

AIRCRAFT INDUSTRIES ASSOCIATION OF AMERICA, INC.

AVIATION FACTS  
AND FIGURES  
1945

RUDOLF MODLEY  
Editor

McGRAW-HILL BOOK COMPANY, INC.

NEW YORK AND LONDON

1945

AVIATION FACTS AND FIGURES, 1945

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*Second Printing*

THE MAPLE PRESS COMPANY, YORK, PA.

## PREFACE

Two characteristics are responsible for the revolutionary changes in transportation and in warfare which have been brought about by the airplane.

One is the airplane's superior speed. Today's airliners travel four times as fast as any other means of transportation serving the general public. Tomorrow's airliners will increase this margin easily.

The other characteristic is the ability of aircraft to move freely through space. Trains can move only along lines prescribed by their tracks. Ships can move with greater freedom, being able to travel in any direction on any body of water deep enough to permit them to operate. But aircraft can travel anywhere independent of surface conditions—over arid deserts, ice-capped peaks, congested cities, and the wide expanses of the ocean. Their only limit is the sky itself.

Because the United States has realized and exploited these characteristics, she is the leading power in the air. Her Army and Navy Air Forces are the strongest in the world. She leads the world in air commerce. Her aircraft industry is the world's largest. In comparison with any other history of military or industrial growth, the United States has achieved this preeminent position in an amazingly short time. Personnel in the Army Air Forces grew from 22,000 in 1939 to 2,400,000 in 1944. Only 143 military aircraft were produced in the entire month of January, 1939. Five years later, in January, 1944, twice that many planes were being produced every day!

Employment in the industry grew from less than 50,000 wage earners to more than 2 million. In 1944 the value of production reached the staggering total of 16,745 million dollars. This sum equals the total value of production in 1939 by the automobile industry, the steel works, the meat-packing plants, the petroleum industry, the bakeries, the cigarette companies, the smelters and refiners of nonferrous metals, the paper and paperboard mills, and the printers and publishers of newspapers—the nine leading industries of 1939.

The industry has no time to stop and look back on its achievements. It is face to face with the problems of survival inherent in the necessary shrinkage to a peacetime level. Here are some of the questions that confront the aircraft industry today:<sup>1</sup>

<sup>1</sup> These queries are largely derived from seven questions outlined by Lynn L. Bollinger, Tom Lilley, and Albert E. Lombard, Jr., in "Preserving American Air Power," *Harvard Business Review*, Spring, 1945, p. 374.

1. Will the industry be able to survive the readjustment period through which we are now passing? This question is compounded by the small financial resources of the industry, the losses which may be sustained in the settlement of terminated war contracts, and the effects of government policy in the disposal of surplus plants and surplus aircraft.

2. How large will be peacetime military orders, and how soon can they be expected?

3. What will be the role of commercial aviation, personal flying, airport development, and exports in postwar years?

4. Will civil and military business be sufficient to maintain a properly balanced and rapidly expansible nucleus of aircraft-production capacity in peacetime? This question applies to production facilities as well as to labor and management skills.

5. What will be the government policies in regard to research and development?

The aircraft industry, our air commerce, and the nation's air forces are the components of America's air power. To this power our country must look for the strength that will ensure continuing peace. If present efforts for an international security organization fail to prevent a Third World War, it may be necessary some day to repeat the aircraft-production miracle of the Second World War. But then we shall have to repeat this miracle in the space of one year—not five. Hence the answers to the questions above are vital to the future of the nation.

Questions of such importance require serious study by all of us. Yet the relative shortness of time in which aviation has assumed major significance has prevented an accumulation of records on which students normally base long-range historical and economic interpretations. Security regulations during the war added to this difficulty. All these factors have contributed to the lack of basic information on the role of air power in our national life.

Only now is it possible to furnish some of the factual data for objective studies. The new handbook on aviation, of which this volume is the first, should do much to help students of some or all of the questions confronting aviation. To our knowledge this is the first comprehensive survey of aviation statistics. It has been brought together from dozens of different sources and should prove valuable as a reference work for legislators, administrators in government and industry, writers and editors, analysts and students. We hope that they will give us the benefit of their suggestions and criticisms so that future editions may be improved.

Statistics on aviation are compiled by many agencies. A collection of such statistics emphasizes the lack of comparability among many of the data available. It points to the need for better coordination among the

fact-finding agencies of the government which are concerned with statistics, a need which is increasingly recognized by these agencies themselves.

This volume has been in the making for more than a year. In March, 1945, a draft was sent for review to experts in the industry and in government. To all those who have willingly given their time to help make this book, we express our sincere appreciation.

*Aviation Facts and Figures*, 1945 was compiled and edited by the Research and Statistics Service of the Aircraft Industries Association, with Rudolf Modley as Director and Paul Price and Beverly White as Assistants. Chapter 4 was prepared by Mr. Raymond Durrell.

EUGENE E. WILSON.

*President*

*Aircraft Industries Association  
of America, Inc.*

WASHINGTON, D. C.,  
*September, 1945.*

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## CHAPTER 1

### PRODUCTION FACILITIES

Several ways were used to expand aircraft war production. Existing plants were enlarged; new plants were built. The industry worked two or three shifts a day, many new workers were hired and trained, and production methods were improved. In addition, much work was sub-contracted, let out to thousands of producers who furnished the prime contractor with products used in the final assembly.

Floor space is one of the accepted ways of measuring the capacity of aircraft facilities. Several of the following tables use this measurement. Definitions of the different terms used will be found at the end of the book.

The tremendous expansion of aircraft facilities was financed to the largest extent by Federal funds. The Reconstruction Finance Corporation alone, as of Dec. 31, 1944, had made commitments through the Defense Plant Corporation for 574 aircraft facilities in the amount of 3.1 billion dollars.

In January, 1945, 24 manufacturers were producing airplanes, 4 were producing gliders, 15 were producing engines, and 7 were producing propellers. Several of these manufacturers had two or more facilities in operation.

After the war, some of the presently existing aircraft facilities will become surplus or stand-by facilities. Listings of industrial plant sites available for disposal are published by the Surplus War Property Division of the Defense Plant Corporation.

TABLE 1-1. ESTIMATED GROSS VALUE OF FACILITIES, 1939-1944

	All manu- facturing, millions	Aircraft, engines, parts, and acces- sories, millions	Aircraft, etc., as per cent of total manufac- turing <sup>a</sup>
1939.....	\$39,588	\$ 114	.3
Expansion, July, 1940-December, 1944.....	24,058	3,792	15.8
Approximate value, December, 1944 <sup>a</sup> .....	63,646	3,906	6.1

Expansion figures represent cost of new construction and equipment put in place (without depreciation).

<sup>a</sup> Computed by Aircraft Industries Association, Research and Statistics Service.

Source: War Production Board, *Facts for Industry*, Facilities Expansion, July, 1940-June, 1944, Series 50-4-1, pp. 6, 17. (Brought up to date by War Production Board, Program and Statistics Bureau, Industrial Division, Facilities Branch, letter of May 12, 1945.)

TABLE 1-2. AIRPLANE FACILITIES IN MILITARY PRODUCTION (PRIME CONTRACTORS), 1938-1944<sup>a</sup>

Year	Airplane	Engine	Propeller	Total
1938	9	4	2	15
1939	17	7	4	28
1940	25	12	4	41
1941	28	13	3	44
1942	46 <sup>b</sup>	17	5 <sup>c,b</sup>	68 <sup>d</sup>
1943	59 <sup>e</sup>	20	7 <sup>c,b</sup>	86 <sup>f</sup>
1944	49 <sup>f</sup>	17	7 <sup>c,b</sup>	73 <sup>g</sup>

<sup>a</sup> Includes Canadian facilities engaged in United States financed activities.

<sup>b</sup> Includes 1 Canadian facility.

<sup>c</sup> Does not include facilities that manufacture blades and/or hubs alone and plants producing wood propellers.

<sup>d</sup> Includes 2 Canadian facilities. <sup>f</sup> Includes 5 Canadian facilities.

<sup>e</sup> Includes 4 Canadian facilities. <sup>g</sup> Includes 6 Canadian facilities.

Sources: 1938-1940: "Report of the Commanding General of the Army Air Forces to the Secretary of War," Jan. 4, 1944, giving "facilities in operation."

1941-1944: Aircraft Resources Control Office, *Report 15*, giving "facilities in production" for December of each year.

TABLE 1-3. VALUE OF AIRCRAFT FACILITIES EXPANSION INITIATED JULY, 1940-DEC. 31, 1944, BY TYPE OF PRODUCT AND SOURCE OF FINANCING<sup>a</sup>  
(Millions of dollars)

Type of product	Federally financed <sup>b</sup>	Privately financed	Total
Assembled aircraft and airframe parts.....	\$1,274	\$ 93	\$1,367
Aircraft engines.....	1,362	118	1,480
Engine parts and accessories.....	382	27	409
Propellers and parts.....	203	24	227
Other parts and accessories.....	227	46	273
Total.....	\$3,448	\$308	\$3,756

<sup>a</sup> Includes only projects estimated to cost \$25,000 or more.

<sup>b</sup> Includes projects financed by the British government.

Source: War Production Board, Information Division, letter of Nov. 16, 1944. (Brought up to date by War Production Board, Program and Statistics Bureau, Industrial Division, Facilities Branch, letter of May 12, 1945.)

TABLE 1-4. TOTAL FLOOR SPACE OF AIRCRAFT, ENGINE AND PROPELLER FACILITIES (PRIME CONTRACTORS), 1939-1944  
(Thousands of square feet)

Date	Airplane	Glider	Engine	Propeller	Total
Jan. 1, 1939.....	7,479	.....	1,726	250	9,455
Jan. 1, 1940.....	9,606	.....	3,018	492	13,115
Jan. 1, 1941.....	17,943	.....	6,463	1,050	25,456
Sept. 1, 1941.....	31,786	.....	10,651	1,734	44,171
Jan., 1943.....	77,536	2,486	31,829	5,240	117,091
Dec., 1943.....	110,423	3,558	54,189	6,835	175,005
Dec., 1944.....	102,951	1,664	54,888	7,888	167,391

Sources: 1939-1941: Unpublished surveys of the Aeronautical Chamber of Commerce.

1943-1944: Aircraft Resources Control Office, *Report 15*.



PRODUCTION FACILITIES

TABLE 1-5. VALUE OF AIRCRAFT, ENGINES, PARTS, AND ACCESSORIES FACILITIES INITIATED JULY 1, 1940-DEC. 31, 1944, BY LOCATION (Millions of dollars)

Census division and state	Federally financed	Privately financed	Total <sup>a</sup>	Per cent <sup>a</sup>
<b>New England:</b>				
Maine.....	.....	b	b	
New Hampshire.....	\$ 1	b	\$ 1	
Massachusetts.....	41	\$ 6	47	
Rhode Island.....	2	1	3	
Connecticut.....	108	22	130	
Total.....	\$ 152	\$ 29	\$ 181	4.8
<b>Middle Atlantic:</b>				
New York.....	\$349	\$14	\$363	
New Jersey.....	172	23	195	
Pennsylvania.....	101	12	113	
Total.....	\$ 622	\$ 49	\$ 671	17.9
<b>East North Central:</b>				
Ohio.....	\$428	\$40	\$468	
Indiana.....	252	7	259	
Illinois.....	412	5	417	
Michigan.....	405	38	443	
Wisconsin.....	100	4	104	
Total.....	\$1,597	\$ 94	\$1,691	45.0
<b>West North Central:</b>				
Minnesota.....	\$ 17	\$ 1	\$ 18	
Iowa.....	2	1	3	
Missouri.....	107	2	109	
Nebraska.....	29	b	29	
Kansas.....	73	8	81	
Total.....	\$ 228	\$ 12	\$ 240	6.4
<b>South Atlantic:</b>				
Delaware.....	\$ 1	b	\$ 1	
Maryland.....	66	\$ 5	71	
Virginia.....	1	b	1	
West Virginia.....	.....	b	b	
North Carolina.....	5	1	6	
Georgia.....	53	b	53	
Florida.....	3	2	5	
Total.....	\$ 129	\$ 8	\$ 137	3.6
<b>South Central:</b>				
Kentucky.....	\$ 17	\$ 1	\$ 18	
Tennessee.....	8	7	15	
Alabama.....	16	b	16	
Mississippi.....	.....	b	b	
Arkansas.....	.....	b	b	
Louisiana.....	43	.....	43	
Oklahoma.....	86	2	88	
Texas.....	121	2	123	
Total.....	\$ 291	\$ 12	\$ 303	8.1
<b>Mountain:</b>				
Wyoming.....	\$ 4	.....	\$ 4	
Colorado.....	4	b	4	
Arizona.....	18	\$ 1	19	
Utah.....	.....	b	b	
Total.....	\$ 26	\$ 1	\$ 27	.7
<b>Pacific:</b>				
Washington.....	\$ 40	\$ 3	\$ 43	
Oregon.....	1	1	2	
California.....	165	80	245	
Total.....	\$ 206	\$ 84	\$ 290	7.7
Undistributed by states.....	197	19	216	5.8
United States total.....	\$3,448 <sup>c</sup>	\$308	\$3,756	100.0
Per cent <sup>c</sup> .....	91.8	8.2	100.0	

<sup>a</sup> Computed by Aircraft Industries Association, Research and Statistics Service.

<sup>b</sup> Less than \$500,000.

<sup>c</sup> Includes projects financed by the British government.

Source: War Production Board, *Facts for Industry, Facilities Expansion*, July, 1940-June, 1944, Series 50-4-1, pp. 33, 34. (Brought up to date by War Production Board, Program and Statistics Bureau, Industrial Division, Facilities Branch, letter of May 12, 1945.)

TABLE 1-6. TOTAL FLOOR SPACE OF AIRCRAFT, ENGINE, AND PROPELLER FACILITIES IN PRODUCTION (PRIME CONTRACTORS), BY LOCATION, DECEMBER, 1944  
(Thousands of square feet)

Division <sup>a</sup>	Airplane	Glider	Engine	Propeller	Total	Per cent
New England.....	2,259	.....	4,991	947	8,197	4.9
Middle Atlantic.....	19,225	.....	13,824	3,186	36,235	21.6
East North Central.....	15,816	1,376	31,543	3,755	52,490	31.4
West North Central.....	9,233	288	3,903	.....	13,424	8.0
South Atlantic.....	10,568	.....	.....	.....	10,568	6.3
East South Central.....	2,077	.....	.....	.....	2,077	1.3
West South Central.....	12,958	.....	627	.....	13,585	8.1
Pacific.....	30,815	.....	.....	.....	30,815	18.4
Total.....	102,951	1,664	54,888	7,888	167,391	100.0
Per cent.....	61.5	1.0	32.8	4.7	100.0	

<sup>a</sup> See Table 1-4 for states included in the divisions.  
Source: Aircraft Resources Control Office, Report 15.

TABLE 1-7. VALUE OF FEDERALLY FINANCED AIRCRAFT FACILITIES INITIATED, BY TYPE OF PRODUCT AND BY PLANT AND EQUIPMENT,<sup>a</sup> JULY, 1940-FEB. 28, 1945  
(Millions of dollars)

Type of product	Land, building, and other costs	Machinery and production equipment	Total
Airframes and subassemblies.....	\$ 696	\$ 346	\$1,042
Engines.....	401	867	1,268
Propellers.....	14	35	49
Accessories and parts.....	33	65	98
Turrets.....	6	9	15
Instruments.....	19	21	40
Total in plants costing over \$5,000,000	\$1,169	\$1,343	\$2,512
Investments in plants costing less than \$5,000,000 and in converted plants.....	319	825	1,144
Grand total.....	\$1,488	\$2,168	\$3,656

<sup>a</sup> These figures on authorized costs are given in this form only as a rough measure of the machinery and production equipment provided. They do not entirely agree with data on the same subject provided by the War Production Board and should not be used or interpreted as the exact cost of either plants or machinery because of variations in percentages of completion and changes in production requirements.

