation revealed that the aircraft had collided with a mound of snow on the runway, during the take-off at Midway Airport. The mound of snow tapered from a height of 36 inches and was 5 to 6 feet wide, and approximately 35 feet long. Weather at the time of take-off at Midway Airport was; measured 1,300 feet overcast, visibility 3 miles with light snow and a temperature of 29 degrees.

PROBABLE CAUSE: (1) Accumulation of ice and snow on the runway.
(2) Darkness and reduced visibility, caused by snow showers.

2/25/60	1011 CST	Chicago, Ill.	Delta	CV-440	Substantial	None	24	0	0	3	0	0	21

The flight entered VFR weather conditions shortly after passing the outer marker inbound for landing at Chicago and made a left circling approach to runway 4R. During the approach and ensuing landing, the first officer flew the aircraft from the right seat and because of the choppiness of the air the captain handled the power to maintain airspeed. An airspeed of 120 knots was maintained on the final approach, 110 knots over the fence and 105 knots over the runway boundary lights and as the aircraft passed over the runway, the captain reduced power to zero thrust. At this time, the aircraft settled rapidly to the runway and a hard landing occurred. The captain immediately applied power, took control of the plane and completed the landing. Reverse thrust was applied and all appeared normal; however, on completion of the roll-out, it was noted the the left wing was lower than normal. Hydraulic pressure was fluctuating and the engines were shut down. Braking became ineffective as the hydraulic pressure dropped to zero and the left wing continued to settle until the No. 1 propeller struck the ramp surface. The weather as taken shortly after the accident was: Measured 1,800 overcast, 3 miles visibility with light and blowing snow; wind ENE at 20 knots, with gusts to 33 knots.

PROBABLE CAUSE: (1) Failure of the pilots to maintain sufficient airspeed during landing in a gusty surface wind resulting in an excessive rate of sink and hard landing.
(2) Lack of coordination between the first officer handling the flight controls and the captain handling the power controls.

2/26/60	2215 EST	Erie, Pa.	Allegheny	M-202	Substantial	None	16	0	0	3	0	0	13

The flight was a regularly scheduled passenger flight between Philadelphia, Pennsylvania and Cleveland, Ohio, with several intermediate stops and was uneventful until a take-off at Erie, Pennsylvania, one of the intermediate stops. The take-off roll was started on the centerline, but with the aircraft lined up slightly left of the runway heading. During the take-off run the aircraft veered to the left side of the runway and the landing gear struck a snowbank. Shortly after contact, the nose wheel collapsed and the aircraft continued to a stop, resting on its nose and main landing gear at a location approximately 50 feet off the south side of the runway and 1,500 feet west of where the take-off run was started. The take-off was made by the first officer who occupied the left seat. The captain stated that the aircraft had reached a speed

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
2/26/60	(Cont'd) of 70 knots before he became aware of the aircraft veering to the left. The captain elected to abort the take-off and placed the throttles in reverse pitch. The weather in the area at the time of the accident was, measured 500 feet overcast, visibility 1 mile, light snow, blowing snow and fog.															
	PROBABLE CAUSE: (1) Failure of the copilot to establish and maintain alignment with the runway for take-off under instrument conditions. (2) Failure of the captain to adequately supervise the take-off.															
2/28/60	1143 CST	Olathe, Kansas	Trans World	M-404	Substantial	None	9	0	0	3	0	0	6			
	On the takeoff as the aircraft became airborne and was entering its initial climb, the left main wheel assembly separated from the airframe. The flight was advised of this and directed to Kansas City then to the Naval Air Station at Olathe, Kansas for an emergency landing. A successful wheels-up landing was accomplished. Investigation disclosed that a fatigue failure had occurred to the landing gear gland nut which permitted the wheel assembly to separate from the aircraft.															
	PROBABLE CAUSE: Fatigue failure left main gear gland nut. Contributing Factor: Rough surface of runway due to accumulation of snow and ice.															
2/29/60	1159 CST	Chicago, Ill.	Trans World	L-1049G	Substantial	None	63	0	0	7	0	0	56			
	While the aircraft was being taxied for take-off following a scheduled stop at Chicago, the right landing gear collapsed rearward. Investigation disclosed the gear collapsed as a result of the failure of the right main landing gear lower drag strut assembly. The failure showed evidence of fatigue.															
	PROBABLE CAUSE: Fatigue failure of the right main landing gear drag strut.															

2/29/60	1249 EST	Syracuse, N. Y.	American	CV-240	Substantial	None	4	0	0	3	0	0	1

During the engine run-up prior to departure from LaGuardia on a scheduled nonstop flight to Syracuse, a malfuhction was experienced in the left propeller reversing circuit and the aircraft was returned to the hangar for a maintenance check. The propeller relay reversing control box was changed; however, operation was still intermittent and a check of the reverse switch linkage showed the actuating finger of the reverse switch was not providing solid contact. This was corrected in accordance with approved procedure and subsequent repeated actuation gave normal indications and normal propeller reversing. The subsequent take-off and flight to Syracuse were without incident until the captain started to pull the throttles through the detent to apply reverse thrust during the roll-out. He felt the aircraft swerve to the right and immediately moved the throttles out of the reverse range and applied forward thrust to the right engine to correct the swerve. His action, however, was not in time to prevent the aircraft from hitting a snowbank on the edge of the runway. The first officer was looking outside the cockpit and thus having failed to monitor the reverse pitch indicator lights he was unable to state whether or not the lights illuminated. The weather conditions at the time of landing were: Estimated ceiling 4,000 feet overcast, visibility, one mile variable, light snow, wind northwest 14. According to crew statements visual contact was established at approximately 400 feet altitude nearing the middle marker and at this point the entire runway was in sight. Runway 28, the active runway, is 8,000 feet long and a normal touchdown was made in the first 1,500 feet of the runway, which was bare, with very little drift correction necessary. A subsequent investigation revealed the "B" relay in the propeller relay reversing control box assembly was not functioning when the coil was energized.

PROBABLE CAUSE: (1) Failure of the crew to ensure that the propeller blades were in reverse pitch before applying power for reversing.
(2) Malfunction of "B" circuit in propeller reverse relay control assembly.

253

25

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
3/5/60	0232 PST	Spokane, Wash.	Northwest	DC-7	Substantial	None	70	0	0	5	0	0	65			

The flight originated as an IFR flight from Spokane, Washington to Chicago, Ill. At 13,000 feet, while climbing to cruising altitude, the No. 4 engine BMEP gauge fluctuated rapidly between 190 and 197 BMEP. Power was reduced to 120 BMEP and fire was observed in the No. 4 engine. The No. 4 propeller was feathered, the engine firewall shut-off valve was pulled and the right bottle of Freon was discharged. The fire appeared to diminish for a short period and flared up again; the second bottle of Freon was discharged. The fire continued to burn for approximately 3 minutes and went out. The aircraft returned safely to Spokane on 3 engines.

PROBABLE CAUSE: (1) Failure of the No. 10 connecting rod of the No. 4 engine.
(2) Prior damage to the No. 10 connecting rod by hydraulicking of the No. 10 piston.

3/9/60	2251 CST	St. Louis, Mo.	Eastern	DC-7B	Substantial	None	51	0	0	5	0	0	46			

The flight was a scheduled flight from Boston, Massachusetts to St. Louis, Missouri and was uneventful until landing at St. Louis. Following a normal ILS approach the aircraft touched down within the first one-third of the runway. Immediately after touchdown the runway lights were obstructed from the captain's view by a 3 or 4-foot windrow of snow on each side of the runway. The aircraft veered to the side of the runway and the right main gear collided with a windrow of snow. Shortly thereafter the nose gear collided with the windrow and collapsed. The aircraft came to rest on the nose section and main landing gear. There was no fire. Weather at the time of the accident was, precipitation obscuration, vertical visibility 400 feet, surface visibility 3/8 mile, heavy snow and smoke.

PROBABLE CAUSE: (1) Loss of visual reference at touchdown, caused by obscuration of runway lights during hours of darkness.
(2) Improper supervision of runway lighting facilities.

3/9/60	1411 CST	Chicago, Ill.	American	L-188	Substantial	None	39	0	0	6	0	0	33

The flight, a regularly scheduled passenger flight between New York City and Midway Airport, Chicago, was uneventful until landing at the Midway Airport. On touchdown, the aircraft veered to the left and the left landing gear struck a snowbank approximately 20 feet off the left side of the runway. The left gear was collapsed. As the aircraft veered to the left at touchdown the captain placed the power levers in the BETA range, but No. 4 BETA light did not come on. The first officer then shut down the No. 4 engine. Reverse thrust was then applied to No. 3 and positive thrust to No. 1 and No. 2 engines. Before this corrective action became effective the left landing gear made contact with the snowbank. Investigation revealed that the propeller control linkage disconnection on No. 4 engine had failed, resulting in unwanted positive thrust on the right side.

PROBABLE CAUSE: (1) Unwanted positive thrust on the right side at touchdown, caused by failure of the propeller control linkage disconnection on No. 4 engine.
(2) Patches of ice and snow on the runway.

3/9/60	1438 EST	New York, N. Y.	Eastern	L-749	Substantial	None	23	0	0	3	0	0	20

The flight was a scheduled air carrier flight originating in Albany, N. Y. with a destination of New Orleans, La., with an intermediate stop at LaGuardia Field, N. Y. While taxiing from the loading gate to the take-off position, the left landing gear collapsed and the aircraft settled onto its left wing port nacelles and left vertical stabilizer. Investigation revealed that all cockpit controls were in their normal position and the system had adequate pressure to perform its intended function. Further investigation revealed a failure of the port lower drag shock strut piston shaft.

PROBABLE CAUSE: Material failure of the left drag shock strut piston shaft.

3/10/60	1841 EST	New York, N. Y.	American	L-188	Substantial	None	75	0	0	6	0	0	69

The regularly scheduled flight from Detroit to N. Y. was without incident until after the night landing. During a wide turn from the active runway onto the taxiway, the aircraft passed too close to a high snowbank located at the intersection. The No. 1 propeller struck the snowbank, the impact of which twisted the propeller and caused serious damage to the gear box. Minor damage was incurred by Nos. 2 and 3 propellers.

PROBABLE CAUSE: (1) Failure to provide adequate clearance from snowbank during turn onto taxiway.
(2) Taxiway lights obscured by snow at intersection.

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
3/16/60	2110 EST.	Baltimore, Md.	American	DC-6	Substantial	None	25	0	0	5	0	0	20			

The flight, a scheduled flight between Boston, Massachusetts and Washington, D. C., was uneventful until landing was made by the first officer at Baltimore, Maryland. During the landing roll-out, the nose gear collapsed and the aircraft came to rest on its nose and main gear. Investigation disclosed that the captain inadvertently actuated the landing gear lever above the NEUTRAL position. When the warning horn sounded, the gear handle was returned to the NEUTRAL position where it was found upon examination of the cockpit. Investigation also revealed that inadvertent actuating of the landing gear lever, will retract the nose gear until a substantial amount of the weight of the aircraft is transmitted to the right main gear oleo strut.

PROBABLE CAUSE: The landing gear lever was inadvertently actuated above the NEUTRAL position before weight of the aircraft was firmly on the main landing gear.

3/17/60	1525 EST	Nr. Cannelton, Ind.	Northwest	L-188C	Destroyed	After Impact	63	6	0	0	57	0	0			

The regularly scheduled flight from Minneapolis, Minnesota to Miami, Florida, with an intermediate stop at Chicago, Illinois, departed Chicago at 1438 CST after a routine completion of the first segment. En route to Miami it cruised at 18,000 and the pilots made normal progress reports until the last, about 1513 CST. The flight crashed at an estimated time of 1525 CST. An extensive and difficult investigation indicated that the aircraft crashed after the right wing failed in flight because of flutter resulting from a whirl mode oscillation of the outboard engine nacelles. Clear air turbulence appears to have existed to the extent it could have contributed to the initiation of the flutter but not to the extent to have produced nacelle damage necessary to make whirl mode self-sustaining. It is probable, therefore, that there was unrecognizable prior damage to the wing or in the wing and outboard nacelles, making the effect of turbulence more critical.

PROBABLE CAUSE: In-flight separation of the right wing because of flutter induced by oscillation of the outboard nacelles. Contributing Factors: (1) Reduced stiffness of the structure. (2) Entry of the aircraft into an area of severe clear air turbulence.

3/18/60	2041 CST	Lansing, Mich.	Northwest	B-377	None	None	67	0	0	6	0	1	60

During a regularly scheduled flight from New York to Minneapolis, Minnesota, the captain took evasive action to avoid a flight of 2 aircraft which were approaching on an apparent collision course. The action occurred in clear weather over the vicinity of Lansing, Michigan. The maneuver resulted in injury to 1 passenger and 1 stewardess who were thrown off balance and fell to the cabin floor.

PROBABLE CAUSE: An evasive maneuver to avoid an imminent collision.

3/24/60	2328 EDT	Syracuse, N. Y.	American	DC-6B	Substantial	None	63	0	0	5	0	0	58

The flight from Newark, New Jersey to Syracuse, New York was uneventful until the landing at destination. There, the approach was made with approximately 10 degree right correction because of a cross wind and initial touchdown occurred nose wheel first and approximately 46 feet left of the runway centerline. Following touchdown, the aircraft continued to the left of runway alignment despite the use of right brake, right rudder and additional thrust from the No. 1 engine. The aircraft rolled off the left side of the runway where the nose gear collapsed. At the time of the accident the runway was covered with snow which was between 1½ and 3 inches deep. At the time of the approach the surface wind was reported as 18 knots; one minute after the accident the wind was recorded as 30 knots.

PROBABLE CAUSE: (1) Failure to establish and maintain runway alignment during touchdown and landing roll. (2) Surface wind condition in excess of that reported and reduced braking because of snow on the runway.

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
4/20/60	1306 EST	Hickory, N. C.	Piedmont	F-27 Cessna 310	Substantial Destroyed	None	40	0	0	4	0	0	36			4

The Cessna 310 and Fairchild F27 were involved in a midair collision at 1306 EST while both were making the final approach for landing in VFR conditions. The accident occurred approximately one-fourth mile from the approach end of runway 19 at an altitude of between 100 and 150 feet. Subsequent to the collision the damaged F27 was landed without further incident; however, the Cessna crashed out of control and all occupants received fatal injuries. The Hickory Airport does not have a control tower; however, the airport is served by an FAA Flight Service Station, which had established communications with the Cessna. The Air Carrier maintains a radio located on the airport which provides the same assistance as the FSS for company flights and has an interphone connection with the FSS. The F27 was on a scheduled flight from Cincinnati, Ohio to Fayetteville, North Carolina with an en route stop at Hickory. At 1254 EST the pilot made an in-range report to the company radio, over a location approximately 23 miles northwest of the airport. Thereafter, an approximate 500 to 600 feet per minute rate of descent from 7,500 feet was established at an airspeed of 170 knots to the base leg of the landing approach. The landing check list was completed just after the turn onto final approach and the aircraft descended to an altitude of between 100 and 150 feet at an airspeed of 100 knots when the company radio advised the flight that there was "an aircraft right off the runway." The pilots were unable to observe the reported aircraft and in reply to their query were told "runway 19 -- it looks like he is right behind you -- you had better go around." An immediate go-around was ordered and the first officer retracted the gear as the captain started to advance power; however, the impact occurred before an appreciable amount of power could be added. The aircraft responded normally to control and the gear was immediately returned to the down-position and the aircraft was landed safely. The pilot of the Cessna, commercial rating, age 37, with 2,250 total hours, 130 in multiengine aircraft, was completing an IFR flight from Grand Rapids, Michigan. At 1246 EST he had reported over a point 54 miles NNW of Hickory at 12,000 feet at which time he requested descent clearance which was granted. At 1256 he cancelled his instrument flight plan and proceeded VFR to Hickory. The flight path of the Cessna thereafter was not established until it was observed approximately 3 miles NNE of the

4/20/60 (Cont'd)

approach end of runway 19 at Hickory. At 1302 E the pilot called the Hickory FSS and advised he was in the Hickory area and requested the wind direction. This information was furnished and the pilot was advised of no reported traffic in the area. Approximately one minute later the air carrier agent called the FSS on the interphone and advised that the F-27 was inbound and requested traffic. He was informed the Cessna was the only reported traffic. Immediately thereafter unsuccessful attempts by the FSS were made to contact the Cessna. According to ground witnesses both of the aircraft appeared to be in straight flight on a southerly heading and descending toward the airport until the collision occurred. According to the witnesses during the final approach the Cessna was at all times above and slightly to the rear of the F-27 and descending at a steep angle. The Cessna struck the left propeller of the F-27 careened from the left wing and the vertical fin and fell nearly vertically to the ground.

PROBABLE CAUSE: Pilot of the Cessna, the over-taking aircraft, failed to see and avoid the F-27 during the landing approach.

5/8/60	2053 CST	Lubbock, Texas	Continental	Viscount 812	None	None	30	0	0	3	0	0	27	0	1	0

The flight was a regularly scheduled passenger flight operating between Dallas, Texas and Albuquerque, New Mexico. Following a routine landing, the aircraft was taxied to the ramp area and the engines shut down. The refueling attendant, in an effort to remove the kinks from the regueling hose, was thrown off balance and backed into the still rotating propeller of the No. 2 engine. He suffered serious injuries as a result of 2 blades of the propeller striking his right arm.

PROBABLE CAUSE: Refueling attendant inadvertently backed into a rotating propeller.

5/9/60	1545 EST	New York, N. Y.	Trans World	B-707	Substantial	After Impact	109	0	0	9	0	0	100			

Because of low ceiling and visibility, approach to the airport had to be accomplished on instruments. The instrument approach was poorly executed and visual contact with the runway was established when the aircraft was too high and too close to the runway threshold to be landed safely. Nevertheless, the captain continued the approach until more than one-half of the available runway had passed beneath the aircraft. When the decision was made to abandon the approach, a go-around was initiated. Contrary to company regulations and good operating procedures the landing gear was raised before a positive climb had been assured. The aircraft touched down and the landing gear retracted. As a result, the aircraft settled to the runway and slid to a stop about 500 ft. from the end.

PROBABLE CAUSE: The Board determines the probable cause of this accident was a poorly conducted instrument approach necessitating a go-around which was initiated too late and improperly executed.

5/29/60	0820	CST	Dallas, Texas	Trans-Texas	DC-3	None	None	20	0	1	2	0	0	17

The flight was a regularly scheduled passenger flight between Houston and Dallas, Texas and was uneventful until clear air turbulence was encountered approximately 20 miles from Dallas. At the onset of the turbulence the stewardess was thrown violently against the companionway roof and then against the floor. The "Fasten Seat Belt" sign turned on approximately 10 minutes before encountering the turbulence.

PROBABLE CAUSE: Clear air turbulence.