Source: "War Plant Disposal," Progress Report on the Preparation of Joint Hearings on the Disposal of Surplus Aircraft Plants and Facilities, printed for the use of the (Senate) War Contracts Subcommittee of the Committee on Military Affairs and the (Senate) Industrial Reorganization Subcommittee of the Special Committee on Economic Policy and Planning, May 8, 1945, Subcommittee Print No. 2, p. 22.

PRODUCTION FACILITIES

TABLE 1-8. VALUE OF CONSTRUCTION AND EQUIPMENT PUT IN PLACE, JULY, 1940-  
DECEMBER, 1944  
(Aircraft, engines, parts, and accessories)  
(Millions of dollars)

Period	Construction	Equipment	Total
1940: 3rd quarter.....	\$ 18	\$ 27	\$ 45
4th quarter.....	25	36	61
Second half 1940.....	\$ 43	\$ 63	\$ 106
1941: 1st quarter.....	\$ 44	\$ 55	\$ 99
2d quarter.....	61	59	120
3d quarter.....	84	88	172
4th quarter.....	61	114	175
Total 1941.....	\$ 250	\$ 316	\$ 566
1942: 1st quarter.....	\$ 90	\$ 135	\$ 225
2d quarter.....	129	146	275
3d quarter.....	189	207	396
4th quarter.....	191	196	387
Total 1942.....	\$ 599	\$ 684	\$1,283
1943: 1st quarter.....	\$ 174	\$ 207	\$ 381
2d quarter.....	124	216	340
3d quarter.....	87	150	237
4th quarter.....	52	140	192
Total 1943.....	\$ 437	\$ 713	\$1,150
1944: 1st quarter.....	\$ 48	\$ 81	\$ 129
2d quarter.....	33	112	145
3d quarter.....	35	201	236
4th quarter.....	46	131	177
Total 1944.....	162	525	687
Grand total.....	\$1,491	\$2,301	\$3,792

Source: War Production Board, *Facts for Industry*, Facilities Expansion, July, 1940-June, 1944, Series 50-4-1, p. 18. (Revised and brought up to date by War Production Board, Program and Statistics Bureau, Industrial Division, Facilities Branch, letter of May 12, 1945.)

## CHAPTER 2

### PRODUCTION

On Dec. 17, 1903, the first power-driven flight in a heavier-than-air aircraft was achieved by the Wright brothers. Their biplane, powered by a 16-hp motor, remained in the air for 12 seconds and traveled a distance of 120 feet.

The potentialities of this venture were hardly exploited until the outbreak of the First World War, more than 10 years later. "Back-yard" builders produced most of the few planes made between 1903 and 1914.

The First World War provided the first real impetus to aircraft production in the United States. At first, during the years 1914-1916, planes were produced largely for export. After the United States entered the war, production was stepped up sharply in order to meet the requirements of the Allies.

Production figures for the early years are scarce. The United States Census first undertook to report on aircraft production in 1914. (Figures on aeronautic exports had been available since 1912.) But up to 1925, aircraft and engine production data suffer from many shortcomings and should serve as trend indications rather than as reliable bases for calculations.

From 1925 to 1937, aircraft and engine production figures were published by the Aeronautical Chamber of Commerce.

Since 1938, military plane production data have been provided by the armed services and war agencies concerned with aircraft production.

For civil production, figures provided by the Civil Aeronautics Administration have been used.

TABLE 2-1. AIRPLANE PRODUCTION, 1919-1926

Year	Number of Airplanes
1919	662
1921	302
1923	587
1925	789
1926	1,186 <sup>a</sup>

<sup>a</sup> An additional 150 planes were produced from war surplus parts.

Source: Department of Commerce, Aeronautics Branch, *Air Commerce Bulletin*, Sept. 2.

PRODUCTION

TABLE 2-2. AIRPLANE DELIVERIES AND EXPORTS, 1909-1919<sup>a</sup>

Year	Number of airplanes delivered and accepted <sup>b</sup> by the			Exported <sup>c</sup>	Total
	Army	Navy	Post Office		
1909	1	.....	..	N.A.	1
1910	.....	.....	..	N.A.	.....
1911	7	4	..	N.A.	11
1912	12	4	..	29	45
1913	8	6	..	29	43
1914	11	4	..	34	49
1915	20	6	..	152	178
1916	83	59	..	269	411
1917	1,807	206	..	135	2,148
1918	11,916	2,075	9	20	14,020
1919	409	273	13	85	780
Total.....	14,274	2,637	22	753	17,686

N.A. Not available.

<sup>a</sup> Excludes deliveries to users other than the government.

<sup>b</sup> Excludes spares delivered, remodeling jobs, and intergovernment deliveries.

<sup>c</sup> Fiscal years 1912-1918, calendar years thereafter. In 1919 are included 41 airplanes delivered or exported July-December, 1918.

Source: Department of Commerce, Aeronautics Branch, *Air Commerce Bulletin*, Sept. 2, 1929, p. 6.

TABLE 2-3. VALUE OF AIRCRAFT AND PARTS PRODUCED, 1914-1939

Year	Cost of materials, supplies, fuel, purchased electric energy and contract work <sup>a</sup>	Value added by manufacture <sup>b</sup>	Value of products <sup>c</sup>
1914	\$ 133,939	\$ 655,933	\$ 789,872
1919	7,126,965	7,245,678	14,372,643
1921	2,407,395	4,234,593	6,641,988
1923	3,829,574	9,115,689	12,945,263
1925	2,869,967	9,654,752	12,524,719
1927	7,517,183	13,644,670	21,161,853
1929	27,368,103	43,784,821	71,152,924
1931	13,101,494	27,176,784	40,278,278
1933	7,956,663	18,503,429	26,460,092
1935	14,360,682	30,986,348	45,347,030
1937	56,556,229	93,143,527	149,699,756
1939	96,250,233	183,246,611	279,496,844

<sup>a</sup> Figures for years prior to 1935 do not include cost of contract work.

<sup>b</sup> Value of products less cost of materials, supplies, fuel, purchased electric energy, and contract work.

<sup>c</sup> 1914-1929: Total selling values at the plant.

1931-1933: Value of aircraft less values of engines installed.

1935: Includes values of instruments and accessories, but not the value of engines, propellers, and power-plant accessories installed.

1937-1939: As 1935, but includes value of aircraft engines.

Source: Bureau of the Census, 16th Census, "Manufactures 1939—Aircraft and Parts, including Aircraft Engines," p. 19, Table 1.

TABLE 2-4. AIRCRAFT PRODUCTION, 1925-1944  
(Number of aircraft)

Year	Civil	Military	Total
1925	268	447	789 <sup>a</sup>
1926	604	532	1,186 <sup>a</sup>
1927	1,565	621	1,995 <sup>a</sup>
1928	3,542	1,219	4,761
1929	5,357	677	6,034
1930	1,937	747	2,684
1931	1,582	812	2,394
1932	549	593	1,142
1933	591	466	1,057
1934	772	437	1,209
1935	1,109	459	1,568
1936	1,559	1,141	2,700
1937	2,281	949	3,230
1938	1,823 <sup>b</sup>	1,800	3,623 <sup>b</sup>
1939	3,715 <sup>b</sup>	2,141	5,856 <sup>b</sup>
1940	6,785 <sup>b</sup>	6,086	12,871 <sup>b</sup>
1941	6,844 <sup>b</sup>	19,290	26,134 <sup>b</sup>
1942	985 <sup>b</sup>	47,873	48,858 <sup>b</sup>
1943	.....	85,946	85,946
1944	.....	96,369	96,369

<sup>a</sup> Because of different sources civil and military figures do not add up to totals shown.

<sup>b</sup> Excludes production of civil aircraft exported.

Sources: 1925-1927: "Disposal of Surplus Aircraft and Major Components Thereof," Senate Subcommittee Print No. 6, June 26, 1944, p. 92.

1928-1937: Aeronautical Chamber of Commerce, *The Aircraft Yearbook*, 1935, p. 454; 1938, p. 442

1938-1939, military: Letter from War Department, Bureau of Public Relations, Air Forces Group, Aug. 25, 1944.

1938-1944, civil: Civil Aeronautics Administration, *Civil Aeronautics Journal*, Vol. 5, No. 1, and unpublished information. 1940-1944, military: Aircraft Resources Control Office, *Report 15*.

TABLE 2-5. MILITARY AIRCRAFT PRODUCTION, BY MONTHS, 1939-1945  
(Number of aircraft, excluding spares)

Month	1939	1940	1941	1942	1943	1944	1945
Jan.....	143	267	1,016	2,980	5,013	8,789	6,535
Feb.....	163	266	962	3,099	5,453	8,760	6,296
Mar.....	180	298	1,135	3,497	6,264	9,117	7,053
Apr.....	152	376	1,388	3,501	6,472	8,343	6,412
May.....	180	480	1,331	3,989	7,114	8,902	6,354
June.....	211	602	1,477	3,734	7,094	8,049	5,794
July.....	247	561	1,461	4,109	7,373	8,000	4,784
Aug.....	256	528	1,853	4,281	7,612	7,939	.....
Sept.....	117	515	1,914	4,307	7,598	7,597	.....
Oct.....	51	617	2,273	4,063	8,362	7,429	.....
Nov.....	104	737	2,051	4,812	8,789	6,747	.....
Dec.....	337	839	2,429	5,501	8,802	6,697	.....
Total.....	2,141	6,086	19,290	47,873	85,946	96,369	.....

Sources: 1939: Gen. H. H. Arnold at Military Establishment Appropriation Bill, 1941, Hearings, Mar. 7, 1940, p. 479.

1940-1945: Aircraft Resources Control Office, *Report 15*.

TABLE 2-6. AIRFRAME WEIGHT OF MILITARY AIRCRAFT PRODUCED (INCLUDING SPARES), BY MONTHS, 1940-1945  
(Millions of pounds)

Month	1940	1941	1942	1943	1944	1945
Jan.....	1.6	3.9	14.4	35.9	90.0	81.2
Feb.....	1.5	4.4	15.8	41.4	94.6	83.3
Mar.....	1.4	4.6	18.8	47.3	101.4	86.8
Apr.....	1.5	6.2	18.6	52.7	96.4	81.4
May.....	2.2	5.8	21.6	57.3	102.4	80.9
June.....	2.4	6.1	23.1	62.1	97.8	72.7
July.....	2.3	5.8	25.5	63.7	93.9	....
Aug.....	2.0	7.8	27.3	69.1	93.9	....
Sept.....	1.7	8.7	30.1	71.1	90.0	....
Oct.....	2.2	10.3	28.1	76.1	87.8	....
Nov.....	2.4	9.3	31.4	80.5	81.7	....
Dec.....	3.4	12.8	37.9	85.7	80.8	....
Total.....	24.6	85.7	292.6	742.9	1,110.7	....

Source: Data from the files of the Aircraft Resources Control Office and Aircraft Resources Control Office, Report 15.

TABLE 2-7. AIRFRAME WEIGHT OF MILITARY AIRCRAFT PRODUCED (EXCLUDING SPARES), BY MONTH, 1941-1945  
(Millions of pounds)

Month	1941	1942	1943	1944	1945
Jan.....	3.5	12.6	30.3	78.5	72.3
Feb.....	4.0	14.0	35.5	81.4	71.3
Mar.....	4.2	16.0	41.0	89.1	79.2
Apr.....	5.6	15.3	45.6	82.4	73.6
May.....	5.2	19.0	50.5	89.8	71.6
June.....	5.6	19.4	53.6	84.4	65.3
July.....	5.4	22.3	56.0	80.5	53.6
Aug.....	7.1	23.5	59.5	79.7	....
Sept.....	7.6	25.7	61.4	78.9	....
Oct.....	8.7	24.1	66.7	75.4	....
Nov.....	8.0	28.2	71.2	71.6	....
Dec.....	11.2	33.0	74.6	71.5	....
Total.....	76.1	253.1	645.9	963.2	....

Source: Data from the files of the Aircraft Resources Control Office, May 31, 1945 and monthly preliminary statement of Aircraft Resources Control Office, Report 15.

TABLE 2-8. AIRCRAFT ENGINE PRODUCTION, 1917-1944  
(Number of engines, excluding spare parts)

Year	Civil	Military	Total
1917-1919	N.A.	44,453	N.A.
1926	N.A.	842	N.A.
1927	N.A.	1,397	N.A.
1928	632	2,620	3,252
1929	5,517	1,861	7,378
1930	1,925	1,841	3,766
1931	1,976	1,800	3,776
1932	813	1,085	1,898
1933	1,120	860	1,980
1934	2,048	688	2,736
1935	1,974	991	2,965
1936	2,433	1,804	4,237
1937	4,095	1,989	6,084
1938	N.A.	N.A.	N.A.
1939	N.A.	N.A.	11,172
1940	N.A.	N.A.	13,669
1941 <sup>a</sup>	N.A.	50,684	N.A.
1942 <sup>a</sup>	N.A.	136,767	N.A.
1943 <sup>a</sup>	N.A.	226,561	N.A.
1944 <sup>a</sup>	N.A.	256,571	N.A.

N.A. Not available.

<sup>a</sup> Does not include aircraft engines produced for other than aircraft use.

Sources: 1917-1919: "Disposal of Surplus Aircraft and Major Components Thereof," Senate Subcommittee Print No. 6, June 26, 1944, p. 71.

1926-1937: Aeronautical Chamber of Commerce, *The Aircraft Yearbook*, 1935, p. 455; 1938, p. 442.

1939: Bureau of the Census, 16th Census, "Manufactures 1939—Aircraft and Parts, Including Aircraft Engines," p. 20, Table 5.

1940: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," p. 82.

1941-1944: Aircraft Resources Control Office, *Report 15*, revised by data from the files of the Aircraft Resources Control Office, Apr. 28, 1945.

TABLE 2-9. MILITARY AIRCRAFT ENGINE PRODUCTION, BY HORSEPOWER CAPACITY,  
1941-1944  
(Number of engines, excluding spare parts)

Year	Total	Under 300 hp	300 to 1,000 hp	1,000 to 1,600 hp	1,600 hp and over
1941	50,684	12,341	11,481	17,710	9,152
1942	136,767	25,350 <sup>*</sup>	20,191	61,209	30,017
1943	226,561	30,218	22,658	127,200	46,485
1944	256,571	10,787	13,253	146,645	85,886

Source: *Automotive and Aviation Industries*, 27th Annual Statistical Issue, Mar. 15, 1945, p. 48.  
(Based on data from the Aircraft Resources Control Office.)