6/1/60	1830	EST	Charlotte, N. C.	Capital	DC-6B	None	None	93	0	0	5	0	1	87

The flight a regularly scheduled passenger flight between Miami, Florida and Cleveland, Ohio, was uneventful until turbulence was encountered in the vicinity of Charlotte, North Carolina. While cruising at an altitude of 15,000 ft, in this area, a line of build-ups was observed across the intended course, and which were estimated to extend to 17,000 ft. Approximately five minutes prior to reaching the build-ups, the "Fasten seat belt" sign was turned on and an announcement made to fasten all seat belts. One passenger in the lavatory, however, did not utilize her belt and fell to the floor during the brief period of turbulence. The passenger received a fractured ankle. Another passenger, who refused to comply with the cabin attendant's request to remain in her seat with belt fastened, walked up the aisle and was thrown to the floor.

PROBABLE CAUSE: (1) Failure of the injured passengers to comply with safety instructions.
(2) Turbulence.

6/14/60	1508	PDT	Anaheim, Calif.	Los Angeles Airways	S-55	Substantial	None	9	0	0	1	0	0	8

Shortly after touchdown, and while the helicopter was positioned into the 15-knot surface wind, the cyclic control moved to the full aft position causing the rotor blades to strike the tail cone. The accident occurred as the pilot was beginning his routine after landing cockpit ground procedure. A subsequent check was made of the four cyclic control friction knobs and they were found to function normally.

PROBABLE CAUSE: (1) Failure of the pilot to properly tighten friction locks on the cyclic control.
(2) Failure to maintain manual control of the cyclic control.

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
6/14/60	0219 CST	Chicago, Ill.	United	DC-8	Substantial	None	47	0	0	6	0	0	41			

The scheduled passenger flight was uneventful from Idlewild Airport, New York to the O'Hara Airport at Chicago, until the flight landed on runway 14L. During the landing roll the aircraft deviated to the left of the runway where the nose gear collapsed when it sank in soft terrain. Investigation showed that reverse thrust action was initiated from all four engines shortly after touchdown. At this time the aircraft deviated to the left and rolled off the runway despite efforts to correct the alignment with unbalanced power and nose wheel steering. Further investigation showed that because of a malfunction of the No. 4 reverse mechanism, the No. 4 engine did not reverse when reverse thrust was initiated. This resulted in reverse thrust from three engines and forward thrust from No. 4 The captain could not recall whether or not the No. 4 reverse light came on.

PROBABLE CAUSE: Inability of the pilot to maintain directional control caused by failure of the No. 4 reverse mechanism.

6/19/60	1949 CST	Dallas, Texas	American	B-707	Substantial	None	112	0	0	8	0	0	104			

During landing the aircraft over-rotated and the bottom rear portion of the fuselage scraped the runway causing abrasive damage to the fuselage skin. The pilot stated the aircraft had a slight tendency to float prior to touchdown and over the end of the runway the captain reduced power gradually and actuated the horizontal stabilizer trim switch momentarily for nose-up zero yoke force. The nose came up gradually and ground contact occurred at which time a slight forward yoke pressure was being used. After touchdown the nose-up pressure became heavier and although the captain used full forward throw of the yoke he was unable to get the nose down. It was then noted that the stabilizer trim was in full nose-up position. Speed brakes were used to get weight of the aircraft on the gear for more effective braking and reverse thrust. In addition, nose-down trim was applied, after which the landing was completed without further incident. Examination of the horizontal stabilizer trim system disclosed no evidence of malfunction or failure and the system functioned normally.

PROBABLE CAUSE: Inadvertent actuation of the stabilizer trim switch to the full nose-up position during flare-out and touchdown.

6/22/60	2052 EST	Newark, N. J.	Eastern	L-188	Substantial	None	54	0	0	6	0	0	48

During a phase eight ground inspection of the aircraft following a routine flight from Birmingham, Ala. to Newark, N. J. with enroute stops, substantial fire damage was found in the flap well behind the No. 1 engine. Investigation revealed the rearmost tail pipe lower shroud was loosely fitted where it joined the No. 1 engine tail pipe shroud extension. As a result there was an opening between 1/8 and 1/4 inch over a length of about 6 inches. Test revealed an accumulation of fuel in the area after false or late starts.

PROBABLE CAUSE: Improper fit between the tail pipe lower shroud and the tail pipe shroud extension permitting accumulation of fuel which was ignited causing fire damage at an unknown time.

7/3/60	1858 EST	Nr. Poughkeepsie, New York	United	DC-8	None	None	84	0	0	7	0	1	76

The flight, a regularly scheduled flight between New York and Los Angeles was uneventful until turbulence was encountered near Poughkeepsie. While climbing to cruising altitude the aircraft's airborne radar scope indicated a heavy precipitation area on the flight path. A clearance was given the flight to alter course to avoid this area and while climbing between 15,000 and 16,000 feet moderate turbulence was encountered with several sharp up and down jolts. Although the "fasten seat belt" sign was on since the beginning of the flight, several passengers had unfastened their safety belts and as a result of the turbulence were thrown from their seats and were injured.

PROBABLE CAUSE: (1) Turbulence in flight.
(2) Failure of passengers to comply with seat belt sign and the cabin attendants to insure such compliance.

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
7/17/60	1136 PDT	Los Angeles, Calif.	Los Angeles Airways	S-55	Substantial	None	8	0	0	1	0	0	7			

During taxi of the helicopter into the area of Gate 17 which was assigned to the helicopter operation the pilot noted there was a food service truck backed up to a Boeing 707 which occupied Gate 18. He saw that the food service truck extended into the Gate 17 area and gave way about 1 foot to the right of the taxi line. Despite this in passing all three main rotor blade tips struck the bed of the ground service vehicle. Impact tore off the blade movement balance weights and two weights were hurled into two aircraft parked 277 feet and 715 feet from the helicopter. Investigation revealed the truck was parked 69 inches over the white clearance line of the helicopter gate. The main gears of the Boeing 707 were positioned 18 inches forward and 39 inches right of the painted gear ramp spots.

PROBABLE CAUSE: (1) The pilot failed to assure adequate rotor clearance during taxi.
(2) Improper parking of the ground service vehicle.
(3) Inadequate space allocation at Gate 18 for existing use.

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	Other F	Other S	Other M
7/22/60	1430 CST	Houston, Texas	Trans-Texas Airways	DC-3 DC-7B Parked	Substantial	None	12	1	0	2	0	0	9			

The flight was a regularly scheduled passenger flight between Dallas and Houston, Texas, with intermediate stops. The First Officer flew the aircraft from the left seat; the Captain occupied the right. While taxiing to the main terminal at Houston, the First Officer experienced a loss of braking. He advised the Captain "to get on the emergency hydraulic pump." The First Officer did not know if this had been done; however, shortly thereafter both pilots applied full right throttle and the copilot applied left rudder to avoid a parked DC-7B. The aircraft entered a left turn during which the cockpit of the DC-3 and right wing of the DC-7B made contact. The wing cut into the cockpit, fatally injuring the captain. Investigation showed the loss of braking resulted from a defective "O" ring in the right landing gear compensating cylinder, causing a loss of brake fluid. It also disclosed that shortly after the flight departed Dallas the crew was notified that there was a can of hydraulic fluid aboard if it were needed. Maintenance records indicated that

7/22/60 (Cont'd)

there were four discrepancies relating to the hydraulic system of the aircraft made within the ten days prior to the accident. It was also learned the aircraft was rescheduled for the subject flight to get the aircraft to Houston, where parts were available to replace a retract strut.

PROBABLE CAUSE: (1) A defective "O" ring in the right landing gear compensating cylinder, resulting in a loss of hydraulic fluid and causing a loss of braking.
(2) Judgment in scheduling the aircraft for flight without repairing hydraulic trouble.

7/27/60	2238 CDT	Forest Park, Ill.	Chicago Helicopter Airways	S-58	Destroyed	After Impact	13	2	0	0	11	0	0

The helicopter, N-879, departed Chicago Midway airport on a scheduled flight to Chicago O'Hare airport, 17 miles away. The flight departed on scheduled in VFR weather conditions. All radio transmissions were routine. When the flight had cruised to about the midpoint of its trip, a part of one of the main rotor blades broke away. The helicopter began to descend with its landing lights on. Sounds similar to the rapid cracking of a bullwhip were heard by witnesses. Moments later, the tail cone and tail rotor separated from the aircraft, and the angle of descent increased. The helicopter spun around on its vertical axis - crashed nose-down on its left side - and burst into flames.

PROBABLE CAUSE: The Board determined N-879 became uncontrollable and crashed as a result of a structural disintegration in flight, initiated by a fatigue fracture of a main rotor blade.

8/13/60	1620 CST	Madison, Wisc.	North Central	DC-3	Substantial	None	19	0	0	3	0	0	16

The captain detected the collapse of the left gear immediately after touchdown. A go-around was successfully accomplished, and it was then determined that the left forked drag strut was detached from its aft fitting. A gear-up landing was subsequently accomplished with minor damage to the aircraft structure. The fitting assembly,,P/N 4341810 to which the drag strut is attached, had broken off at a point 3 inches from the strut attachment bolt. This fitting possessed an old break and other cracks in the failed area.

PROBABLE CAUSE: Fatigue failure of the left landing gear strut brace fitting, P/N 4341810.

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
8/25/60	2200 CST	Nr. Chanute, Kansas	Trans World	L-049	None	None	53	0	1	4	0	1	47			

While cruising at an altitude of 5,000 feet over the vicinity of Rantoul, Illinois en route to Kansas City from New York, lightning was observed in the distance and in anticipation of possible turbulence the "Fasten Seat Belt" sign was turned on as a precautionary measure. Over Chanute AFB the flight entered low clouds which did not appear to be directly associated with the distant thunderstorm activity; however, shortly after the aircraft entered the clouds severe turbulence was encountered. One passenger and one stewardess were thrown to the cabin floor and received serious injuries.

PROBABLE CAUSE: Severe in-flight turbulence.

9/6/60	0850 CST	Des Moines, Ia.	Ozark	DC-3	Substantial	In-Flight	14	0	0	3	0	0	11			

Immediately after take-off an unidentified odor was detected and visual inspection revealed a faint glow of fire in the area of the inboard cowl flaps of the right engine. The flight was cleared for an immediate landing and the aircraft was landed. During the roll-out, smoke and flames were observed emanating from the engine cowling and the right engine fire extinguisher was discharged without effect. The fire was then extinguished by ground personnel using a portable fire extinguisher. All damage occurred to the right engine and nacelle. Investigation disclosed a failure of the No. 10 cylinder exhaust insert mounting caused the fire.

PROBABLE CAUSE: Failure of the right engine, No. 10 cylinder exhaust insert mounting.

9/8/60	1425 CST	Texarkana, Ark.	American	DC-6A	None	None	65	0	1	4	0	0	60			

While the regularly scheduled flight from New York to Oakland, California, was cruising at an altitude of 14,000 feet in VFR conditions, it encountered a thermal or "bump" of moderate intensity. The sudden jolt threw one of the cabin attendants off balance. She fell to the cabin floor and sustained a broken leg.

PROBABLE CAUSE: In-flight turbulence.

9/10/60	1945 EST	Atlanta, Ga.	Southern Airways	DC-3 DC-3 Parked	Minor	None	12	0	0	3	0	0	9

While the captain was maneuvering the aircraft in a congested ramp area with assistance from the ground personnel, the ground assistant gave him the signal to stop the aircraft. The captain applied brakes but not in time to prevent the left wing tip from striking the right wing tip of a parked plane. (Parked aircraft; Southern Airways, DC-3 N-68SA, (M).

PROBABLE CAUSE: Failure of the pilot and ground personnel to assure adequate separation between aircraft while attempting to maneuver the aircraft in a congested area.

9/11/60	2102 EDT	Washington, D. C.	American	CV-240	Substantial	None	35	0	0	3	0	0	32

The approach for landing and touchdown was normal; however, shortly thereafter, the nose gear retracted and the nose dropped to the runway as the aircraft rolled to a stop. The copilot stated he had inadvertently moved the landing gear handle while intending to raise the flaps immediately after touchdown. Investigation revealed no malfunction of the landing gear retraction and warning system nor was there any evidence of malfunction of the system which prevents movement of the landing gear selector lever toward the up position when the weight of the aircraft is on the landing gears.

PROBABLE CAUSE: Copilot inadvertently actuated the gear lever to the up position after touchdown for landing.

9/13/60	1815 CST	Minneapolis, Minn.	Capital	Viscount-700D	Substantial	None	45	0	0	4	0	0	41

The aircraft was being rotated for lift off when the No. 1 main wheel tire recap tread came off, struck the No. 2 propeller, and penetrated the left side of the fuselage. The takeoff was continued and the No. 2 propeller was feathered due to vibration. The flight thereafter returned and landed without further incident.

PROBABLE CAUSE: Failure of the tire tread during takeoff.

9/14/60	0800 EST	LaGuardia, N. Y.	American	L-188	Destroyed	After Impact	76	0	0	6	0	0	70

During the landing approach the main gear struck a dike prior to touchdown resulting in a nose over. Investigation revealed the runway had been shortened due to construction and the dike was unmarked.

PROBABLE CAUSE: Failure of the pilot to properly plan and execute the approach to a landing. Factors which may have contributed were the shortened runway and the unmarked upper portion of the dike.

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
10/1/60	0756 EST	Orlando, Fla.	Eastern	M-404 Beech	Substantial Destroyed	None	27	0	0	3	0	0	24			1

The pilot of the Beechcraft was cleared to land with a right hand approach to runway 31. A minute later the pilot of the air carrier requested landing instructions and the tower cleared him as "number two to land following a Bonanza on a right base leg". The Bonanza was not in sight from the tower, although the pilot had stated that he was "just off runway 25". The air carrier pilot saw an aircraft in the pattern which he believed to be his traffic, so he continued his approach. At that instant, he observed the landing Bonanza 100 feet ahead at the same altitude and in a slightly left bank. The Bonanza then disappeared underneath as a jolt was felt by the occupants of the Air Carrier. The Bonanza crashed and the Air Carrier landed safely with a damaged right wing.

PROBABLE CAUSE: (1) Failure of each of the pilots to observe and avoid the other aircraft.
(2) Failure of the tower controller to exercise adequate control over aircraft in the traffic pattern.

10/4/60	1740 EDT	Boston, Mass.	Eastern	L-188	Destroyed	None	72	3	1	1	59	8	0			

A few seconds after becoming airborne, the aircraft struck a flock of starlings. A number of these birds were ingested in engines Nos. 1, 2, and 4. Engine No. 1 was shut down and its propeller was feathered. Nos. 2 and 4 experienced a substantial momentary loss of power. This abrupt and intermittent loss of recovery of power resulted in the aircraft yawing to the left and decelerating to the stall speed. As speed decayed during the continued yaw and skidding left turn, the stall speed was reached; the left wing dropped, the nose pitched up, and the aircraft rolled left into a spin and fell almost vertically into the water. An altitude of less than 150 feet precluded recovery.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was the unique and critical sequence of the loss and recovery of engine power following bird ingestion, resulting in loss of airspeed and control during takeoff.

10/7/60	1312 EDT	Newark, N. J.	American	DC-6	Substantial	None	22	0	0	5	0	0	17

The approach and landing in a 15 knot cross wind (90 degrees to the left of the runway) was accomplished with the First Officer at the controls and the Captain handling the co-pilots duties. Shortly after touchdown a violent vibration was experienced and the propellers, which had been placed in reverse on touchdown, were brought out of reverse and nose wheel steering and brakes were used to keep the aircraft on the runway. The vibration ceased momentarily then increased in intensity until the nose gear collapsed. Following the collapse of the nose gear, the aircraft skidded to a stop and came to rest on its nose section and the main landing gear. A section of the left upper torque link was found on the runway about 75 feet beyond the point of initial contact. Although the fractured surface of the torque link bore evidence of a discolored fatigue crack there is no indication that the torque link would have failed under normal landing loads.

PROBABLE CAUSE: Aircraft was landed nose wheel first in a cross wind resulting in overloads and subsequent failure of the nose gear. Improper supervision of the landing by the Captain.

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
10/25/60	1714 CST	Fort Worth, Tex.	American	B-707	Substantial	None	126	0	0	8	0	0	118			

During the approach for landing, the nose gear failed to extend and all normal and emergency methods were used to no avail. The captain then requested that the runway be foamed and he landed the aircraft on the main gear with the nose gear retracted. After the aircraft was placed on jacks, the landing gear was actuated and it operated normally. Although it was not positively determined, it was considered that some small foreign object could have entered the nose gear up-down lock mechanism and prevented the unlocking mechanism from actuating.

PROBABLE CAUSE: Failure of the nose gear to extend for reasons undetermined.

10/28/60	1139 MST	Missoula, Mont.	Northwest	DC-4	Destroyed	After Impact	12	4	0	0	8	0	0			

The flight took off from Spokane, Washington on an IFR flight plan. Enroute radio reports were routine and indicated the flight was on schedule, and in no difficulty. The aircraft was observed from the ground flying on course toward Missoula in and along the Clark Fork Valley within six nautical miles west of the scene of the crash. The engines were running as the aircraft was descending as if on an approach to a landing. As the aircraft descended deeper into the valley, flight visibility became restricted by light snow showers, and the tops of the mountains surrounding the valley were obscured by the overcast. The aircraft entered a steep left banking turn and the nose was raised in an apparent attempt to turn and climb out through an intersecting valley; however, the aircraft continued to sink toward the ground, rolled to the left and crashed inverted.

PROBABLE CAUSE: The Board believed the accident was caused by the failure of the pilot to continue in accordance with his IFR flight plan by attempting a VFR approach during instrument weather conditions.

11/3/60	1619 EST	Wilmington, Del.	Eastern	M-404	Substantial	None	41	0	0	3	0	0	38

Prior to departing the ramp for take-off, the First Officer occupied the left seat with the Captain in the right. This was contrary to company regulations as the First Officer was not authorized to fly the aircraft from the left seat. Shortly after starting the take-off run, the aircraft veered off the runway to the left and the First Officer thought that he noted a BMEP drop off on No. 1 engine. As the aircraft deviated from the runway, the Captain took over the controls and, after paralleling the runway for a considerable distance, brought the aircraft to a stop. After reverse thrust was applied, and just before the arresting of all forward motion, the right main gear and right propeller contacted a high spot in the terrain, allowing the propellers to strike the ground. A subsequent check of the No. 1 engine failed to disclose any malfunction that would contribute to a power interruption and its operation was entirely normal throughout the succeeding ferry flight.

PROBABLE CAUSE: (1) Loss of directional control during the take-off roll.
(2) Inadequate supervision by the captain.