TABLE 2-10. NUMBER AND HORSEPOWER OF MILITARY AIRCRAFT ENGINES PRODUCED, BY MONTHS, 1941-1945

Month	1941		1942		1943		1944		1945	
	Number of engines	Horsepower (including spares), in thousands	Number of engines	Horsepower (including spares), in thousands	Number of engines	Horsepower (including spares), in thousands	Number of engines	Horsepower (including spares), in thousands	Number of engines	Horsepower (including spares), in thousands
Jan.....	2,680	2,537	7,140	7,464	16,011	21,395	22,627	36,098	17,324	32,803
Feb.....	2,961	2,890	7,349	7,462	15,328	20,311	21,067	35,079	15,684	29,713
Mar.....	3,304	3,269	8,969	9,114	16,930	23,814	23,923	39,235	16,669	31,802
Apr.....	3,552	3,607	9,973	10,386	16,838	24,173	22,681	37,392	14,017	27,721
May.....	3,515	3,652	10,795	11,353	17,869	25,687	22,819	38,126	14,426	29,017
June.....	3,873	3,703	11,750	12,774	17,735	26,445	23,072	38,502	11,251	24,801
July.....	4,370	4,578	11,872	14,127	18,753	28,468	22,603	36,570	.....	.....
Aug.....	4,706	4,761	12,891	16,397	19,688	30,034	24,102	39,879	.....	.....
Sept.....	4,910	4,778	13,238	17,289	20,585	39,934	20,881	35,294	.....	.....
Oct.....	4,936	4,902	13,683	18,003	21,856	33,558	19,268	33,355	.....	.....
Nov.....	5,709	5,953	14,181	19,856	22,680	35,301	17,235	31,716	.....	.....
Dec.....	6,168	6,117	14,926	21,103	22,288	35,558	16,293	30,037	.....	.....
Total....	50,684 <sup>a</sup>	50,747	136,767 <sup>b</sup>	165,328	226,561 <sup>c</sup>	344,678	256,571 <sup>d</sup>	431,282	.....	.....

<sup>a</sup> Plus 4,467 engines for ordnance and additional spare parts.

<sup>b</sup> Plus 10,591 engines for ordnance and spare parts equivalent to 22,667 additional engines.

<sup>c</sup> Plus 8,479 engines for ordnance and spare parts equivalent to 77,257 additional engines.

<sup>d</sup> Plus 5,800 engines for ordnance and spare parts equivalent to 58,897 additional engines.

Source: Aircraft Resources Control Office, *Report 15*, revised by data from the files of the Aircraft Resources Control Office, Apr. 28, 1945.

TABLE 2-11. USE OF CRITICAL MATERIALS IN AIRCRAFT, ENGINES AND PROPELLERS, SECOND QUARTER, 1944

Materials	Weight used for				Use for aircraft, etc., as per cent of total use
	All products	Aircraft and parts	Engines and parts	Propellers and parts	
Carbon steel, thousands of short tons.....	58,700.9	61.1	31.3	3.5	.2
Alloy steel, thousands of short tons.....	7,267.5	208.8	382.8	88.8	9.4
Copper and copper-base alloys, millions of pounds.....	3,276.9	36.9	33.4	14.3	2.6
Aluminum, millions of pounds..	2,488.9	830.3	326.6	98.5	50.4

Source: War Production Board, Program and Statistics Division, letter of May 12, 1945. Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 2-12. MILITARY AIRCRAFT-ENGINE PRODUCTION, BY TYPE AND MONTH, 1941-1945  
(Excluding spare parts)

Month	1941		1942		1943		1944		1945	
	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled	Air-cooled	Liquid-cooled
Jan.....	2,546	134	5,930	1,210	13,729	2,282	19,057	3,570	13,937 <sup>a</sup>	3,387
Feb.....	2,661	300	6,161	1,188	13,114	2,214	17,567	3,500	12,952 <sup>a</sup>	2,732
Mar.....	2,993	311	7,457	1,512	14,859	2,071	19,820	4,103	13,416 <sup>a</sup>	3,253
Apr.....	3,315	237	8,317	1,656	14,678	2,160	18,669	4,012	11,643 <sup>a</sup>	2,374
May.....	3,112	403	8,990	1,805	14,945	2,924	19,442	3,377	11,541 <sup>a</sup>	2,885
June.....	3,469	404	9,796	1,954	14,807	2,928	18,931	4,141	9,812 <sup>a</sup>	1,439
July.....	3,857	513	9,806	2,066	15,591	3,162	18,622	3,981	.....	.....
Aug.....	3,993	713	10,765	2,126	16,614	3,074	19,356	4,746	.....	.....
Sept.....	4,181	729	11,108	2,130	17,295	3,290	17,644	3,237	.....	.....
Oct.....	4,166	770	11,505	2,178	18,627	3,229	15,924	3,344	.....	.....
Nov.....	4,854	855	12,080	2,101	19,895	2,785	14,282	2,953	.....	.....
Dec.....	5,040	1,128	12,697	2,229	19,020	3,268	13,963	2,330	.....	.....
Total.....	44,187 <sup>a</sup>	6,497	114,612 <sup>b</sup>	22,155	193,174 <sup>c</sup>	33,387	213,277 <sup>d</sup>	43,294	.....	.....

<sup>a</sup> Plus 4,467 engines for ordnance.

<sup>b</sup> Plus 10,591 engines for ordnance.

<sup>c</sup> Plus 8,479 engines for ordnance.

<sup>d</sup> Plus 5,800 engines for ordnance.

<sup>e</sup> Monthly and total figures include an undisclosed number of jet aircraft engines that for security reasons cannot be shown.

Source: Aircraft Resources Control Office, *Report 15*, revised by data from the files of the Aircraft Resources Control Office, Apr. 28, 1945.

TABLE 2-13. AIRCRAFT USE OF FRACTIONAL HORSEPOWER MOTORS, 1943-1945  
(Thousands of units)

Quarter	Total shipments	Aircraft types	Aircraft use as per cent of total
3d, 1943.....	2,703	739	27.3
4th, 1943.....	2,678	714	26.4
1st, 1944.....	3,082	887	29.0
2d, 1944.....	3,440	1,030	29.9
3d, 1944.....	3,532	1,150	32.5
4th, 1944.....	3,658	1,143	31.2
1st, 1945.....	3,802	1,093	28.7

Source: War Production Board, Information Division, letter of Nov. 16, 1944. (Brought up to date by War Production Board, Program and Statistics Bureau, letter of May 12, 1945.)

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 2-14. CONTROLLABLE AIRCRAFT PROPELLER SHIPMENTS, BY MONTH, 1941-1945  
(Number of propellers)

Month	1941			1942		
	Steel blade	Dural blade	Total	Steel blade	Dural blade	Total
Jan.....	N.A.	N.A.	2,111	762	5,826	6,588
Feb.....	N.A.	N.A.	1,912	667	4,578	5,245
Mar.....	N.A.	N.A.	2,524	2,456	4,621	7,077
Apr.....	N.A.	N.A.	2,419	1,154	7,220	8,374
May.....	N.A.	N.A.	2,612	1,503	7,221	8,724
June.....	N.A.	N.A.	2,829	1,395	8,231	9,626
July.....	N.A.	N.A.	2,987	1,079	8,543	9,622
Aug.....	N.A.	N.A.	3,434	1,254	8,337	9,591
Sept.....	N.A.	N.A.	4,171	1,213	8,697	9,910
Oct.....	N.A.	N.A.	4,449	2,176	8,787	10,963
Nov.....	N.A.	N.A.	4,411	1,586	8,419	10,005
Dec.....	N.A.	N.A.	5,142	1,602	9,952	11,554
Total.....	N.A.	N.A.	39,001	16,847	90,432	107,279

  

Month	1943			1944		
	Steel blade	Dural blade	Total	Steel blade	Dural blade	Total
Jan.....	2,079	10,130	12,209	1,636	20,957	22,593
Feb.....	2,149	10,554	12,703	1,541	20,822	22,363
Mar.....	2,797	11,616	14,413	1,697	20,445	22,142
Apr.....	2,938	12,779	15,717	2,058	19,375	21,433
May.....	2,668	13,279	15,947	2,099	19,873	21,972
June.....	2,272	14,603	16,875	2,792	18,988	21,780
July.....	2,526	16,784	19,310	2,725	16,475	19,200
Aug.....	2,494	17,772	20,266	2,965	18,035	21,000
Sept.....	2,234	18,179	20,413	2,544	17,102	19,646
Oct.....	2,004	20,270	22,274	2,987	14,503	17,490
Nov.....	1,797	19,548	21,345	2,867	14,477	17,344
Dec.....	1,554	20,911	22,465	3,057	13,720	16,777
Total.....	27,512	186,425	213,937	28,968	214,772	243,740

  

Month	1945		
	Steel blade	Dural blade	Total
Jan.....	2,401	13,535	15,936
Feb.....	2,417	12,713	15,130
Mar.....	3,079	12,745	15,824
Apr.....	3,089	11,405	14,494
May.....	2,952	10,267	13,219
June.....	2,546	7,789	10,333

N.A. Not available.

Source: Aircraft Resources Control Office, Report 15.

TABLE 2-15. VALUE OF AIRPLANES AND ENGINES PRODUCED AND SPARES SOLD, 1925-1939  
(Millions of dollars)

Year	Airplanes less engines			Engines			Spare parts sold		
	Civil	Military	Total	Civil	Military	Total	Civil	Military	Total
1925	\$ 1.5	\$ 5.2	\$ 6.7	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1926	2.7	6.2	8.9	N.A.	\$ 4.1	N.A.	N.A.	N.A.	N.A.
1927	7.0	7.5	14.5	N.A.	6.6	N.A.	N.A.	N.A.	N.A.
1928	17.2	19.1	36.3	\$ 1.0	12.4	\$13.4	N.A.	N.A.	N.A.
1929	33.6	10.8	44.4	17.9	8.6	26.5	N.A.	N.A.	N.A.
1930	10.7	10.7	21.4	6.3	10.8	17.1	\$ 6.9	\$ 6.3	\$13.2
1931	6.7	13.0	19.7	4.1	10.4	14.5	4.4	8.5	12.9
1932	2.3	10.4	12.7	2.9	6.4	9.3	2.6	7.4	10.0
1933	6.2	9.8	16.0	4.7	5.0	9.7	2.7	5.1	7.8
1934	10.0	8.8	18.8	10.3	5.2	15.5	4.8	3.7	8.5
1935	10.4	11.4	21.8	6.5	6.2	12.7	5.5	5.2	10.7
1936	12.4	27.8	40.2	7.5	14.6	22.1	6.7	8.1	14.8
1937	19.2	37.1	56.3	15.3	14.8	30.1	14.0	13.9	27.9
1939	27.8	129.2	157.0	N.A.	N.A.	74.3	N.A.	N.A.	37.2

N.A. Not available.

Sources: 1925-1937: Aeronautical Chamber of Commerce, *The Aircraft Yearbook*, 1935, p. 454; 1938, p. 442.

1939: Estimate based on Bureau of the Census, 16th Census, "Manufactures 1939, Aircraft and Parts, including Aircraft Engines," Tables 4 and 5 and footnotes. Engine Parts included with engines. Experimental work of about 11 million dollars not allocated.

TABLE 2-16. VALUE OF MILITARY AIRFRAMES, ENGINES, PROPELLERS, AND SPARE PARTS PRODUCED AND OF TOTAL AIRCRAFT PRODUCTION, JULY 1, 1940-DEC. 31, 1944  
(Millions of dollars—at August, 1943 unit costs)

Year	Air-frames	Engines	Pro-pellers	Airplane spare parts	Total	Total aircraft <sup>a</sup>
1940 (second half)	\$ 144	\$ 111	\$ 21	\$ 58	\$ 334 <sup>b</sup>	\$ 342
1941	820	462	80	296	1,658	1,765
1942	2,769	1,434	255	1,278	5,736	6,071
1943	6,696	2,453	447	2,781	12,377	12,979
1944	9,231	3,432	531	3,145	16,339	16,745

<sup>a</sup> Including aircraft other than airplanes, air-borne equipment, experimental, research, and development.

<sup>b</sup> Reports to the Aircraft Industries Association indicate a total for the entire year 1940 of approximately 553 million dollars at current unit cost.

Source: War Production Board, Bureau of Program and Statistics, Military Division, Aircraft Branch, letter of Mar. 27, 1945.

TABLE 2-17. AIRCRAFT USE OF ANTI-FRICTION BALL AND ROLLER BEARINGS (EXCLUDING ALLOY STEEL BALLS), 1943-1945  
(Millions of units)

Quarter	Total shipments	Aircraft types	Other types for aircraft <sup>a</sup>	Aircraft use as per cent of total
2d, 1943.....	81.5	20.9	11.9	40.3
3d, 1943.....	85.5	22.7	12.2	40.9
4th, 1943.....	90.7	22.2	13.2	39.1
1st, 1944.....	96.4	19.9	14.1	35.3
2d, 1944.....	91.7	17.0	13.4	33.2
3d, 1944.....	81.2	11.1	12.2	28.8
4th, 1944.....	77.7	8.4	13.2	27.8
1st, 1945.....	81.9	9.1	13.8	28.0

<sup>a</sup> Estimated.

Source: War Production Board, Information Division, letter of Nov. 16, 1944. (Brought up to date by War Production Board, Program and Statistics Bureau, letter of May 12, 1945.)

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 2-18. VALUE OF AIRCRAFT<sup>a</sup> SUPPLY CONTRACTS, BY YEAR OF AWARD, 1940-1945  
(Millions of dollars)

Year	Aircraft <sup>a</sup>	Total war supply contracts	Aircraft <sup>a</sup> as per cent of total supply contracts
1940 (3 qtrs).....	\$ 3,823	\$ 10,875	35.2
1941.....	6,255	19,070	32.8
1942.....	19,912	65,865	30.2
1943.....	16,178	49,615	32.6
1944.....	13,335	40,658	32.8
1945 (1 qtr).....	1,594	7,186	22.2
Total.....	\$61,097	\$193,269	31.6

<sup>a</sup> Includes airframes, engines, propellers, and other parts, including starters, generators, carburetors, etc., parachutes and aircraft pontoons. Armament such as gun turrets and bomb racks is included, but instruments and communication equipment are excluded.

Source: War Production Board, Bureau of Program and Statistics, Military Division, Procurement Reports Branch, *War Supply and Facility Contracts*, June 4, 1945, pp. 3, 4.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 2-19. AIRCRAFT<sup>a</sup> SUPPLY CONTRACTS, CUMULATIVE THROUGH MARCH, 1945,  
BY STATE

State	Millions of Dollars
Alabama.....	\$ 76.7
Arizona.....	59.3
California.....	10,179.0
Colorado.....	1.8
Connecticut.....	4,063.5
Delaware.....	18.8
District of Columbia.....	3.9
Florida.....	7.2
Georgia.....	473.8
Illinois.....	2,369.1
Indiana.....	3,625.1
Iowa.....	3.8
Kansas.....	2,743.4
Kentucky.....	355.5
Louisiana.....	216.1
Maine.....	10.0
Maryland.....	2,019.8
Massachusetts.....	350.8
Michigan.....	7,286.2
Minnesota.....	141.2
Mississippi.....	6.1
Missouri.....	994.1
Nebraska.....	758.0
New Hampshire.....	3.4
New Jersey.....	4,100.6
New York.....	6,915.0
North Carolina.....	56.4
Ohio.....	5,220.5
Oklahoma.....	1,637.6
Oregon.....	1.3
Pennsylvania.....	1,004.6
Rhode Island.....	21.2
Tennessee.....	413.1
Texas.....	2,345.6
Utah.....	.9
Vermont.....	13.9
Virginia.....	9.4
Washington.....	1,918.7
Wisconsin.....	701.0
Wyoming.....	12.7
Off continent and unassigned.....	957.5
Total.....	\$61,096.6

<sup>a</sup> Includes airframes, engines, propellers, and other parts, including starters, generators, carburetors, etc., parachutes and aircraft pontoons. Armament such as gun turrets and bomb racks is included, but instruments and communication equipment are excluded.