11/3/60	1733 CST	Eau Claire, Wisc.	Northwest	L-188 AF-B47	None	None	58	0	0	6	0	1	51

Shortly before 1731 EST flight 70 was approaching the Eau Claire, Wisc. VOR on an easterly heading and it was climbing to 25,000 feet in visual weather conditions according to an IFR clearance. At this time an Air Force B-47 was holding on the VOR at 30,000 feet in accordance with an IFR flight plan with a VFR on top clearance. In the events which followed the B-47 flight was cleared to descend to 23,000. The controller gave the B-47 pilot an advisory indicating flight 60 was at 25,000 obviously believing the flight had already reached 25,000. At the same time another controller was giving the pilots of flight 60 radar advisories on the B-47 and the pilots had the B-47 in sight. There was adequate separation with both planes heading east until the descending B-47 turned south in its holding pattern. The southerly course of the B-47 and the easterly course of the Electra then became closing courses at the same altitude. The courses apparently also became collision courses until the Electra pilot took an abrupt evasive action. The evasive maneuver threw two passengers off balance with resultant injury.

PROBABLE CAUSE: Improper air traffic control procedures.

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
11/17/60	1623 MST	Denver, Colo.	United	DC-6 Beech 35	Substantial Substantial	None	19	0	0	4	0	0	15			

During the pertinent time period in which the collision developed and occurred, air traffic conditions at Stapleton Field were unusually heavy. This was due to the numerous arriving and departing flights and because one of the two runways normally available under existing conditions was closed for construction. In addition, it was necessary to hold air traffic to permit departures. Under the above described circumstances the DC-6 circled the field once and the Bonanza pilot circled numerous times. On downwind leg after its circle of the airport, the DC-6 was given sequence to land number 3 behind a Twin Cessna. The DC-6 flight negotiated the remainder of the traffic pattern and on final approach was properly sequenced behind the Cessna for landing. During the same period the Bonanza pilot had sequenced his aircraft in the traffic flow by making 360 degree turns and then proceeding to final approach without tower direction or being sighted until then. On final approach the Bonanza pilot asked for his landing sequence and was told he was number 5 behind a Convair. The pilot then said he was on final. Asked by the local controller if he were behind the DC-6 the Bonanza pilot replied in the affirmative although all indications show the Bonanza was ahead of the DC-6 and behind the Cessna. At this point the Bonanza was told to go around. The pilot later said he had not heard this instruction, although it was given two times with an interval between each time. Seconds later the Bonanza pilot realized the DC-6 must have been behind him and he started a right turn. At this instant he saw the DC-6 above, behind and to his right. He made a right climbing turn evasive attempt during which the collision occurred. Impact took place when the right wing and the propeller of the Bonanza struck the bottom of the DC-6 left wing. Both planes were damaged in a manner confirming the sequence of events as indicated. Both planes were landed safely. The pilots of the DC-6 stated that they had not seen the Bonanza until the instant before collision when it appeared out of the sun from left abeam of the cockpit. The sun was low on the horizon slightly left of front of the aircraft during the approach to runway 30. The density of the traffic situation was further amplified by the fact that during the 14-minute period before collision, 218 transmissions were made of which 99 were by the local controller.

11/17/60 (Cont'd)

PROBABLE CAUSE: (1) Failure of the Bonanza pilot to adhere to traffic pattern procedures and to execute an immediate go-around.
(2) High level of air traffic in the traffic pattern.
(3) Failure of the DC-6 pilots before and during final approach to see the Bonanza under an adverse condition of sunglare.

12/4/60	1710 EST	Wolbach, Nebraska	United	B-720	None	None	91	0	0	7	0	1	83

While cruising at 23,000 feet, the pilot flew the aircraft between cumulus cloud formations to remain clear of the clouds. Turbulence was encountered and before all passengers returned to their seats and fastened seat belts, two abrupt jolts of turbulence were encountered. One passenger was thrown off balance and injured.

PROBABLE CAUSE: (1) In-flight turbulence.
(2) Inadequate precaution prior to entering an area of possible turbulence.

12/5/60	1736 EST	Avoca, Pa.	Allegheny	M-202	Substantial	None	20	0	0	3	0	0	17

During the landing roll, the left wing settled to the runway, and the aircraft veered to the left, coming to rest approximately 44 feet off the runway. Investigation revealed that bushing, P/N 202 SD 82022 was missing from the inboard side of the left main gear drag link and this prevented the left main gear from extending. The pilots stated that the landing gear indicators showed the gear to be down and locked. The horn did not blow to indicate gear up because of worn relay contacts.

PROBABLE CAUSE: Material failure of the left landing gear drag link assembly.

12/5/60	1135 EST	Atlanta, Ga.	Trans World	L-1049G	Substantial	None	36	0	0	6	0	0	30

At the time of this accident the First Officer occupied the left seat and the Captain the right. A normal take-off was executed; however, after the first power reduction was made and the auto feathering turned off, the engineer informed the pilot that the No. 4 engine was losing power and a yaw to the right was felt by both pilots. The No. 4 engine was feathered and a right turn initiated to place the aircraft in proper alignment for landing. At that instant No. 3 propeller oversped and the No. 3 engine was observed to be on fire. The No. 3 engine was feathered, all combustibles shut off, and the fire extinguisher discharged twice to arrest the fire. The fire bell and warning light went out. The engineer believed that he could get some power out of No. 4 engine, therefore it was restarted as a precautionary measure. A normal landing

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
12/5/60	(Cont'd)															

was then executed without further incident. Subsequent to the accident, the No. 3 and No. 4 engine were examined to determine the reason for failure or malfunction. The No. 3 engine, upon visual inspection, was found to have a hole in the No. 2 cylinder which permitted flammable fluids to escape resulting in substantial fire damage to the nacelle, cowl flaps, wing, and engine compartments forward of the firewall. Disassembly of the No. 3 engine revealed complete disintegration of the front power section. Failure of this engine was attributed to distress of the No. 2 piston resulting from either a piston land or ring failure. Inspection and run-up of the No. 4 engine failed to reveal any evidence of an engine discrepancy or malfunction. The engine operated normally during several test flights and there have been no known power problems reported on this engine since the aircraft re-entered scheduled service.

PROBABLE CAUSE: Failure of the No. 3 engine attributed to distress of the No. 2 piston resulting from either piston land or ring failure.

12/16/60	1033 EST	Nr. Staten Island,	Trans World	L-1049	Destroyed	After	44	5	0	0	39	0	0			
		New York	United	DC-8	Destroyed	Impact	84	7	0	0	77	0	0	5		

Both flights were operating under instrument flight rules. TWA flight No. 266 N-6907 a Constellation, destination was LaGuardia Airport, N. Y. and UAL flight N-8013U, a DC-8 destination was New York International Airport. Both aircraft were descending for landing at their respective airports when they collided near Miller Army Air Field, Staten Island, N. Y. Following the collision N-6907C fell on Miller Army Field and N-8013U continued in a northeasterly direction, crashing in Brooklyn, N. Y. Weather at the altitude of the collision and at the time of the accident was such as to preclude flight by visual means.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was that United Flight 826 proceeded beyond its clearance limit and the confines of the airspace allocated to the flight by Air Traffic Control. A contributing factor was the high rate of speed of the United DC-8 as it approached the Preston intersection, coupled with the change of clearance which reduced the enroute distance along VICTOR 123 by approximately 11 miles.

Domestic Operators - Cargo Service

1/5/60	1145 CST	Frankfort, Ill.	Chicago Helicopter Airways	B-47-G2	Substantial	None	1	0	0	1

Departure from Chicago Heights Heliport on a scheduled mail flight at 1130 CST. Approximately fifteen minutes later the engine developed roughness and a precautionary landing was made in an open field. On the approach the pilot did not observe a power transmission cable about 30 feet high. The helicopter canopy struck the power line, breaking the canopy, denting the fuel tank and bending the fuel lines. The pilot received lacerations of the forehead. He was able to complete a normal landing however, without further damage, due in part to the fact that the power line had broken. Fouled spark plugs were the cause of the engine roughness.

PROBABLE CAUSE: (1) Failed to observe obstruction in flight path.
(2) Powerplant malfunction due to fouled spark plugs.

1/13/60	1945 EST	Tampa, Fla.	Delta	C-46	Substantial	None	2	0	1	1

The flight involved was a regularly scheduled cargo flight which originated in Miami, Florida with Chicago, Illinois as its destination. Difficulty was experienced in starting the left engine and it was allowed to cool for 2 minutes before attempting another start. After the propeller was turned through several blades and the mixture was brought to rich, the engine backfired, causing the fuel on the ground to ignite. The captain ordered the right engine shut down and both pilot and copilot evacuated the aircraft. The captain broke his leg when he jumped from the aircraft to the ramp.

PROBABLE CAUSE: (1) The mixture control lever was rigged 5/16 inches aft of its proper position throughout its range, (idle cut off, auto lean and full rich.)
(2) Very heavy layer of oil and grease on the starting ramp.

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	Other F	Other S	Other M
2/6/60	0819 CST	Chicago, Ill.	Delta	C-46	Substantial	None	2	0	0	2						

The flight was a scheduled cargo flight from Miami, Florida to Chicago, Illinois. The flight was routine until a landing at Chicago, The active runway at Chicago was 31R; however, the pilot requested and was granted permission to use runway 27L. The wind favored runway 27L more than runway 31R. The touchdown was normal, but immediately thereafter it became apparent that braking was ineffective. The captain took over the controls and attempted to groundloop the aircraft to the left. The aircraft turned left, ran off of the end of the runway and collided with a steel link chain fence. It came to rest with the right wing protruding into the street. Investigation revealed that the surface of runway 27L was coated with a thin layer of ice. Runway 31R was clear of ice and snow because it had been in use for several hours prior to the accident.

PROBABLE CAUSE: Unsafe landing conditions caused by ice on the runway.

All-Cargo Carriers

3/23/60	0855 CST	Mobile, Ala.	AAXICO	C-46	Substantial	None	2	0	0	2						

The all cargo flight between Panama City, Florida and Brookley Air Force Base, Mobile, Alabama, was uneventful until landing at Mobile. The aircraft was being flown by the copilot from the left seat while the captain occupied the right seat. Noticing that the approach, from one mile out, was going to be high , the copilot was instructed by the captain to extend more flaps and to increase the rate of descent. The approach from this point until the flare-out appeared to be normal. The flare-out, however was slow and the aircraft touched down in a slightly tail-high attitude and bounced. On the second touchdown, the flaps were retracted. The aircraft then veered to the right and the copilot overcorrected to the left in an attempt to regain directional control. It then veered back to the right, at which time the captain took over the controls and applied full power to the right engine. Full power was then applied to both engines and the aircraft left the right side of the runway at a 45-degree angle. The aircraft was "pulled" into the air in a nose-high attitude and shortly thereafter collided with the obstruction

3/23/60 (Cont'd) light on the GCA shack. After gaining altitude, the controls were checked and found to be capable of normal operation. The aircraft then returned to the airfield and was landed without further incident. Investigation revealed that the left wing had contacted the GCA obstruction light which extends to 28 feet and 6 inches above the ground.

PROBABLE CAUSE: (1) Failure of the copilot to effect recovery following a poor landing.
(2) Failure of the captain to adequately supervise the copilot.

Nonrevenue Operations

5/21/60	0823 EST	Columbia, S. C.	Delta	DC-3	Substantial	None	2	0	0	2

The flight was for the purpose of transporting a replacement engine for a company aircraft located at Columbia, S. C. After a normal flight and landing, the aircraft was being parked and while turning it into the parked position the right wing struck a guy wire which supported a light pole. The copilot stated that he saw the wire but could not judge the distance between the wing rip and the wire while the aircraft was turning. A mechanic was directing the parking; however, he was lost from view while the turn was made.

PROBABLE CAUSE: Failure of crew to exercise adequate caution while parking the aircraft.

5/23/60	1152 EST	Atlanta, Ga.	Delta	CV-880	Destroyed	After Impact	4	4	0	0

The flight was scheduled for training for two pilots who were to "check out" in the CV-880. A pilot trainee occupied the left seat and qualified instructor-pilot occupied the right. Immediately after liftoff the aircraft assumed an extremely nose high attitude and banked steeply to the left. It then rolled to a vertical right bank, the nose fell through, and the aircraft struck the ground.

PROBABLE CAUSE: The Board determined the probable cause of this accident was that the aircraft was stalled, for reasons undetermined, at an altitude too low to effect recovery.

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	Other F	Other S	Other M
6/23/60	2227 CST.	Dallas, Texas	Continental	DC-7	Substantial	None	2	0	0	2						

The flight from El Paso to Dallas was routine and without incident until after landing at Dallas. During the landing roll, the gear control was inadvertently actuated to the up position by the captain who was performing the duties of copilot on the flight. The right main and nose gears retracted and the aircraft ground-looped off the runway.

PROBABLE CAUSE: Inadvertent gear retraction during landing.

7/28/60	1123 EST	Avoca, Pa.	Allegheny	CV-440	Substantial	None	2	0	0	2						

During a training flight the final approach of a simulated single-engine approach and landing was high and fast. The instructor-pilot decided to discontinue the single-engine approach and told the trainee pilot to make a landing. The latter closed the throttle and was approaching the runway about 115 knots when the instructor suggested that 40 degrees of flap be extended. This was done; however, the aircraft crossed the end of the runway about 30 feet above the runway at an airspeed of 115 knots. About 10 feet above the runway the instructor ordered a go-around. As the go-around was initiated the instructor raised the landing gear. The aircraft, however, settled to the runway wheels-up, and slid to a stop less than 270 feet from the far end of the runway.

PROBABLE CAUSE: Inadequate supervision of the trainee pilot's action by the instructor-pilot during the execution of a go-around following a poorly executed approach.

Intra-Alaska Carriers - Scheduled Passenger Service

3/29/60	1333	Z	Cape Pole, Alaska	Ellis	Grumman G-21A	Destroyed	None	3	0	0	1	0	0	2

The flight which started and terminated at Ketchikan, Alaska with several en route stops was uneventful until landing at Cape Pole, Alaska. After the aircraft touched down, skipped several times, it settled into the water, bow and right wing first, and rolled to an inverted position. The pilot stated that he must have landed on the backside of a swell; however, water conditions were reported as good at the time of the accident.

PROBABLE CAUSE: Misjudged flare-out during a water landing.

11/28/60	1015	AST	Akiak, Alaska	Northern	Cessna Consolidated T-50	Substantial	None	2	0	0	1	0	0	1

Knowing the river had not been frozen over the previous week the pilot did not believe the ice would support the ski-equipped aircraft during landing and decided to land on a snow-covered sand bar. The pilot did not see flags which marked a landing area on the ice. During deceleration after landing the skis struck ridges and a deep erosion in the snow-covered sand bar. The main skis were distorted and the tail ski was torn off.

PROBABLE CAUSE: (1) Hidden hazard in the selected landing area.
(2) Failure of the pilot to note the area marked for landing.

12/19/60	1410	AST	Kodiak Island, Alaska	Kodiak Airways	Grumman G-21A	Substantial	None	4	0	0	1	0	0	3

While taxiing across the beach to enter the water for take-off, the pilot found it necessary to apply considerable power to the left engine to avoid striking a log lying on the beach and the left gear was sheared by a half-buried log that had not been noticed by the pilot. The left float and wing tip were damaged when the aircraft settled on its left side.

PROBABLE CAUSE: (1) The pilot failed to see obstruction while taxiing.
(2) Unsuitable terrain for operating aircraft.

Intra-Alaska Carriers - Military Contract Passenger

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
12/18/60	1454 AST	Northeast Cape, Alaska	Wien	Beech C-18	Destroyed	None	10	0	2	0	0	8	0			

The flight from Nome to Northeast Cape, including one en route stop, was routine and without incident. At Northeast Cape eight passengers boarded the aircraft and their baggage was stored aboard. The pilot stated that the aircraft was loaded under his supervision and, while he did not have a load manifest showing the weights of the passengers or their baggage, he estimated that he had the aircraft loaded within the weight and balance tolerances. The eight passengers were seated on the right and rear of the cabin and the major portion of the cargo and baggage was stowed on the left side and secured by a rope. The remaining baggage was piled on the left side in front of the main cabin door, in the aisles, and carried by the passengers in their laps. The aircraft was taxied to the end of the 4,000 foot runway and, after engine run-up and completion of the check list, the pilot lowered flaps to about 11 degrees and proceeded with the take-off. After acceleration to 60 knots the pilot pulled the aircraft off the runway and immediately retracted the landing gear and noted that the airspeed read approximately 70 knots. At this point, which was about half way down the runway, the aircraft started a steep climb and full forward elevator had no effect. When at an altitude of approximately 150 to 200 feet, the aircraft entered a stalled condition and fell off first on the right wing, then to the left, and descended in what was described as a "falling leaf". It made ground contact in a wing level, slightly nose-down attitude. Examination at the accident scene disclosed no malfunction of the powerplants, the aircraft, controls, or component parts. A weight and balance computation using actual passenger and baggage weights was computed and the aircraft was found to be overloaded by 709 pounds; the center of gravity was 10.9 inches aft of C. G. limits.

PROBABLE CAUSE: (1) Loss of control during take-off climb due to overload condition and improper center of gravity.
(2) Judgment of pilot in initiating flight without adequate preflight preparation.

Intra-Alaska Carriers - Nonscheduled Revenue Operations

8/15/60	2215 AST	Nome, Alaska	Munz	L-10A	Destroyed	None	10	0	0	1	0	0	9

About 35 minutes after take-off, at 1945 b.s.t., from Kotzebue, Alaska for the return flight to Nome, the pilot experienced a power loss from the right engine. The pilot feathered the propeller and trimmed the aircraft for single engine flight. The pilot elected to continue to Nome because a return to Kotzebue entailed recrossing a body of water. He also overflew an airfield at Tin City because of strong gusty surface winds and turbulence close to the ground. Suspecting that carburetor ice may have caused the power loss, while en route the pilot unsuccessfully attempted several times to restart the right engine. The propeller, however, was not unfeathered in the attempts because he did not use or know the procedure. The flight reached Nome and landed at 2215. The aircraft was landed on runway 02 into the 11 m.p.h. surface wind; however, prior to landing the pilot did not reset the spring bungee rudder assist tension although he had been told during training to counteract some of the yaw force by rudder pressure in a single engine landing. Shortly after touchdown, the aircraft veered to the left off the runway into a creek bed. The pilot stated that during the roll-out he was unable to overcome the rudder pressure and stop the veer to the left. He also said he did not attempt to correct the deviation with power from the left engine although braking was ineffective. The reason for the loss of power was undetermined.

PROBABLE CAUSE: Loss of directional control during the landing roll resulting from the pilot's failure to use the proper single engine landing technique.

11/28/60	2328 Z	Kotzebue, Alaska	Wien	Beech B-18	Minor	None	1	0	0	1			

All of the windows of the aircraft except the windshield were frosted over when the pilot approached a congested area of the parking ramp. A ground crewman met the plane to assist the pilot and gave signals which the pilot said he believed meant to continue taxiing. The right wing tip struck a parked aircraft causing minor damage. (Parked aircraft: Cessna 180)

PROBABLE CAUSE: Misinterpretation by the pilot of unclear signals given by the ground crewman.