Source: War Production Board, "Summary of War Supply and Facility Contracts by State and Industrial Area," June 4, 1945, p. 4.

TABLE 2-20. CONTRIBUTION OF PREWAR INDUSTRIES<sup>a</sup> TO AIRCRAFT PRODUCTION, FIRST HALF, 1944

	First quarter, 1944		Second quarter, 1944	
	Value, <sup>b</sup> millions	Per cent	Value, <sup>b</sup> millions	Per cent
Aircraft and parts:				
Produced by:				
Government operated and new plants...	\$1,548.1	45.9	\$1,819.7	53.7
Aircraft, parts, and engine plants.....	1,224.4	36.3	990.8	29.2
Motor vehicles and parts plants.....	312.4	9.3	305.9	9.0
All other plants (less than 5% of total) ..	284.6	8.5	275.4	8.1
Total.....	\$3,369.5	100.0	\$3,391.8	100.0
Aircraft engines and parts:				
Produced by:				
Government operated and new plants...	\$ 469.1	35.2	\$ 485.2	35.6
Motor vehicles and parts plants.....	351.6	26.4	353.0	25.9
Aircraft, parts and engine plants.....	340.7	25.5	354.7	26.0
All other plants (less than 5% of total) ..	173.0	12.9	170.1	12.5
Total.....	\$1,334.4	100.0	\$1,363.0	100.0
Aircraft propellers and parts:				
Produced by:				
Government operated and new plants...	\$ 125.1	66.1	\$ 128.4	66.0
Refrigerators and refrigeration machine plants.....	34.6	18.3	32.9	16.9
Aircraft, parts and engine plants.....	15.1	8.0	16.9	8.7
All other plants (less than 5% of total) ..	14.5	7.6	16.4	8.4
Total.....	\$ 189.3	100.0	\$ 194.6	100.0

<sup>a</sup> Prewar industries according to 1939 industry classification.

<sup>b</sup> Represents value at points of shipments and includes duplication of items received for further processing from other plants.

Sources: War Production Board, Industry and Facilities Branch, *Facts for Industry*, Metal Products, Series 50-3-1, Part I, pp. 9 and 10.

War Production Board, Program and Statistics Division, letter of May 12, 1945.

TABLE 2-21. SUBCONTRACTS OF AIRCRAFT PRIME CONTRACTORS,<sup>a</sup> 1944

	January, 1944	December, 1944
Percentage of outside production:		
Airplane manufacturers.....	29	38
Glider manufacturers.....	48	40
Engine manufacturers.....	30	28
Percentage of production for others: <sup>a</sup>		
Airplane manufacturers.....	7	11
Glider manufacturers.....	2	8
Engine manufacturers.....	2	1

<sup>a</sup> Includes other prime contractors and nonaeronautical production.

Source: Aircraft Resources Control Office, *Report 15*.

## CHAPTER 3

### LABOR

Figures on aircraft employment since 1914 are available in the Census of Manufactures. Census figures on wage earners are not strictly comparable with the employment figures reported by the Bureau of Labor Statistics because of the difference in definition between "employment" and "wage earners" (see definitions at end of book).

Important differences also exist between the wartime data on employment in the aircraft industry issued by the Bureau of Labor Statistics. Two sets of data exist. One series deals with the "aircraft industry" as this industry is classified in normal times (Standard Classification). The other one deals with data on all plants contributing to the manufacture of aircraft—even though the plants may be part of the automobile or any other "nonaircraft industry" (Total Classification). The following tables credited to the BLS show "total" industry data.

The tremendous demand for aircraft that started with the beginning of the European war created a serious labor problem for the then small aircraft industry. The industry met it by increasing its own employment—especially that of women—by working longer hours and more shifts, by increasing productivity per worker, and by obtaining the assistance of thousands of subcontractors and vendors.

Wartime statistics on aircraft labor were collected by the Bureau of Labor Statistics in collaboration with the armed services and the Aircraft Resources Control Office.

TABLE 3-1. WAGE EARNERS IN THE AIRCRAFT INDUSTRY, 1914-1939

Year	Wage Earners (Average for Year)	Year	Wage Earners (Average for Year)
1914	168	1931	9,870
1919	3,543	1933	7,816
1921	1,395	1935	11,384
1923	2,901	1937	24,003
1925	2,701	1937 <sup>a</sup>	30,384
1927	4,422	1939 <sup>a</sup>	48,638
1929	14,710		

<sup>a</sup> Aircraft and parts, including aircraft engines. Engines not included in other data.

Source: Bureau of the Census, 16th Census, "Manufactures 1939—Aircraft and Parts, Including Aircraft Engines," Table 1, p. 19.



TABLE 3-2. TOTAL EMPLOYMENT IN THE AIRCRAFT INDUSTRY, BY TYPE OF CONTRACTOR, 1942-1945  
(Thousands of employees)

Year and month <sup>a</sup>	Total	Prime contractors <sup>b</sup>	Subcontractors and parts suppliers <sup>c</sup>
1942:			
Jan.....	618	460	158
Feb.....	683	502	181
Mar.....	735	538	197
Apr.....	793	573	220
May.....	848	611	237
June.....	930	664	266
July.....	1,000	710	290
Aug.....	1,099	772	327
Sept.....	1,180	820	360
Oct.....	1,280	879	401
Nov.....	1,384	939	445
Dec.....	1,497	1,004	493
1943:			
Jan.....	1,609	1,064	545
Feb.....	1,681	1,111	570
Mar.....	1,739	1,148	591
Apr.....	1,790	1,181	609
May.....	1,837	1,212	625
June.....	1,895	1,252	643
July.....	1,942	1,282	660
Aug.....	1,981	1,305	676
Sept.....	2,032	1,338	694
Oct.....	2,074	1,365	709
Nov.....	2,102	1,383	719
Dec.....	2,079	1,369	710
1944:			
Jan.....	2,080	1,369	711
Feb.....	2,063	1,357	706
Mar.....	2,018	1,327	691
Apr.....	1,987	1,306	681
May.....	1,956	1,285	671
June.....	1,910	1,255	655
July.....	1,883	1,235	648
Aug.....	1,813	1,187	626
Sept.....	1,741	1,140	601
Oct.....	1,691	1,107	584
Nov.....	1,672	1,095	577
Dec.....	1,667	1,091	576
1945:			
Jan.....	1,684	1,103	581
Feb.....	1,677	1,098	579
Mar.....	1,643	1,075	568
Apr.....	1,586	1,037	549
May.....	1,464	960	504

<sup>a</sup> All data are as of end of month.

<sup>b</sup> Includes actual employment of airframe, engine, propeller, glider, and special-purpose aircraft plants, and modification centers.

<sup>c</sup> Estimated; includes employment in many plants classified by the Bureau's Employment Statistics Division in other industries, such as electrical equipment and automobiles; all establishments having subcontracts are included, even when aircraft and parts do not constitute their primary activity.

Source: Department of Labor, Bureau of Labor Statistics, "Wartime Development of the Aircraft Industry," *Bulletin* 800, November, 1944, p. 4. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)

TABLE 3-3. TOTAL EMPLOYMENT IN AIRFRAME, ENGINE, AND PROPELLER PLANTS  
(PRIME CONTRACTORS), 1940-1945  
(Number of employees)

Year and month <sup>a</sup>	Total	Airframe plants	Engine plants	Propeller plants
1940:				
Jan. <sup>b</sup> .....	77,500	59,000	16,000	2,500
Feb.....	82,416	62,125	17,433	2,858
Mar.....	87,742	65,518	19,106	3,118
Apr.....	95,182	71,116	20,671	3,395
May.....	104,066	77,246	23,176	3,644
June.....	114,698	85,744	24,825	4,129
July.....	126,214	93,799	28,042	4,373
Aug.....	135,293	101,030	29,738	4,525
Sept.....	146,054	108,710	32,392	4,952
Oct.....	156,353	117,637	33,290	5,426
Nov.....	167,294	125,501	36,129	5,664
Dec.....	178,489	133,654	38,848	5,987
1941:				
Jan.....	194,135	146,197	41,329	6,609
Feb.....	204,962	153,554	44,143	7,265
Mar.....	216,156	161,231	47,205	7,720
Apr.....	231,102	172,240	50,461	8,401
May.....	246,006	183,134	53,960	8,912
June.....	269,059	200,260	59,381	9,418
July.....	293,661	218,925	64,813	9,923
Aug.....	319,125	238,549	70,213	10,363
Sept.....	341,450	255,796	74,710	10,944
Oct.....	371,247	276,810	82,907	11,530
Nov.....	391,453	291,574	87,544	12,335
Dec.....	423,027	313,297	96,746	12,984
1942:				
Jan.....	460,356	341,603	104,156	14,597
Feb.....	501,753	368,669	116,804	16,280
Mar.....	538,060	390,278	129,387	18,395
Apr.....	572,616	412,927	138,974	20,715
May.....	611,272	439,188	148,738	23,346
June.....	653,033	470,765	156,964	25,304
July.....	695,359	505,274	162,893	27,192
Aug.....	753,425	553,240	170,680	29,505
Sept.....	796,954	589,503	176,597	30,854
Oct.....	852,862	635,056	185,387	32,419
Nov.....	910,932	680,535	195,869	34,528
Dec.....	970,359	729,995	204,177	36,187
1943: <sup>c</sup>				
Jan.....	1,027,914	770,471	219,084	38,359
Feb.....	1,072,573	800,055	232,186	40,332
Mar.....	1,106,664	819,848	244,434	42,382

TABLE 3-3. TOTAL EMPLOYMENT IN AIRFRAME, ENGINE, AND PROPELLER PLANTS  
(PRIME CONTRACTORS), 1940-1945.—(Continued)  
(Number of employes)

Year and month <sup>a</sup>	Total	Airframe plants	Engine plants	Propeller plants
Apr.....	1,139,018	839,349	255,547	44,122
May.....	1,166,555	856,244	263,684	46,627
June.....	1,203,479	881,139	273,798	48,542
July.....	1,233,385	900,584	282,944	49,857
Aug.....	1,257,427	907,098	297,329	53,000
Sept.....	1,290,181	924,872	310,573	54,736
Oct.....	1,311,765	931,109	325,916	54,740
Nov.....	1,326,345	936,466	336,128	53,751
Dec.....	1,310,799 <sup>d</sup>	922,859	333,303	54,637 <sup>d</sup>
1944:				
Jan.....	1,307,953 <sup>d</sup>	913,091	337,698	57,164 <sup>d</sup>
Feb.....	1,295,791	898,865	339,833	57,093
Mar.....	1,267,657	875,423	335,614	56,620
Apr.....	1,247,182	856,325	334,458	56,399
May.....	1,227,724	840,351	332,149	55,224
June.....	1,197,974	811,623	331,667	54,684
July.....	1,180,866 <sup>e</sup>	796,976 <sup>e</sup>	329,620	54,270
Aug.....	1,139,919 <sup>f,g</sup>	769,282 <sup>f</sup>	317,346 <sup>g</sup>	53,291
Sept.....	1,095,198 <sup>d</sup>	741,129	300,451	53,618 <sup>d</sup>
Oct.....	1,062,900	721,449	289,563	51,888
Nov.....	1,050,320	715,421	284,356	50,543
Dec.....	1,045,635	713,081	283,548	49,006
1945:				
Jan.....	1,058,236	723,850	286,233	48,153
Feb.....	1,053,089	720,384	285,406	47,299
Mar.....	1,031,363	704,053	280,443	46,867
Apr.....	996,356 <sup>h</sup>	679,039 <sup>h</sup>	270,821	46,496
May.....	920,441	622,039	255,359	43,043

<sup>a</sup> All data as of end of month.

<sup>b</sup> Estimated.

<sup>c</sup> Beginning with January, 1943, and thereafter, figures differ generally from those previously released owing to a shift in reporting from a net to a gross basis. The effect of this change is an increase of approximately 9,500 over the total and airframe employment previously reported for January, 1943. The engine and propeller figures were not affected until later in 1943, and the change is of insufficient magnitude to impair the employment trend.

<sup>d</sup> Change in propeller coverage responsible for an addition of approximately 1,500 workers in December, 1943, 2,510 in January, 1944, and 1,300 in September, 1944.

<sup>e</sup> Approximately 900 workers shifted to the airframe category because the function of one modification center was transferred to an airframe plant.

<sup>f</sup> Approximately 5,600 workers shifted to the airframe category from three modification centers to their respective airframe plants.

<sup>g</sup> Decline of about 3,200 workers resulted from exclusion of one engine plant that was engaged primarily in nonaeronautical production.

<sup>h</sup> Approximately 1,600 workers shifted to airframe category when function of one modification center was transferred to its airframe plant.

Source: Department of Labor, Bureau of Labor Statistics "Wartime Development of the Aircraft Industry," *Bulletin* 800, Nov. 20, 1944, p. 5. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)

TABLE 3-4. TOTAL AIRCRAFT EMPLOYMENT AND TOTAL EMPLOYMENT IN MANUFACTURING, 1940-1945  
(Thousands of employes)

Year and month	Aircraft industry	Manufacturing	Aircraft as per cent of manufacturing
Jan., 1940.....	100 <sup>a</sup>	10,453	1.0
Jan., 1941.....	253	11,603	2.2
Jan., 1942.....	618	13,740	4.5
Jan., 1943.....	1,609	16,423	9.8
Jan., 1944.....	2,080	16,825	12.4
Jan., 1945.....	1,684	15,555	10.8

<sup>a</sup> Estimate.

Sources: Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, November, 1944, p. 912, July, 1944, p. 224. (Aircraft data brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)

War Manpower Commission, *Manpower Statistics*, June, 1945, p. 15.

Percentages computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 3-5. WORKERS IN SELECTED OCCUPATIONS<sup>a</sup> IN METAL-AIRFRAME PLANTS  
DECEMBER, 1943

Occupation	Per Cent
Total, all occupations.....	100.0
Assemblers, electrical and radio.....	2.1
Assemblers, general.....	20.8
Assemblers, precision.....	1.3
Cable splicers.....	.3
Carpenters, maintenance.....	.6
Clerks, stock, and stores.....	4.9
Craters.....	.5
Drill-press operators.....	1.6
Electricians, maintenance.....	.8
Filers and burrers.....	1.0
Grinder operators.....	.5
Helpers, general.....	3.8
Inspectors, detail.....	1.3
Inspectors, final assembly.....	1.4
Inspectors, general assembly.....	2.2
Inspectors, machined parts.....	.5
Inspectors, service and flight.....	.3
Installers, controls.....	.8
Installers, electrical.....	1.5
Installers, general.....	6.5
Installers, hydraulics.....	.9
Installers, power plant.....	.6
Janitors.....	2.4
Jig builders.....	2.1
Laborers.....	.9
Lathe operators, engine.....	.6
Lathe operators, turret.....	.7

TABLE 3-5. WORKERS IN SELECTED OCCUPATIONS<sup>a</sup> IN METAL-AIRFRAME PLANTS, DECEMBER, 1943.—(Continued)

Occupation	Per Cent
Learners.....	5.5
Machinists, bench.....	1.0
Mechanics, experimental.....	.7
Mechanics, field and service.....	1.6
Mechanics, maintenance.....	1.0
Metal fitters.....	1.1
Milling-machine operators.....	1.3
Oilers, maintenance.....	.2
Painters, aircraft.....	1.1
Painters, maintenance.....	.2
Plant protection.....	1.6
Plumbers, maintenance.....	.1
Power-shear operators.....	.4
Punch-press operators.....	.9
Riveters.....	10.5
Saw operators.....	.6
Sheet-metal workers, bench.....	2.9
Spot welders.....	.6
Template makers.....	.6
Tool and die makers.....	.9
Tool-crib attendants.....	1.2
Truck-crane operators.....	.1
Truck drivers.....	.4
Truckers, power.....	.5
Tube benders, bench.....	.5
Welders, aluminum.....	.2
Welders, gas.....	.6
Welders, jig and fixtures.....	.4
Working supervisors, maintenance.....	.2
Working supervisors, production.....	2.2

<sup>a</sup> The classifications within jobs used in this study were originally developed by the Southern California Airframe Industry and are now applied by many establishments in other parts of the country. Figures based on 420,480 first-shift factory workers in 50 metal-airframe plants.

Source: Condensed from Department of Labor, Bureau of Labor Statistics, "Average Hourly Earnings in the Airframe Industry, 1943," *Bulletin* 790, pp. 1, 7, 8-11, reprinted from *Monthly Labor Review*, May, 1944

TABLE 3-6. DIRECT EMPLOYEES BY SHIFTS (PRIME CONTRACTORS), JANUARY, 1945

Shift	Manufacturers, per cent		
	Airplane	Engine	Propeller
First.....	60	56	54
Second.....	36	35	33
Third.....	4	9	13
Total.....	100	100	100

Source: Aircraft Resources Control Office, *Report* 15.

TABLE 3-7. TOTAL FEMALE EMPLOYMENT IN AIRFRAME, ENGINE, AND PROPELLER PLANTS (PRIME CONTRACTORS), 1942-1945

Year and month <sup>a</sup>	Number of female employes				Female employment as percent of total employment			
	Total	Airframe plants	Engine plants	Propeller plants	Total	Airframes	Engine	Propellers
1942:								
Jan.	23,137	18,656	3,920	561	5.0	5.5	3.8	3.8
Feb.	30,218	24,226	5,352	640	6.0	6.6	4.6	3.9
Mar.	38,455	30,448	7,040	967	7.1	7.8	5.4	5.3
Apr.	48,009	38,442	8,225	1,342	8.4	9.3	5.9	6.5
May	60,350	48,218	10,348	1,784	9.9	11.0	7.0	7.6
June	77,135	63,307	11,686	2,142	11.8	13.4	7.4	8.5
July	95,482	79,346	13,565	2,571	13.7	15.7	8.3	9.5
Aug.	119,967	100,966	15,913	3,088	15.9	18.2	9.3	10.5
Sept.	153,301	131,351	18,480	3,470	19.2	22.3	10.5	11.2
Oct.	196,665	168,993	23,517	4,155	23.1	26.6	12.7	12.8
Nov.	237,002	202,542	29,394	5,066	26.0	29.8	15.0	14.7
Dec.	280,497	240,595	34,090	5,812	28.9	33.0	16.7	16.1
1943:								
Jan.	321,788	274,248	41,247	6,293	31.3	35.6	18.8	16.4
Feb.	351,752	295,743	47,889	8,120	32.8	37.0	20.5	20.1
Mar.	370,635	309,129	52,779	8,727	33.5	37.7	21.6	20.5
Apr.	387,092	319,329	58,110	9,653	33.9	38.0	22.7	21.9
May	402,385	328,740	62,873	10,772	34.5	38.4	23.8	23.1
June	421,548	340,288	69,730	11,530	35.0	38.6	25.4	23.7
July	435,468	347,494	75,970	12,004	35.2	38.6	26.8	24.1
Aug.	449,938	353,656	83,694	12,588	35.7	39.0	28.1	24.2
Sept.	468,169	363,952	91,353	12,864	36.2	39.3	29.4	23.5
Oct.	479,923	367,701	99,199	13,023	36.5	39.5	30.4	23.8
Nov.	486,073	370,262	103,112	12,699	36.7	39.5	30.7	23.6
Dec.	472,519 <sup>b</sup>	358,823	100,657	13,039 <sup>b</sup>	36.0	38.9	30.2	23.9
1944:								
Jan.	466,292 <sup>b</sup>	351,509	100,743	14,040 <sup>b</sup>	35.7	38.5	29.8	24.6
Feb.	461,074	346,028	100,732	14,314	35.6	38.5	29.6	25.1
Mar.	454,412	339,296	100,450	14,666	35.8	38.8	29.9	25.9
Apr.	448,066	333,316	99,704	15,046	35.9	38.9	29.8	26.7
May	445,725	331,295	99,434	14,996	36.3	39.4	29.9	27.2
June	439,503	324,262	99,929	15,312	36.7	40.0	30.1	28.0
July	435,608	319,055	101,217	15,336	36.9	40.0	30.7	28.3
Aug.	419,216	307,699	96,417	15,100	36.8	40.0	30.4	28.3
Sept.	398,418 <sup>c</sup>	296,091	87,434	14,893 <sup>c</sup>	36.4	40.0	29.1	27.8
Oct.	386,466	288,257	83,894	14,315	36.4	40.0	29.0	27.6
Nov.	379,822	285,469	80,507	13,846	36.2	39.9	28.3	27.4
Dec.	375,520	281,703	80,530	13,287	35.9	39.5	28.4	27.1
1945:								
Jan.	376,804	282,489	81,259	13,056	35.7	39.0	28.6	27.1
Feb.	372,719	279,352	80,741	12,626	35.5	38.8	28.5	26.7
Mar.	364,141	271,780	80,084	12,277	35.4	38.6	28.7	26.2
Apr.	349,446	261,026	75,974	12,446	35.1	38.4	28.2	26.8
May	316,032	234,050	70,424	11,558	34.4	37.6	27.8	26.9

<sup>a</sup> All data as of end of month.

<sup>b</sup> Change in propeller coverage responsible for an addition of approximately 450 female workers in December, 1943, a further addition of 450 in January, 1944.

<sup>c</sup> Change in propeller coverage responsible for an addition of approximately 200 female workers.

Source: Department of Labor, Bureau of Labor Statistics, "Wartime Development of the Aircraft Industry," *Bulletin* 800, Nov. 20, 1944, p. 8. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)

TABLE 3-8. PERCENTAGE OF TOTAL EMPLOYMENT IN AIRFRAME, ENGINE, AND PROPELLER PLANTS, BY ARMY AIR FORCES PROCUREMENT DISTRICTS (PRIME CONTRACTORS), JUNE, 1940, AND DECEMBER, 1944

Army Air Forces procurement districts	Airframes	Engines	Propellers	All plants
June, 1940				
Eastern.....	35.0	84.8	100.0	48.1
Southeastern.....	.7	.....	.....	.5
Central.....	.....	1.5	.....	.3
Middle Central.....	.....	13.3	.....	2.9
Middle Western.....	3.1	.....	.....	2.3
Western.....	61.2	.4	.....	45.9
Total.....	100.0	100.0	100.0	100.0
December, 1944				
Eastern.....	26.3	29.3	47.5	28.1
Southeastern.....	4.9	.4	.....	3.5
Central.....	10.7	33.6	42.1	18.4
Middle Central.....	3.1	29.1	10.4	10.5
Middle Western.....	22.8	7.6	.....	17.6
Western.....	32.2	.....	.....	21.9
Total.....	100.0	100.0	100.0	100.0

States in Procurement Districts

EASTERN: Conn., Del., Maine, Md., Mass., N.H., N.J., N.Y., Penn., R.I., Vt.

SOUTHEASTERN: Ala., Fla., Ga., Ky., Miss., N.C., S.C., Tenn., Va., W.Va.,

CENTRAL: Mich., Ohio

MIDDLE WESTERN: Ark., Colo., Kan., La., Mo., Mont., Neb., N.M., N.D., Okla., S.D., Tex., Wyo.

WESTERN: Ariz., Calif., Idaho, Nev., Ore., Utah, Wash.

MIDDLE CENTRAL: Ill., Ind., Iowa, Minn., Wis.

Source: Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, November, 1944, p. 920. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment, letters of Aug. 24, 1944, and Mar. 3, 1945.)

TABLE 3-9.—AVERAGE AIRFRAME WEIGHT (INCLUDING SPARES) ACCEPTED PER EMPLOYEE (ADJUSTED FOR SUBCONTRACTING), 1941-1945  
(Pounds accepted per employee<sup>a</sup>)

Month	1941	1942	1943	1944	1945
January.....	23	40	39	79	92
February.....	26	41	44	82	86
March.....	28	46	49	91	96
April.....	35	43	52	87	94
May.....	32	47	56	94	
June.....	33	46	55	91	
July.....	27	47	57	89	
August.....	34	46	60	89	
September.....	33	46	60	91	
October.....	36	41	64	90	
November.....	30	43	69	88	
December.....	40	46	73	88	

<sup>a</sup> Weight of spares included in computation of average.

Source: Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, November, 1944, p. 930. Revised by data from the files of the Bureau of Labor Statistics, Division of Construction and Public Employment.

TABLE 3-10. PERCENTAGE OF TOTAL EMPLOYMENT IN AIRFRAME, ENGINE, AND PROPELLER PLANTS, BY WAR MANPOWER COMMISSION LABOR AREA CLASSIFICATION<sup>a</sup> (PRIME CONTRACTORS), 1943-1945

Type of plant and WMC labor-area classification <sup>b</sup>	1943		1944		1945
	Jan.	July	Jan.	July	Jan.
<b>Airframe plants:</b>					
Group I.....	70.4	67.0	60.2	57.6	54.9
Group II.....	15.8	19.1	25.3	16.9	19.5
Group III.....	6.6	6.6	5.9	18.1	10.3
Group IV.....	7.2	7.3	8.6	7.4	15.3
Total.....	100.0	100.0	100.0	100.0	100.0
<b>Engine plants:</b>					
Group I.....	35.2	32.8	35.4	47.9	59.5
Group II.....	42.9	51.5	41.7	27.0	20.8
Group III.....	20.2	14.4	21.7	23.6	11.1
Group IV.....	1.7	1.3	1.2	1.5	8.6
Total.....	100.0	100.0	100.0	100.0	100.0
<b>Propeller plants:.....</b>					
Group I.....	27.5	11.4	9.5	20.5	17.5
Group II.....	44.9	57.3	64.5	70.2	73.1
Group III.....	27.6	29.8	26.0	8.0	8.1
Group IV.....	.....	1.5	.....	1.3	1.3
Total.....	100.0	100.0	100.0	100.0	100.0
<b>All plants:</b>					
Group I.....	61.3	56.9	51.6	53.2	54.5
Group II.....	22.7	28.1	31.2	22.2	22.3
Group III.....	10.3	9.3	10.9	19.2	10.4
Group IV.....	5.7	5.7	6.3	5.4	12.8
Total.....	100.0	100.0	100.0	100.0	100.0

<sup>a</sup> All data are as of end of month.

<sup>b</sup> Group I. Areas of current labor shortage.

Group II. Areas of labor stringency and those anticipating a labor shortage within 6 months.

Group III. Areas in which slight labor reserves will remain after 6 months.

Group IV. Areas in which substantial labor reserves will remain after 6 months.

Source: Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, November, 1944, p. 918. (Brought up to date by letters from Department of Labor, Division of Construction and Public Employment, of Mar. 3, 1945, and July 3, 1945.)



TABLE 3-11. TOTAL EMPLOYMENT IN AIRFRAME, ENGINE, AND PROPELLER PLANTS, BY STATE (PRIME CONTRACTORS), DECEMBER, 1944

State	Number of employes	State	Number of employes
Airframe plants:		Propeller plants:	
Arizona.....	a	Connecticut.....	6,971
California.....	182,712	Indiana.....	a
Connecticut.....	a	Michigan.....	a
Delaware.....	a	New Jersey.....	a
Georgia.....	a	New York.....	a
Illinois.....	a	Ohio.....	13,112
Indiana.....	a	Pennsylvania.....	4,072
Kansas.....	54,463	Total.....	49,006 <sup>b</sup>
Kentucky.....	a	Total airframe, engine, and propeller plants:	
Louisiana.....	9,007	Arizona.....	a
Maryland.....	44,689	California.....	182,712
Michigan.....	27,023	Connecticut.....	45,243
Missouri.....	a	Delaware.....	a
Nebraska.....	a	Georgia.....	a
New Jersey.....	a	Illinois.....	61,754
New York.....	102,264	Indiana.....	36,655
Ohio.....	49,606	Kansas.....	54,463
Oklahoma.....	a	Kentucky.....	a
Pennsylvania.....	5,061	Louisiana.....	9,007
Tennessee.....	4,725	Maryland.....	44,689
Texas.....	41,004	Massachusetts.....	a
Washington.....	a	Michigan.....	99,202
Total.....	713,081 <sup>b</sup>	Minnesota.....	a
Engine plants:		Missouri.....	33,512
Connecticut.....	a	Nebraska.....	a
Illinois.....	45,238	New Jersey.....	65,924
Indiana.....	26,198	New York.....	119,970
Massachusetts.....	a	Ohio.....	93,407
Michigan.....	64,682	Oklahoma.....	a
Minnesota.....	a	Pennsylvania.....	13,670
Missouri.....	a	Tennessee.....	5,846
New Jersey.....	a	Texas.....	41,004
New York.....	13,870	Washington.....	a
Ohio.....	a	Wisconsin.....	a
Pennsylvania.....	4,537	Total.....	1,045,635 <sup>b</sup>
Tennessee.....	a		
Wisconsin.....	a		
Total.....	283,548 <sup>b</sup>		

<sup>a</sup> Withheld to avoid disclosing exact or approximate employment by individual companies.

<sup>b</sup> Totals include employment in states not disclosed.

Source: Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment, letter of Mar. 3, 1945.