12/3/60	1030 AST	Head of Nichowak River, Alaska	Cordova	PA-18	Substantial	None	1	0	0	1			

During the landing roll on a snow-covered frozen river, the left wheel of the aircraft broke through the crusted snow causing the plane to nose over.

PROBABLE CAUSE: Pilot landed on area covered by snow, the condition of which was unsuitable for wheel equipment aircraft.

Intra-Alaska Carriers - Nonscheduled Revenue 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	Other F	Other S	Other M
12/10/60	1055 BST	Golovin, Alaska	Munz	Stinson	Substantial	None	3	0	0	1	0	0	2			

Shortly after takeoff from Nome a Non-scheduled flight to Shaktoolik, some snow showers and bad weather were encountered. When in the vicinity of Golovin, the visibility suddenly dropped in snow squalls. The pilot at first attempted to turn back but because of the white-out condition, he elected to land straight ahead on the ice of Golovin Bay. While in a turn the left gear struck a snowbank, collapsing the gear. The pilot was not qualified for instrument flight and had made no radio contacts prior to the emergency landing.

PROBABLE CAUSE: (1) White-out conditions resulting in loss of visual reference.
(2) Pilot attempted to continue VFR flight in IFR conditions.

Nonscheduled Nonrevenue Operations

4/9/60	0009 Z	Fairbanks, Alaska	Wien	F-27A	Substantial	None	2	0	0	2						

During take-off for a local night IFR test flight following an engine change, the copilot prematurely retracted the landing gear and the bottom of the fuselage contacted the runway. The captain stated that he felt the fuselage strike the runway immediately before the plane became airborne. He said he was able to continue the take-off, circle the airport and make a gear down landing without additional damage.

PROBABLE CAUSE: Copilot prematurely retracted the landing gear during the take-off run.

6/3/60	1323 AST	Kodiak, Alaska	Kodiak Airways	Grumman G-44	Destroyed	None	1	0	0	1						

At the completion of a charter trip from Kodiak to Cape Chiniak, the pilot made a water landing. He then lowered the landing gear of the amphibious plane and taxied onto a runway for unloading. Following take-off for the return flight, the pilot forgot to raise the landing gear and during the water landing at the destination, the plane nosed over.

PROBABLE CAUSE: Pilot failed to raise the landing gear prior to water landing.

International/Territorial Operators - Scheduled Passenger Service

2/7/60	1628 PST	Los Angeles, Calif. PAWA		B-707	Substantial	None	123	0	0	10	0	0	113

When visual contact was established during an ILS approach with a ceiling of 500 ft. and a visibility of 1½ miles, the pilots saw that the aircraft was well left of alignment with the runway of intended landing. The copilot who was flying the aircraft executed a right turn to the runway and then a left turn to align with it. During the latter turn the numbers 1 and 2 jet pods scrapped the runway.

PROBABLE CAUSE: Improperly executed ILS approach.
Inadequate supervision by the captain.

3/9/60	2210 Z	Dominion Creek, Alaska	Alaska Airlines	Cessna 180	Substantial	None	2	0	0	1	0	0	1

Following landing on a snow-covered field, the ski-equipped aircraft slid normally for 150 to 200 feet. It then nosed over on its back. Investigation showed that when the aircraft came to rest the skis were in the retracted position. Extensive tests also revealed that the extension mechanism was capable of normal operation. Consequently, it was evident that the skis were not fully extended to the locked position prior to landing and the skis retracted after touchdown.

PROBABLE CAUSE: Failure to assure skis were fully extended and locked before landing.

6/14/60	0447 AST	Mt. Gilbert, Alaska	Pacific Northern	L-749	Destroyed	None	14	5	0	0	9	0	0

The flight failed to maintain its intended track after taking off from Cordova, Alaska bound for Anchorage, Alaska, and crashed into the sheer face of Mt. Gilbert at the 9,000 foot level. Mt. Gilbert was approximately 28 nautical miles to the right of the flight's first intended checkpoint and is 9,646 feet in elevation.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was the failure of the crew to use all available navigational aids in establishing the aircrafts position on Amber 1 Airway, thereby allowing the aircraft to deviate from course and fly over hazardous terrain. A contributing factor was the failure of Air Defence Radar, which had been tracking the aircraft, to notify either ARTCC or the crew that the aircraft was proceeding on a dangerous course.

International/Territorial Operators - 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
7/14/60	0430 Z	Manila, P. I.	Northwest	DC-7C	Destroyed	In Flight	58	0	0	7	1	0	50			

At approximately 0430 Manila Time, July 14, 1960 (2030 g.m.t. July 13, 1960), a Northwest Airlines DC-7C, N-292, operating as Flight 1-11, en route from Okinawa to Manila, P. I., ditched in the Pacific Ocean, approximately 67 nautical miles northeast of the Manila Airport, after reporting fire in the left wing and loss of the No. 2 propeller. All 58 occupants, including the 7 crew members, successfully evacuated the aircraft. Of these, 44 suffered minor injuries and one woman passenger died. While the flight was en route between Okinawa and the P. I., the No. 2 engine experienced an appreciable power loss followed by overspeeding of the propeller. The crew instituted emergency procedures but was unable to control or feather the propeller. The propeller separated from the engine with a resulting nose section fire. Attempts to extinguish the fire failed, and the crew elected to ditch the aircraft. The ditching was accomplished at night during a rainstorm and while under instrument conditions.

PROBABLE CAUSE: The Board determines that the probable cause of this accident was the internal failure of No. 2 engine, resulting in oil contamination, loss of oil supply, subsequent loss of the No. 2 propeller assembly, and fire-in flight, which necessitated a ditching.

8/10/60	1410 BST	Northeast Cape, Alaska	Alaska Airlines	Beech C-18S	Destroyed	None	6	0	0	1	0	0	5			

On completion of a scheduled flight from Nome to Northeast Cape, the pilot made a wheel landing, using full flaps. After rolling about 1,000 feet, a strong gust of wind weathervaned the aircraft to the left. The pilot was unable to regain directional control and the aircraft rolled off the side of the runway into a ditch. A gusty cross wind prevailed with velocity between 30 and 40 knots. This condition also existed before the flight was initiated from Nome and the pilot had been informed of it.

PROBABLE CAUSE: (1) Loss of directional control during landing in a strong, gusty cross wind.
(2) Judgment of the pilot in initiating the flight to Northeast Cape where a known adverse cross wind existed.

9/7/60	1903 Z	Accra, Ghana, Africa	PAWA	DC-7	None	None	40	0	0	10	0	0	30	1	0	0

After landing at Accra, Ghana, one of several en route stops for the scheduled flight from N. Y. to Johannesburg, the aircraft was taxied to the terminal with the Nos. 1 and 4 engines shut down. The aircraft was parked and the other engines were being stopped when a ground crewman crossed under the aircraft from left to right and was struck by the No. 3 propeller. The propeller was rotating to a stop when it struck the ground crewman. The accident occurred during approaching darkness; however, the area was well lighted and weather conditions were clear.

PROBABLE CAUSE: Lack of alertness of the ground crewman.

International/Territorial Operators - Nonrevenue Operations

2/22/60	2058 Z	Anchorage, Alaska	Alaska Airlines	DC-6A	Substantial	None	4	0	0	4

The flight was made to ferry the aircraft from Anchorage International Airport to Elmendorf AFB, Anchorage, Alaska, a flight of about ten minutes. An instrument flight and GCA approach to Elmendorf was required because of instrument weather conditions reported as: thin obscurement; measured ceiling, 300 feet, broken; 1,000 feet, overcast; visibility, five miles; fog. During the GCA final approach the aircraft descended and struck the ground 1,200 feet short of the runway. Investigation disclosed the approach was made by the captain contrary to the airspeed, flap setting, rpm and power settings required by the carrier. Furthermore, although the GCA controller advised the flight it was below the limits of the glide path and to make a missed approach, the descent was continued until the aircraft struck the ground. Investigation also disclosed the First Officer and Flight Engineer were aware that the initial airspeed for the glide slope was too high, the rpm setting was 2,200 instead of 2,400, the power setting was about 20 inches of manifold pressure instead of 25 and the flap setting used was 40 degrees instead of 30 degrees, but did not call the Captain's attention to these factors. Furthermore, all were aware the descent was continued below the minimum altitude. There was no evidence found of malfunction or failure of the aircraft and both pilots' airspeed indicators and altimeters tested within allowable limits.

PROBABLE CAUSE: The pilot used improper power and flap settings resulting in an excessive rate of descent which was continued until the aircraft struck the ground.

Supplemental Air Carriers Passenger/Cargo

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
Passenger Service - Public																
10/29/60	2202 EST	Toledo, Ohio	Arctic-Pacific	C-46	Destroyed	After Impact	48	2	0	1	20	10	15			

The aircraft took off from Toledo Express Airport on the return flight to San Luis Obispo in weather conditions of 9/10 ths. partial sky obscuration; zero visibility in fog; and weighting approximately 2,000 pounds more than its maximum certificated gross weight of 47,100 pounds. The aircraft crashed approximately 5,800 feet from the threshold of the takeoff runway, caught fire, and was destroyed.

PROBABLE CAUSE: The Board determined that the probable cause of this accident was loss of control during a premature liftoff. Contributing factors were the overweight aircraft, weather conditions, and partial loss of power in the left engine.