TABLE 3-12. AVERAGE HOURS AND EARNINGS OF WAGE EARNERS IN AIRFRAME, ENGINE, AND PROPELLER PLANTS<sup>a</sup> (PRIME CONTRACTORS), 1940-1945

Year and month	Airframe plants average			Engine plants average			Propeller plants average		
	Weekly hours <sup>b</sup>	Weekly earnings	Hourly earnings	Weekly hours <sup>b</sup>	Weekly earnings	Hourly earnings	Weekly hours <sup>b</sup>	Weekly earnings	Hourly earnings
1940:									
Jan.....	40.6	\$27.85	\$0.69	47.0	\$40.09	\$0.85	45.8	\$35.29	\$0.77
Feb.....	39.9	27.55	.69	44.9	38.90	.87	37.6	27.69	.74
Mar.....	41.1	28.48	.69	45.4	38.15	.84	45.5	34.94	.77
Apr.....	40.6	28.16	.69	46.1	38.32	.83	45.4	34.73	.77
May.....	40.0	28.18	.70	46.0	37.47	.82	44.0	32.82	.75
June.....	41.8	30.37	.73	46.9	38.55	.82	45.0	34.41	.76
July.....	41.3	29.88	.72	46.0	37.91	.82	42.9	32.16	.75
Aug.....	43.6	31.87	.73	46.1	38.65	.84	44.2	33.71	.76
Sept.....	44.3	32.34	.73	47.1	38.50	.82	44.7	34.09	.76
Oct.....	44.0	32.64	.74	45.9	38.61	.84	44.1	33.77	.77
Nov.....	44.3	32.95	.74	43.4	37.23	.86	37.6	29.37	.78
Dec.....	44.5	32.97	.74	46.5	39.39	.85	44.7	34.30	.77
1941:									
Jan.....	44.7	34.08	.76	46.3	41.22	.89	45.1	37.26	.83
Feb.....	45.3	34.85	.77	45.5	39.57	.87	47.4	39.28	.83
Mar.....	44.9	34.50	.77	45.8	40.79	.89	47.7	41.15	.86
Apr.....	45.2	35.11	.78	41.9	38.36	.92	37.9	31.39	.83
May.....	45.2	35.21	.78	47.0	45.07	.96	47.4	43.30	.91
June.....	44.6	34.80	.78	47.0	46.49	.99	48.5	44.40	.92
July.....	44.5	35.32	.79	47.0	47.36	1.01	49.6	46.33	.93
Aug.....	45.5	37.85	.83	47.0	48.71	1.04	42.1 <sup>d</sup>	46.26	1.10 <sup>d</sup>
Sept.....	45.4	37.81	.83	48.1	50.82	1.06	45.7	46.50	1.02
Oct.....	44.9	38.63	.86	47.2	52.04	1.10	48.6	49.26	1.01
Nov.....	44.0	39.34	.89	47.7	55.28	1.16	44.8	51.37	1.15
Dec.....	45.8	41.53	.91	48.3	55.63	1.15	53.2	63.95	1.20
1942:									
Jan.....	48.9	46.12	.94	50.6	62.09	1.23	52.0	59.10	1.14
Feb.....	47.5	44.35	.93	49.7	59.34	1.19	49.7	54.15	1.09
Mar.....	47.6	44.33	.93	49.3	60.93	1.23	50.1	56.42	1.13
Apr.....	47.4	44.62	.94	48.5	58.90	1.21	50.9	58.04	1.14
May.....	46.7	44.52	.95	48.3	58.43	1.21	51.5	59.51	1.16
June.....	46.1	44.65	.97	48.2	58.07	1.21	51.0	59.58	1.17
July.....	45.6	44.49	.97	48.0	59.61	1.24	52.1	59.01	1.13
Aug.....	46.0	44.78	.97	48.3	60.21	1.25	48.9	57.47	1.18
Sept.....	45.8	45.34	.99	47.6	61.00	1.28	47.7	59.44	1.25
Oct.....	45.7	44.35	.97	48.8	61.14	1.25	48.3	60.18	1.24
Nov.....	46.1	44.91	.97	47.3	59.25	1.25	46.2	56.38	1.22
Dec.....	46.4	45.59	.98	47.1	58.92	1.25	48.9	59.89	1.22
1943:									
Jan.....	46.3	45.82	.99	47.2	59.84	1.27	49.0	59.62	1.22
Feb.....	45.9	45.89	1.00	47.8	60.21	1.26	47.4	58.05	1.23
Mar.....	46.1	46.48	1.01	48.5	61.33	1.26	47.7	58.18	1.22
Apr.....	47.1	48.90	1.04	48.0	60.40	1.26	48.2	60.14	1.25
May.....	46.7	49.21	1.05	48.8	62.10	1.27	48.2	60.27	1.25
June.....	46.4	49.47	1.07	46.7	59.03	1.26	48.3	60.56	1.25
July.....	45.4	48.31	1.06	46.7	59.40	1.27	48.3	60.94	1.26
Aug.....	45.6	48.97	1.07	47.1	59.70	1.27	49.0	61.27	1.25
Sept.....	46.5	51.58	1.11	47.7	62.25	1.30	49.0	64.11	1.31
Oct.....	46.6	51.30	1.10	47.7	61.14	1.28	47.0	58.89	1.25
Nov.....	46.6	51.84	1.11	47.4	61.14	1.29	47.6	59.75	1.26
Dec.....	45.6	51.12	1.12	46.2	58.47	1.26	47.2	59.89	1.27
1944:									
Jan.....	47.7	54.03	1.13	47.7	61.69	1.29	48.7	61.71	1.27
Feb.....	47.3	53.65	1.13	46.9	60.66	1.29	47.4	59.52	1.26
Mar.....	46.8	53.52	1.14	47.1	60.97	1.29	46.5	58.26	1.26
Apr.....	46.4	53.32	1.15	47.1	61.15	1.30	46.7	59.10	1.26
May.....	46.8	54.30	1.16	46.0	59.49	1.29	46.4	58.16	1.25
June.....	46.9	54.37	1.16	46.7	61.00	1.31	47.3	60.61	1.28
July.....	46.5	53.90	1.16	42.2	55.23	1.31	44.3	57.00	1.29
Aug.....	46.8	54.36	1.16	45.4	59.19	1.30	48.2	62.70	1.30
Sept.....	45.7	53.99	1.18	44.3	58.44	1.32	45.0	59.30	1.32
Oct.....	46.5	54.51	1.17	45.9	59.75	1.30	47.5	62.62	1.32
Nov.....	47.0	55.28	1.18	44.9	59.05	1.31	46.2	61.07	1.32
Dec.....	47.3	55.64	1.18	46.3	61.16	1.32	46.7	62.34	1.33
1945:									
Jan.....	48.1	57.41	1.19	45.6	61.39	1.35	44.1	58.30	1.32
Feb.....	47.1	55.46	1.18	47.1	62.43	1.32	46.1	61.77	1.34
Mar.....	47.0	55.58	1.18	46.8	61.71	1.32	46.8	62.94	1.35
Apr.....	46.8	55.18	1.18	45.7	59.44	1.30	46.7	62.51	1.34

<sup>a</sup> Work week ending nearest fifteenth of month.<sup>b</sup> Average weekly hours for wage earners not strictly comparable with average weekly hours of "direct workers" since coverage is not identical.<sup>c</sup> Fluctuation of hours and earnings in this month was caused by holiday.<sup>d</sup> Fluctuation of hours and earnings in this month was caused by a strike in one plant.

\* Preliminary.

Source: Department of Labor, Bureau of Labor Statistics, "Wartime Development of the Aircraft Industry," *Bulletin* 800, Nov. 20, 1944, p. 20. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)

TABLE 3-13. WAGES IN THE AIRCRAFT INDUSTRY, 1914-1939

Year	Thousands of Dollars
1914	\$ 135
1919	4,907
1921	2,202
1923	4,522
1925	4,222
1927	6,857
1929	21,924
1931	15,481
1933	10,308
1935	14,893
1937	33,353
1937 <sup>a</sup>	43,827
1939 <sup>a</sup>	77,488

<sup>a</sup> Aircraft and parts, including aircraft engines. Previous years do not include engines.

Source: Bureau of the Census, 16th Census, "Manufactures 1939—Aircraft and Parts, including Aircraft Engines," Table 1, p. 19.

TABLE 3-14. METAL-AIRFRAME PLANTS, AVERAGE STRAIGHT-TIME HOURLY EARNINGS, DECEMBER, 1943  
(First-shift workers)

Occupation	Per cent of total employment	Average hourly earnings
Total, all occupations . . . . .	100.0	\$ .950
Selected occupations		
Assemblers, general, class A . . . . .	4.4	1.136
Assemblers, general, class B . . . . .	6.5	.957
Assemblers, general, class C . . . . .	9.9	.868
Clerks, stock, and stores . . . . .	4.9	.874
Filers and burrers, class A . . . . .	1.0	.861
Helpers, general . . . . .	3.8	.760
Installers, general, class A . . . . .	1.6	1.074
Installers, general, class B . . . . .	2.1	1.006
Installers, general, class C . . . . .	2.8	.866
Janitors, class A . . . . .	2.4	.779
Learners . . . . .	5.5	.689
Plant protection . . . . .	1.6	.901
Riveters, class A . . . . .	1.6	1.056
Riveters, class B . . . . .	6.6	.958
Riveters, class C . . . . .	2.3	.840
Sheet-metal workers, bench, class B . . . . .	1.0	.971
Sheet-metal workers, bench, class C . . . . .	1.4	.874
Working supervisors, production . . . . .	2.2	1.192

Source: Condensed from Department of Labor, Bureau of Labor Statistics, "Average Hourly Earnings in the Airframe Industry, 1943," *Bulletin* 790, pp. 8-11, reprinted from *Monthly Labor Review*, May, 1944.

Handwritten calculation: 
$$\begin{array}{r} 91.7 \\ 3 \overline{) 25.92} \\ \underline{27} \phantom{00} \\ 25 \phantom{00} \\ \underline{24} \phantom{00} \\ 12 \phantom{00} \\ \underline{12} \phantom{00} \\ 0 \phantom{00} \end{array}$$

TABLE 3-15. AIRCRAFT ENGINE PLANTS, AVERAGE STRAIGHT-TIME HOURLY EARNINGS, AUGUST, 1943

Occupation	Average hourly earnings	
	Males	Females
Total, all selected occupations.....	\$1.189	\$1.036
Assemblers, bench, class A.....	1.296	N.A.
Assemblers, bench, class B.....	1.131	1.074
Burrers, class B.....	1.106	1.025
Carpenters, maintenance, class A.....	1.160	N.A.
Drill-press operators, single spindle, class A..	1.274	N.A.
Drill-press operators, multiple spindle, class B	1.125	1.079
Electricians, maintenance, class A.....	1.306	N.A.
Engine-lathe operators, class A.....	1.348	N.A.
Engine-lathe operators, class B.....	1.187	1.104
Grinding-machine operators, class A.....	1.303	1.358
Grinding-machine operators, class B.....	1.205	1.060
Guards.....	1.025	.984
Inspectors, class A.....	1.342	1.277
Janitors.....	.875	.825
Machinists, maintenance, class A.....	1.374	N.A.
Milling-machine operators, class B.....	1.148	1.071
Millwrights, class A.....	1.263	N.A.
Polishers and buffers, class A.....	1.316	N.A.
Screw-machine operators, automatic, class B	1.198	1.140

N.A. Not available.

Source: Condensed from Department of Labor, Bureau of Labor Statistics, "Hourly Earnings in Aircraft Engine Plants, August, 1943," Serial No. R 1632, pp. 5, 6, reprinted from *Monthly Labor Review*, March, 1944.

TABLE 3-16. AIRCRAFT METAL-PROPELLER PLANTS, AVERAGE STRAIGHT-TIME HOURLY EARNINGS, OCTOBER, 1942  
(First-shift workers)

Occupation	Average hourly earnings	
	Males	Females
Assemblers, sub.....	\$1.177	\$ .930
Burrers, filers.....	.995	.865
Grinder operators (cylindrical).....	1.227	N.A.
Grinders, portable and bench.....	1.208	N.A.
Inspectors, machined parts.....	1.105	.798
Janitors.....	.796	.711
Learners.....	.760	.744
Milling-machine operators.....	1.169	N.A.
Packers (box makers).....	.980	.719
Polishers and buffers.....	1.205	N.A.
Stockkeepers and storekeepers.....	1.021	.893
Supervisors, working.....	1.282	N.A.
Tool-crib attendants.....	.937	.828
Truckers, hand (dispatchers).....	.862	N.A.

N.A. Not available.

Source: Condensed from Department of Labor, Bureau of Labor Statistics, "Wages in Aircraft Propeller Industry, October, 1942," Serial No. R 1526, p. 8, reprinted from *Monthly Labor Review*, April, 1943.

TABLE 3-17. LABOR TURNOVER RATES IN AIRFRAME, ENGINE, AND PROPELLER PLANTS<sup>a</sup> (PRIME CONTRACTORS), 1941-1945

Year and month	Accessions per 100 employees	Separations per 100 employees			
		Total	Quits	Military	Other <sup>d</sup>
Airframe, engine, and propeller:					
1941 <sup>b,c</sup> .....	114.7	39.0	27.0	3.7	8.3
1942 <sup>b,c</sup> .....	123.9	63.9	38.5	17.2	8.2
1943 <sup>c</sup> .....	91.4	68.6	49.9	11.1	7.6
1944 <sup>c</sup> .....	54.5	74.0	53.2	6.6	14.2
Jan.....	5.4	5.7	4.0	.6	1.1
Feb.....	4.4	5.1	3.6	.5	1.0
Mar.....	4.1	6.4	4.2	.8	1.4
Apr.....	4.1	5.8	4.1	.9	.8
May.....	4.8	6.3	4.4	1.1	.8
June.....	5.5	7.2	4.9	.8	1.5
July.....	5.0	6.3	4.6	.6	1.1
Aug.....	4.2	7.9	5.7	.4	1.8
Sept.....	4.0	7.4	5.7	.3	1.4
Oct.....	4.3	6.0	4.7	.2	1.1
Nov.....	4.6	5.3	4.0	.2	1.1
Dec.....	4.1	4.6	3.3	.2	1.1
1945: Jan.....	6.1	4.7	3.4	.2	1.1
Feb.....	3.9	4.6	3.2	.2	1.2
Mar.....	3.4	5.7	4.0	.4	1.3
Apr.....	3.0	6.5	4.2	.5	1.8
May.....	3.0	10.8	4.7	.7	5.4
Airframe:					
1941 <sup>b,c</sup> .....	124.1	43.0	30.2	3.6	9.2
1942 <sup>b,c</sup> .....	134.6	72.0	45.2	18.0	8.8
1943 <sup>c</sup> .....	92.5	73.7	55.0	10.9	7.8
1944 <sup>c</sup> .....	54.4	78.3	57.3	7.5	13.5
Jan.....	5.0	6.1	4.3	.6	1.2
Feb.....	4.0	5.5	4.0	.5	1.0
Mar.....	3.8	6.9	4.6	.9	1.4
Apr.....	3.7	6.1	4.3	1.0	.8
May.....	4.5	6.7	4.7	1.2	.8
June.....	5.6	8.0	5.4	1.0	1.6
July.....	5.0	6.4	4.9	.7	.8
Aug.....	4.5	8.7	6.2	.5	2.0
Sept.....	4.4	7.9	6.1	.4	1.4
Oct.....	4.6	6.1	4.9	.3	.9
Nov.....	5.1	5.4	4.3	.2	.9
Dec.....	4.2	4.5	3.6	.2	.7
1945: Jan.....	6.5	4.8	3.7	.3	.8
Feb.....	4.2	4.6	3.5	.2	.9
Mar.....	3.5	6.0	4.5	.4	1.1
Apr.....	3.1	7.0	4.5	.6	1.9
May.....	3.0	12.2	5.3	.8	6.1

TABLE 3-17. LABOR TURNOVER RATES IN AIRFRAME, ENGINE, AND PROPELLER PLANTS<sup>a</sup> (PRIME CONTRACTORS), 1941-1945.—(Continued)

Year and month	Accessions per 100 employees	Separations per 100 employees			
		Total	Quits	Military	Other <sup>d</sup>
<b>Engine:</b>					
1941 <sup>b</sup> c.....	90.0	27.3	17.2	3.2	6.9
1942 <sup>b</sup> c.....	93.1	40.8	19.1	15.1	6.6
1943 <sup>c</sup> .....	87.1	48.5	29.7	11.3	7.5
1944 <sup>c</sup> .....	55.2	60.5	39.7	4.7	16.1
Jan.....	7.0	4.3	3.0	.6	.7
Feb.....	5.6	4.0	2.6	.5	.9
Mar.....	5.0	5.0	2.8	.7	1.5
Apr.....	5.3	4.9	3.1	.7	1.1
May.....	5.6	4.9	3.3	.6	1.0
June.....	5.2	5.1	3.2	.4	1.5
July.....	4.8	5.7	3.8	.3	1.6
Aug.....	3.2	5.9	4.2	.2	1.5
Sept.....	3.0	6.2	4.7	.2	1.3
Oct.....	3.5	5.4	3.8	.2	1.4
Nov.....	3.4	4.7	2.8	.1	1.8
Dec.....	3.6	4.4	2.4	.2	1.8
1945: Jan.....	4.8	4.1	2.7	.2	1.2
Feb.....	3.2	4.3	2.4	.2	1.7
Mar.....	2.8	5.0	2.8	.3	1.9
Apr.....	2.7	5.3	3.3	.3	1.7
May.....	2.7	6.2	3.1	.3	2.8
<b>Propeller:</b>					
1941 <sup>b</sup> c.....	71.0	24.4	17.2	2.6	4.6
1942 <sup>b</sup> c.....	90.2	35.9	17.6	13.6	4.7
1943 <sup>c</sup> .....	82.5	55.7	36.9	10.8	8.0
1944 <sup>c</sup> .....	54.3	72.8	52.9	5.9	14.0
Jan.....	4.7	4.8	3.4	.8	.6
Feb.....	4.4	4.3	3.0	.7	.6
Mar.....	4.0	4.7	3.4	.8	.5
Apr.....	5.1	6.1	4.6	.9	.6
May.....	4.6	7.3	4.9	.7	1.7
June.....	5.7	5.7	4.7	.4	.6
July.....	5.2	6.1	5.1	.4	.6
Aug.....	4.6	6.5	5.5	.3	.7
Sept.....	3.9	5.8	4.8	.3	.7
Oct.....	4.3	7.5	5.1	.2	2.2
Nov.....	4.3	6.9	4.6	.2	2.1
Dec.....	3.5	7.1	3.8	.2	3.1
1945: Jan.....	6.4	8.3	2.7	.2	5.4
Feb.....	4.5	6.0	2.6	.2	3.2
Mar.....	4.0	4.3	3.0	.2	1.1
Apr.....	3.4	4.3	3.1	.4	.8
May.....	4.2	14.5	4.1	.4	10.0

<sup>a</sup> Turnover data are not strictly comparable with employment data, since they have been obtained from different sources and coverage is not identical. <sup>b</sup> Based on wage earners only. <sup>c</sup> Annual rates are the sums of the monthly rates per 100 employees. <sup>d</sup> Includes discharges, layoffs, and miscellaneous separations.

Source: Department of Labor, Bureau of Labor Statistics, "Wartime Development of the Aircraft Industry," *Bulletin* 800, Nov. 20, 1944, pp. 14-15. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)

TABLE 3-18. ANNUAL MALE AND FEMALE SEPARATION AND QUIT RATES IN AIRFRAME, ENGINE, AND PROPELLER PLANTS (PRIME CONTRACTORS), 1944

Plants	Total separations <sup>a</sup> per 100 employes		Quits per 100 employes	
	Male	Female	Male	Female
Airframe.....	67.1	95.6	43.2	79.1
Engine.....	49.7	80.3	30.5	59.9
Propeller.....	70.2	78.8	49.9	60.2
Total.....	63.0	92.3	40.7	74.3

<sup>a</sup> Total separations include quits, military separations, discharges, layoffs, and miscellaneous separations.

Source: Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment, letter of Mar. 9, 1945, revised Apr. 16, 1945.

TABLE 3-19. LABOR INJURY RATE AND SEVERITY OF INJURIES, 1943

Industry	Frequency rate <sup>a</sup> (all disabilities)	Severity rate <sup>b</sup>
All reporting industries.....	14.52	1.20
Aircraft manufacturing.....	9.91	.47
Air transport.....	21.86	2.70
Automobile industry.....	10.26	.63
Marine transportation.....	52.08	4.72
Railroad equipment.....	14.37	2.01
Shipbuilding.....	23.75	1.40

<sup>a</sup> Frequency rate is the number of disabling injuries per 1,000,000 man-hours of exposures.

<sup>b</sup> Severity rate is the number of days lost per 1,000 man-hours of exposure, including charges of permanent disabilities and deaths.

Source: National Safety Council, "Accident Facts," 1944, p. 66.

TABLE 3-20. ACCIDENT FREQUENCY AND SEVERITY RATES, 1941-1943

Industry	Frequency rate	Severity rate
All industries.....	14.82	1.37
Aircraft manufacturing.....	9.69	.50
Aircraft engines.....	6.20	.45
Aircraft manufacturing and assembly.....	10.51	.54
Aircraft Parts <sup>a</sup> .....	9.82	.39

<sup>a</sup> 1942-1943.

Source: National Safety Council, "Accident Facts," 1944, p. 68.

TABLE 3-21. ABSENCE RATES IN AIRFRAME, ENGINE, AND PROPELLER PLANTS (PRIME CONTRACTORS), 1943-1945<sup>a</sup>

Month	Total	Air-frames	Engines	Propellers
1943: <sup>b</sup>				
Jan.....	N.A.	6.3	N.A.	N.A.
Feb.....	N.A.	6.8	N.A.	N.A.
Mar.....	6.6	6.7	6.1	6.0
Apr.....	6.5	6.7	5.8	6.3
May.....	6.9	7.1	6.1	5.9
June.....	6.9	7.2	6.1	6.4
July.....	7.4	7.8	6.2	6.9
Aug.....	7.6	8.0	6.6	7.6
Sept.....	7.1	7.4	6.1	7.2
Oct.....	7.3	7.5	6.6	7.3
Nov.....	7.1	7.3	6.8	6.5
Dec <sup>c</sup> .....	9.7	10.1	8.7	9.1
1944: <sup>b</sup>				
Jan.....	7.1	7.4	6.3	6.5
Feb.....	7.5	7.7	6.7	7.5
Mar.....	7.1	7.3	6.5	7.9
Apr.....	7.9	8.1	7.3	8.4
May <sup>b</sup> .....	6.4	6.5	6.3	6.5
June.....	6.2	6.2	6.2	5.2
July.....	6.4	6.2	6.9	6.2
Aug.....	6.5	6.2	7.3	6.1
Sept.....	5.8	5.7	6.1	5.8
Oct.....	5.8	5.7	5.9	5.7
Nov.....	5.8	5.6	6.1	6.9
Dec.....	5.8	6.0	5.4	5.4
1945: <sup>b</sup>				
Jan.....	5.1	5.1	5.2	4.8
Feb.....	5.7	5.8	5.7	5.0
Mar.....	5.7	5.6	5.8	5.3
Apr.....	5.5	5.4	5.9	4.7
May.....	5.5	5.2	6.4	5.0

N.A. Not available.

<sup>a</sup> Covers work week nearest fifteenth of month.

<sup>b</sup> Absence rates for period January, 1943-April, 1944, based on direct workers representing man-hours lost as a percentage of time worked plus time lost. Beginning with May, 1944, absence rates are based on total employment representing man-shifts lost as a percentage of total man-shifts scheduled.

<sup>c</sup> Not comparable owing to influenza epidemic.

Source: Department of Labor, Bureau of Labor Statistics, "Wartime Development of the Aircraft Industry," *Bulletin* 800, Nov. 20, 1944, p. 19. (Brought up to date by Department of Labor, Bureau of Labor Statistics, Division of Construction and Public Employment.)



## CHAPTER 4

### FINANCES

**Introduction.** In 1939, the aircraft manufacturing<sup>1</sup> industry ranked 44th in value of products among United States industries. During the war years it skyrocketed to first place.

This record-breaking growth has been accompanied by an increase

<sup>1</sup> Throughout this chapter, references are made to total or average aircraft industry income account and balance-sheet items. Unless other sources are credited specifically, these data are obtained from a specially prepared set of income accounts and balance sheets covering the years 1937-1944 and embracing the combined figures for the 12 largest aircraft manufacturing companies for each year from the standpoint of sales volume. Accordingly, the 12 aircraft units used in any given year need not be identical with those used in any other year. By and large, however, the variations are relatively minor and are not believed to affect the consistency of the year-to-year relationships. Of the various companies used during this 8-year period, seven companies appear in each of the 8 years. One company appears for 7 years and two companies appear for 6 years. In the instance where two companies have merged, they have been treated as one unit. During the 1937-1944 period, the data for one company and its wholly owned subsidiary have been combined to reflect the operations of one unit, except for earnings, dividends and price-range data, which have been treated separately. Two companies producing mostly aircraft engines have been excluded from this survey.

The principal advantage of this treatment is that the 12 leading units (sales-wise) are always represented and for any given year the total figures reflect the status of the bulk of the aircraft manufacturing industry. Thus, the total figures represent the major portion of the industry in each of the eight years. The "average" data have been determined by dividing each total item by twelve—except in instances where price ranges for one or two companies have been unavailable in a certain year, where shares for a company have not yet been issued publicly, etc.

The various income account and balance-sheet ratios and percentages apply equally to both the total and the average data.

The sources for the 1937-1943 income account and balance-sheet material (unless otherwise noted) are the Industrial Manuals and Supplements compiled and published by Moody's Investors Service, as reported by the individual companies to the Securities and Exchange Commission or the stockholders. The data for 1944 have been assembled from individual company reports.

The balance sheets do not include government-owned inventory, nor do they include government-owned plant, although total net plant figures include "emergency plant expansion"—title to such property nominally remains with the company until the full cost is reimbursed by the government. In the balance sheets that accompany this chapter, no distinction has been made between fixed-price contract receivables and cost-plus-fixed-fee contract receivables, inasmuch as the available individual company reports have made no such distinctions.

in financial problems and responsibilities. To the casual observer, the aircraft manufacturing industry would appear to be in a strong financial position because the magnitude of wartime operations has distorted normal financial relationships out of all proportion. The industry's balance sheet carries sizable current assets, but they are only fractionally larger than current liabilities; the current asset account, moreover, may suffer severe shrinkage in the postwar period through inventory and contract termination settlements.

The wartime income account of the industry shows a net profit many times larger than in the prewar years. But when this profit is related to vastly increased sales, taxes and operating expenses, it turns out to be the smallest of any war industry. Even those profits may prove to have been illusory in the postwar years.

**The First World War and the Postwar Deflation.** The aircraft manufacturing industry, as such, did not come into existence until 1914. "Backyard" production had accounted for the few hundred planes made prior thereto. Foreign demand, consequent upon the outbreak of the first war in Europe, provided aircraft manufacturing with its first industry stimulus—between 1914 and 1916 United States output increased eightfold.

With our entry into the war in 1917, aircraft manufacturing assumed the stature of an important American industry. At the time, there was a widespread belief that aircraft manufacturing would remain an important component of American industry. Accordingly, individual companies did not hesitate to borrow extensively on their own initiative in order to finance the sharp expansion in productive capacity necessitated by war demands.

The end of the First World War found the industry with vastly expanded plant and financial responsibilities on the one hand, and weakened financial resources and absence of production demand on the other. Government purchase of planes was negligible in the after-war years. Civilians were air-minded to a degree, but the government dumped surplus aircraft on the open market, and this action nullified the industry's competitive position for some time. By comparison with wartime standards, the industry's peacetime production was inconsequential.

Cumbersome contract settlement machinery froze a sizable part of the industry's assets for a long time. Ultimately, inventory losses wiped out almost all the resources accumulated during the First World War. The drain of necessary running and impetus expense on remaining free assets rapidly brought the industry to the verge of bankruptcy.

The post First World War deflationary period precipitated many industrial and commercial failures.

TABLE 4-1. INDUSTRIAL PROFITS AND FAILURES, FIRST WORLD WAR

Year	Corporate net profits, <sup>a</sup> millions	Industrial and commercial failures	
		Failures, number	Liabilities, millions
1914	\$2,371	18,280	\$358
1917	7,342	13,855	182
1921	24	19,652	627

<sup>a</sup> Excludes intercorporate dividends and Federal income and war, excess and undistributed profits taxes.

Sources: U.S. Department of Commerce, *Statistical Abstract of the United States, 1942*, p. 352. Temporary National Economic Committee "Profits, Productive Activities and New Investment," *Monograph 12, 1941*, p. 45.

However, the effect of the deflationary forces on the aircraft industry was intensified because of the latter's greater than average wartime expansion compared with its poorer than average resiliency to postwar depression forces. After the war, practically the entire industry went through major reorganization or disappeared from the scene.

During the First World War period, four companies accounted for almost three-quarters of the planes and engines produced for the Army by regular aircraft manufacturers—Curtiss Aeroplane and Motor Corp., Wright-Martin Co., Dayton-Wright Co. and Standard Aircraft Co. None of the four survived without reorganization.

Curtiss Aeroplane and Motor Corp. reorganized in 1923. (The company's sales had fallen from \$46 million in 1918 to \$1.3 million by 1921.)

Wright-Martin Co. reorganized.

Dayton-Wright Co. stopped making planes entirely.

Standard Aircraft Co. went out of business.

Smaller companies—such as Burgess, Sturtevant, and West Virginia—also disappeared from the aircraft scene.

**Financial Position Prior to the Second World War.** During the decade preceding the outbreak of the Second World War, the industry experienced a reasonably satisfactory trend of sales and profits. Government procurement, though small, provided substantial orders; commercial airline companies were steadily expanding the scope of their operations, civilian purchases were mounting, and foreign orders were being filled.

The industry never enjoyed a strong current position because of the need of expending large sums for experimental and development work per dollar of sales. The average company's ratio of current assets to current liabilities was consistently more narrow than that for the average industrial company.

However, up to 1940 the industry was gradually bringing its operating expense ratio under better control (see Table 4-15) and was improving

its profit margin appreciably (Table 4-11). Federal taxes were not unduly burdensome (Table 4-4). Dividend payments (expressed as a percentage of earnings) were somewhat smaller than those paid out by the average industrial company, but aggregated more than half of such earnings (Table 4-10). Mounting confidence of stock purchasers found expression in a firming and finally an improvement in market prices (Table 4-10).

**The Effect of the Second World War on the Industry's Financial Position.** Viewed from the standpoint of either income-account or balance-sheet relationships, the dislocations created by the sudden impact of our preparedness program in 1941 and our war demands in the subsequent years were severe in the extreme.

Between 1940 and 1944, the industry's sales volume increased twenty-three-fold, but its operating expenses increased twenty-seven-fold; Federal taxes increased twentyfold over 1940 (Table 4-2). (The industry was particularly vulnerable to tax inroads because its sevenfold gain in total income between 1940 and 1944 was out of all proportion to the size of its tax-exemption base.) Renegotiation of profits also squeezed net income, and percentage profit on sales fell 92 per cent between 1940 and 1944 after contingencies, and fell 87 per cent before deductions for contingencies.

Profit on sales dropped from 12.9 per cent in 1940 (13.0 per cent before contingency reserves) to 1.0 per cent in 1944 (1.7 per cent before contingency reserves) (Table 4-11). [The profit after contingencies was 1.40 per cent of sales in 1943. The National City Bank of New York, using a different set of component companies, reported a 1.2 per cent profit on sales in 1944 for aircraft and parts companies. This was the lowest of any of the major war industries. The automobile industry had a 3.1 per cent profit on sales, which included aircraft (Table 4-12)].

Data for a representative group of war industries compiled by the Securities and Exchange Commission using still another set of components show that 1942 and 1943 operating and net profits for each of five representative industries were larger than those of the aircraft and aircraft equipment group (Table 4-13). Contingency provisions, as a percentage of net sales, set aside by the aircraft group were no larger on the average than the provisions made by the other groups, despite the fact that the aircraft industry's postwar readjustment problems are considerably more troublesome.

Working capital position has been impaired materially during the war years, because the growth in working capital in terms of dollar volume has not been commensurate with the vastly expanded need of the industry for postwar reserves.