Cargo Service - Public																
2/14/60	0445 EST	Providence, R. I.	United States Overseas	DC-4	Substantial	None	2	0	0	2						

As difficulty with runway alignment on a GCA approach occurred, two circling VFR approaches were attempted. The weather was deteriorating and icing conditions were encountered. On the last attempt clearance to proceed to Boston was requested and received. On the pullup a scraping sound was heard. On arrival at Boston inspection of the aircraft revealed damage to the aircraft as a result of contact with tree tops.

PROBABLE CAUSE: Failure to maintain sufficient altitude to clear obstructions during attempted VFR approach in IFR conditions.

Military Contract - Passenger

2/13/60	2120 EST	McGuire, AFB, N. J.	Associated Air Transport	C-46	Substantial	None	57	0	0	3	0	0	54

The purpose of the flight was a contract civil air movement of military personnel from Standiford Field, Louisville, Kentucky, to McGuire Air Force Base, N. J. The flight was uneventful until reaching the Elkins-Charleston, West Virginia area where light to moderate icing occurred requiring the use of wing de-icers and propeller anti-icers. Shortly after passing Baltimore, light to moderate icing was encountered requiring a power setting of 2400 RPM and 38" MP. The aircraft was losing altitude and it became necessary to apply METO power 2600 RPM and 45" MP. Fuel consumption at this power setting is approximately 500 gallons per hour. During the final approach (GCA), the aircraft stalled, settled onto the ground and came to rest 1200 feet short of the threshold. Investigation revealed that : (1) The flight was continued over a suitable airport to destination with known inadequate fuel reserve; (2) the flight was continued into severe icing conditions; (3) the flight crew was not properly briefed on terminal and enroute weather; and (4) the flight crew did not properly monitor the weather while en route.

PROBABLE CAUSE: Crew failed to maintain an accurate log of the flight as pertains to flight planning/fuel Consumption/fuel requirements.

9/19/60	0602 Z	Guam, Mariana Islands, Agana NAS	World Airways	DC-6B	Destroyed	After Impact	94	7	1	0	73	9	4

The flight received FAA Air Route Traffic Control route and departure clearance and took off into night VFR weather conditions. It made a right turn after takeoff and although making a continuous climb over the distance flown, it struck Mt. Barragada at a point approximately 300 feet above the elevation of the airport, and slid into the thick underbrush cutting a swarth for nearly 1,000 feet before it came to rest. Damage and injury were more attributable to fire than impact forces.

PROBABLE CAUSE: The Board determines that this accident occurred because of the failure of the pilot to comply with published departure procedures applicable to runways 6 left and 6 right.

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
10/4/60	1925 PST	Sacramento, Calif.	Capitol	C-46F	Minor	None	2	0	0	2						
				Cessna	Destroyed	After Impact	2							2	0	0

The pilot was on a night final approach to McClellan AFB when he felt a thud under his aircraft. This was followed shortly thereafter by a bright flash below the aircraft as it was landing. A cursory inspection of the aircraft showed no damage. However, when later informed that a Cessna had collided with the C-46 on final, a closer inspection revealed a 7 inch dent at the trailing edge of the inboard flap of the C-46. The Cessna crashed and exploded. Investigation revealed that the Cessna pilot was on an unauthorized night landing approach.

PROBABLE CAUSE: Cessna pilot failed to see the C-46 in time to avoid a collision.

10/15/60	1103 MST	Plain City, Utah	Capitol	C-46F	Destroyed	After Impact	2	2	0	0						

As near as can be determined, the flight from Tinker AFB to Hill AFB with a scheduled stop at Rapid City, South Dakota, was routine until the pilots were making a simulated ILS approach with radar advisories to Hill AFB. The aircraft crashed from level flight at 6,500 feet MSL, ten miles from the airport. Examination of the wreckage disclosed that an in-flight separation of the right wing had occurred as the result of fatigue failures of the lower attach angle bolts holding the forward portion of the outer wing panel to the center wing panel. As a result of the accident an Airworthiness Directive was issued to require the replacement of all wing attach angle bolts at specified service life intervals.

PROBABLE CAUSE: The fatigue failure of the right wing lower attach angle bolts resulting in an in-flight wing failure.

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
7/22/60	1046 PST	Hawthorne, Calif.	Stewart Air Service	DC-4	Substantial	None	3	0	0	3						

During a type rating check, the ATR pilot, age 43, with 12,480 total hours, 1,200 in type, was given a simulated engine failure during take-off. The pilot flew the aircraft around the pattern and made a normal landing. When he asked for flaps up, the landing gear warning horn sounded and the nose gear collapsed. The FAA inspector, who was seated on the jump seat during the flight, stated that when he heard the warning horn he saw the copilot's hand on the gear handle and the handle was then in the neutral position. The Captain held the nose off as long as possible and when it settled the nose gear was retracted.

PROBABLE CAUSE: Copilot inadvertently actuated the landing gear control instead of the flap control.

10/24/60	1015 EST	Miami, Fla.	Argonaut Airways	C-46	Substantial	None	2	0	0	2						

During a test flight the ATR pilot, age 41, with 9,338 total hours, 7,054 in type, extended the landing gear and received an amber light which indicated the gear was extended but only to the single lock; the gear system utilizes a double lock indicated by a green light. When several attempts to obtain a green light indication using the normal extension system failed, the emergency extension procedure was attempted. Only the amber indication was received. During the latter portion of the landing roll the left gear collapsed. Examination of the landing gear system revealed the left landing gear retract cylinder had failed around the top of the cap. No mechanical reason was found to explain why the gear could not be extended to the double locked position using the emergency hand crank.

PROBABLE CAUSE: (1) Material failure of the left landing gear retract cylinder.
(2) Failure for an undetermined reason of the gear to extend to the double lock position using the emergency system.

ADDENDUM

REVISIONS - 1959 ACCIDENT RECORD

The information presented in the annual "Resume" is based on the data available at the time the publication goes to press. Information subsequently received may alter the basis for the classification of certain occurrences. In this respect, the following changes have occurred relative to the accident record for calendar year 1959 as it appeared in the Resume dated July 15, 1960.

DELETIONS:

1. Under Scheduled Domestic Operators - Scheduled Passenger Service; the accidents shown as occurring on 10/6/59, at Idlewild, N. Y. involving New York Airways, Vertol, and 11/4/59 Santa Maria, California involving a Pacific Air Lines M-202, have been reclassified as Incidents.

2. Under Scheduled Domestic Operators - Nonrevenue Operations; the accident 11/27/59, at Ontario, California involving an American B-707 has been reclassified as an Incident.

3. Under International/Territorial Operators - Scheduled Passenger Service; the accident 6/23/59 at Taipei, Taiwan, Formosa, involving Northwest Airlines DC-7C has been reclassified as an Incident.

ADDITIONS:

1. Under Scheduled Domestic Operators - Scheduled Passenger Service; the accident occurred on 7/6/59 at Goffs, California involving a Trans World Airlines L-1049G with 67 persons aboard. The aircraft damage was substantial with no injuries to 5 crew members and 62 passengers. The aircraft had departed normally from Los Angeles, California with the next scheduled stop at Kansas City, Missouri and was routine until the flight engineer started setting up maximum cruise power at a cruising altitude of 19,000 feet. At this time, number 2 engine surged and the fire warning came on in number 2 engine. The engine was feathered and both bottles of extinguisher were discharged to put out the fire. The number 1 engine started loosing oil rapidly and it was also feathered. An unscheduled, two engine out, landing was made at Las Vegas, Nevada. Investigation revealed that the turbine wheel retaining nut became loose allowing the turbine wheel to work on the shaft spines which were worn and milled away. This condition allowed the turbine to freewheel and overspeed which caused the shaft to break and the turbine buckets to trigger. Part of the turbine wheel went forward, damaging the number 2 propeller.

Parts were also thrown into the number 1 engine oil radiator. Other parts went rearward, damaging the number 2 engine firewall door, allowing fire to enter the wheelwell, scorching the left outboard tire, and burning two holes in the left landing gear door.

2. Under Scheduled Domestic Operators - Scheduled Cargo Service; the accident occurred on 9/24/59 at New York City, New York involving a Northwest Airlines DC-4 with 2 persons aboard. The aircraft damage was substantial with no injuries to the 2 crewmembers. A preflight inspection had been completed by maintenance personnel prior to release of the aircraft for the flight. Thereafter, a walkaround inspection was performed by a maintenance crewchief who, at this time, removed the landing gear downlock pins. According to the flight crew, they also performed a walkaround inspection before boarding the aircraft and it was noted that the nose gear was centered and the gear downlock pins were removed. The crew boarded the aircraft and the prestart cockpit check was completed and the following was observed: Emergency extension valve - back, gear handle - down, hydraulic system pressure - 400 to 500 pounds, brake pressure - 1600 pounds, and all 3 green lights on the landing gear warning system were illuminated. However, while starting the number 3 engine, and as the mixture control was being moved from idle cutoff to rich position, the landing gear warning horn began to sound and the nose gear collapsed. The captain stated that he immediately checked the landing gear handle and it was in the downlock detent. Subsequent to the accident inspection, extensive tests were conducted in an attempt to duplicate conditions existing at the time the nose gear collapsed. These tests indicated that the entire system functioned normally.

3. Under Scheduled Domestic Operators - Nonrevenue Service; the accident occurred on 12/18/59 at Ontario, California involving a Pacific Air Lines DC-3 with 3 persons aboard. The aircraft damage was substantial with no injuries to the 3 crew members. As the aircraft was being taxied into the runup position, the aircraft started to settle on the right side. Investigation determined that the right landing gear had collapsed because of failure of the right landing gear brace strut fitting.