The aircraft industry's working capital position began to deteriorate

in 1939, because growing aircraft orders from European governments necessitated large cash outlays for fixed equipment.

A survey of working capital positions undertaken by the SEC shows that, for the periods covered (Dec. 31, 1939, 1941, 1943, and 1944) the aircraft and aircraft equipment industry's average ratio has been consistently lower than the average for all registered corporations, combined war and nonwar manufacturing corporations, war industry manufacturing corporations, and a group of individual industries doing related war work (Table 4-16).

Virtually all balance-sheet and income-account relationships have been dislocated during the war years. For example, the percentage of net current assets to net sales dropped from about 35 per cent in 1937-1938 to slightly less than 4 per cent in 1944 (Table 4-8). In 1942, the ratio was 4.4 per cent; this compares with a 1942 composite industrial ratio of 30 per cent as reported by the Harvard University Graduate School of Business Administration in its study, "Financial Position of the Aircraft Industry." Similarly, the net current assets as a percentage of inventories fell from 143 to 187 per cent in 1937-1938 to 68 per cent in 1944. The 1942 ratio was considerably lower at 29 per cent. The 1942 industrial composite of 146 per cent reported in the Harvard survey illustrates the degree to which aircraft working capital failed to keep pace with the growth in sales and inventories.

Impairment of liquid position is implicit in the declining ratio of cash and securities to current assets from the 1938-1940 level.

One of the more significant changes in the income account balance-sheet ratios is involved in a comparison of sales and net property. The pyramiding of a ninety-three-fold sales gain between 1937 and 1944 on a fivefold net plant expansion (company and emergency plant but excluding government constructed facilities) mushroomed the percentage of sales to net plant from 404 per cent in 1937 to 8,250 per cent in 1944. Sales as a percentage of total assets also increased disproportionately, from 94 per cent in 1937 to 354 per cent in 1944 (Table 4-14).

A study of the ratios made in conjunction with the annual total and average balance-sheet and income-account data in the tabulations reveals that there was no hand-in-hand development as between sales, on the one hand, and the various indicators of inherent financial stability, on the other hand.

**Postwar Problems.** The operational momentum created by the various wartime influences was of sufficient force to mask any fundamental weaknesses in the industry's financial structure. The—in effect—close government supervision and control of industry operations; the substantial government investment in the form of plant, advances, etc.; the temporary absence of competitive forces; and the normally large experi-

mental and development costs—all aided in giving a false feeling of financial stability during the emergency period.

At the conclusion of the war, however, the industry faced two major problems:

1. The realignment of its balance sheets to provide for the adjustment of inventories, receivables, advances, and other balance-sheet items,

2. The transition from a war-inflated to a peace-deflated level of sales as government procurement of aircraft is cut drastically—during which time the industry is faced with the problem of survival until adequate postwar markets are developed.

The inherent danger stems from the fact that the industry will need a considerable cash reserve to live through the transition. This may not be possible because present cash reserves provide poor coverage, against contingencies, and industry may sustain substantial losses as a result of balance-sheet adjustments.

If the war had ended while 1944 relationships still obtained, the industry would have a net working capital (current assets less current liabilities) of \$225,069,000 and total current assets only 1.2 times current liabilities (Table 4-5). The major point is what current assets can be readily translated into liquid funds—and what the assets will amount to once the various termination adjustments have been made. The industry may have to absorb very substantial losses in current assets as a consequence of contract cancellations and liquidation of inventories.

At the end of 1944, quick assets were \$389,109,000 and aggregated only about 27 per cent of the current asset total (Table 4-6). Approximately 23 per cent was in inventories. Use of the later assets in defraying current liabilities or operating costs is subject to liquidation. Almost half the current asset consists of receivables, the total collection of which will also be subject to contract cancellation adjustments.

Conversion of receivables and inventories may very well consume much time, time during which various current liabilities may become due for payment.

Aside from the possibility of losses sustained in receivable and inventory adjustments, the time needed for conversion represents another financial problem. The \$389,109,000 of cash and securities immediately available for use represent only a fraction of payables, refunds, taxes, and renegotiation refunds due to the government, and advances and contract deposits due the government and other creditors. These current liabilities total \$1,192,728,000 (Table 4-5). If collections on inventories or on receivables were protracted beyond a year's time and the industry were required to discharge those liabilities (which include accrued wages), liquid funds would be the equivalent of only 33 per cent of the particular current liabilities.

The 1944 company-owned inventory total of \$331,828,000 is vulnerable to considerable shrinkage at the war's end. This sum, moreover, did not include government-owned inventory under cost-plus-fixed-fee contracts. (In 1943, these inventories were \$112,268,000 for the average airframe manufacturer, according to the Harvard Business School.) A loss of 25 per cent on company-owned inventory alone would reduce working capital from \$225,069,000 to about \$142,000,000.

Inventory liquidation now is a major industry problem. By and large, the inventory—representing military aircraft in various stages of completion has become practically worthless inasmuch as it is not convertible into civilian aircraft. The industry will have to depend on government reimbursement for inventory that is of little or no value to either the industry or the government, but which represents prior contract commitments. Under the circumstances, it may take considerable time for industry and government representatives to agree on a mutually acceptable basis of values.

From an operating standpoint, the cash and working capital positions of the industry also might prove poor in relation to postwar needs. During 1944, the industry's operating expenses averaged about \$450,000,000 per month. Recent drastic and widespread government contract cancellations at the war's end made it impossible to pare operating expenses with equal rapidity, even though industry partially suspended operations. The momentum or impetus of operating expenses necessarily decelerates at a slower rate than termination of war work.

In addition industry will not be able to start to develop its civilian markets immediately because plant facilities have to be adjusted, new tooling will be needed, experimental and development research will have to be undertaken, and so forth.

Disposal of government-owned plant and facilities constructed under the emergency plant expansion arrangement also poses cash problems. If the industry is to purchase or lease any of the government-owned plants—which represents about 90 per cent of all plant investment—a considerable cash outlay will be required.

The pressure that expenses, taxes, and renegotiation have exerted on profits and the slender margin by which current assets exceed current liabilities indicates a need for cash reserves materially larger than those now held by the industry.

The carry-back provisions of the present income-tax law provide some cushion against an earnings decline, but only to a minor extent. Moreover, the carry-back provisions may be substantially modified during the postwar years. The industry also carries \$74,012,000 of noncurrent assets in the form of postwar tax refund (Table 4-5)—but this would defray operating expenses (on the 1944 level) for less than a

week. Moreover, this money may not be available at the time of most urgent need.

**Returns to Stockholders.** Improvement in earnings per share in the aircraft industry during the war years has been illusory. Compared with prewar years, the stockholder in the average aircraft company has received progressively smaller dividend returns on his equity holding during the war years, except for 1944, when a moderate improvement over 1943 was registered. In 1944, the industry returned 29 per cent of its earnings to its stockholders in the form of dividends, while the average industrial dividend return to stockholders has been almost two-thirds of earnings. In 1944 dividend return, as a percentage of earnings, was just slightly more than half the return that stockholders received in 1937, 1938, and 1939 (Table 4-10).

Net profit on sales, either before or after contingencies, have declined considerably (Table 4-11). The Harvard University study, previously referred to, notes: "Until the losses and expenses of the transition period are taken into account it is impossible to determine the total profits which will remain from war contracts."

Sales increased twenty-three fold between 1940 and 1944, but net worth (which represents the stockholders equity) increased only 4.2 times; from 1937 to 1944 sales increased ninety-three fold, but net worth only 8.8 times (Table 4-17).

As a percentage of sales, stockholders' capital has suffered sharply—the ratio has declined steadily from 69.6 per cent in 1937 to 6.7 per cent in 1944. A very significant impairment also occurred in the relationship of net worth to inventory and to total assets. (Some degree of distortion in the various 1944 net worth ratios is believed to have occurred as a result of changes in accounting procedures on the part of various companies.) (Table 4-17.)

While the percentage of net worth to sales is abnormally low, the return on net worth appears to be high. In Table 4-17, it will be noted that the percentage of net income to worth in 1944 was 15.2 per cent after contingencies and 25.1 per cent before contingencies.

The return on net worth is distorted because the net worth figure gives no recognition to the huge amounts of government-owned property and inventory which is not reflected in balance sheets but on which the industry works as if they were its own and on which it receives profits. Both government-owned plant and inventory are appreciably larger than the company-owned assets. At the same time, the management of these government-owned assets requires responsibilities and risks, especially during the period of inventory liquidation.

Stated in another way, if the industry owned the government plant and government inventory, net worth would be much larger than it



currently is and the return on the stockholders' capital would be thus much lower. As it is, an asset shrinkage of any consequence could wipe out stockholders' equity entirely.

Aircraft-industry stockholders are assuming substantial postwar risks for which wartime returns are hardly commensurate. Stock prices have reflected the inherent uncertainties (Table 4-10). The average August, 1944, high for a selected group of 14 aircraft stocks was 45 per cent below the average 1940 high; the average August, 1944, low was down 24 per cent from the 1940 average low. This downward trend has been in contradiction to the movement of the general market.

Stockholder appraisal of equities almost always automatically finds expression in market behavior. The depressed activity of aircraft equities during the war years suggests an attitude of strong stockholder skepticism concerning earnings and dividend prospects in the postwar years.

TABLE 4-2. INCOME ACCOUNTS, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944  
(Thousands of dollars)

	1937	1938	1939	1940	1941	1942	1943	1944
Net sales.....	\$61,764	\$88,467	\$140,955	\$247,376	\$812,607	\$2,788,882	\$5,209,019	\$5,766,292
Operating profit <sup>a</sup> ..	\$ 5,236	\$10,634	\$ 21,763	\$ 46,619	\$178,052	\$ 379,873	\$ 489,187	\$ 363,823
Total income <sup>b</sup> .....	4,855	9,612	22,681	49,476	182,415	387,426	495,751	367,673
Contingencies.....				\$ 450	\$ 7,995	\$ 27,664	\$ 42,669	\$ 38,122
Federal income tax	\$ 927	\$ 2,016	\$ 4,465	\$ 10,647	\$ 34,981	\$ 28,582	\$ 17,221	\$ 16,834
Excess profits tax (surtax).....	379	52		2,684	73,786	262,107	371,445	274,515
Federal tax credit..					192	9,457	31,703	27,841
Total Federal taxes net.....	\$ 1,306	\$ 2,068	\$ 4,465	\$ 13,331	\$108,575	\$ 281,232	\$ 356,963	\$ 263,508
Net profit, after contingencies....	\$ 2,258	\$ 8,029	\$ 14,566	\$ 31,796	\$ 60,071	\$ 60,623	\$ 72,863	\$ 58,586
Net profit, before contingencies....	2,258	8,029	14,566	32,246	68,066	88,287	115,532	96,708

<sup>a</sup> Operating profit represents all profits derived from operations.

<sup>b</sup> Total income includes nonoperating income or losses.

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-3. INCOME ACCOUNTS, AVERAGE AIRCRAFT COMPANY, 1937-1944  
(Thousands of dollars)

	1937	1938	1939	1940	1941	1942	1943	1944
Net sales.....	\$5,147	\$7,372	\$11,746	\$20,615	\$67,717	\$232,407	\$434,085	\$480,524
Operating profit <sup>a</sup> .....	\$ 436	\$ 886	\$ 1,814	\$ 3,885	\$14,838	\$ 31,656	\$ 40,766	\$ 30,319
Total income <sup>b</sup> .....	405	801	1,890	4,123	15,201	32,286	41,313	30,639
Contingencies.....				\$ 38	\$ 666	\$ 2,305	\$ 3,556	\$ 3,177
Federal income tax.....	\$ 77	\$ 168	\$ 372	\$ 887	\$ 2,915	\$ 2,382	\$ 1,435	\$ 1,403
Excess profits tax (surtax)....	32	4		224	6,149	21,842	30,954	22,876
Federal tax credit.....					16	788	2,642	2,320
Total Federal taxes net.....	\$ 109	\$ 172	\$ 372	\$ 1,111	\$ 9,048	\$ 23,436	\$ 29,747	\$ 21,959
Net profit, after contingencies..	\$ 188	\$ 669	\$ 1,214	\$ 2,650	\$ 5,006	\$ 5,052	\$ 6,072	\$ 4,882
Net profit, before contingencies.	188	669		2,687	5,672	7,357	9,628	8,059

<sup>a</sup> Operating profit represents all profits derived from operations.

<sup>b</sup> Total income includes nonoperating income or loss.

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-4. NET FEDERAL TAXES TO TOTAL INCOME, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944

Year	Per Cent
1937	26.9
1938	21.5
1939	19.7
1940	26.9
1941	59.5
1942	72.6
1943	72.0
1944	71.7

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1939-1944. Data for 1944 from individual company reports.

TABLE 4-5. BALANCE SHEETS, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944  
(Thousands of dollars)

	1937	1938	1939	1940	1941	1942	1943	1944
<b>Assets:</b>								
<b>Current assets:</b>								
Cash.....	\$ 7,363	\$15,620	\$ 35,638	\$179,992	\$111,470	\$ 294,146	\$ 304,541	\$ 291,786
Restricted cash.....				2,529	22,446	9,087	49,775	19,976
Securities.....	149	1,497	1,298	2,048	19,554	12,178	115,634	97,323
Receivables.....	19,903	14,758	12,803	48,554	161,303	514,358	781,393	716,720
Inventories.....	15,009	16,467	47,563	142,192	346,709	424,176	434,246	331,828
Miscellaneous current assets.....	250	408	61	22,498	794	2,922	17,863	2,786
<b>Total current assets.....</b>	<b>\$42,674</b>	<b>\$48,750</b>	<b>\$ 97,363</b>	<b>\$397,813</b>	<b>\$662,276</b>	<b>\$1,256,867</b>	<b>\$1,703,452</b>	<b>\$1,460,419</b>
Net plant and property.....	\$15,304	\$16,689	\$ 23,422	\$ 41,931	\$ 66,678	\$ 66,430	\$ 77,893	\$ 35,521
Emergency plant expansion.....				12,544	43,617	26,196	25,825	34,372
<b>Total net plant.....</b>	<b>\$15,304</b>	<b>\$16,689</b>	<b>\$ 23,422</b>	<b>\$ 54,475</b>	<b>\$110,295</b>	<b>\$ 92,626</b>	<b>\$ 103,718</b>	<b>\$ 69,893</b>
Postwar tax refund.....	128			280		8,349	43,013	74,012
Investments.....	341	337	987	2,384	5,498	11,393	8,005	7,451
Development, etc., expenses.....	1,545	3,637	3,074	4,385	7,077	102	677	934
Deferred charges.....	1,151	1,094	2,419	10,616	7,226	13,713	15,366	10,496
Miscellaneous assets.....	4,525	3,474	3,897	1,130	13,760	26,331	8,655	4,353
<b>Total assets.....</b>	<b>\$65,668</b>	<b>\$73,981</b>	<b>\$131,162</b>	<b>\$471,083</b>	<b>\$806,132</b>	<b>\$1,409,381</b>	<b>\$1,882,886</b>	<b>\$1,627,558</b>
<b>Liabilities:</b>								
<b>Current liabilities:</b>								
Payables.....	\$13,620	\$10,345	\$ 14,322	\$ 37,396	\$ 92,370	\$ 297,592	\$ 448,563	\$ 475,352
Accrued taxes-renegotiation provision.....	1,846	2,805	6,942	16,561	115,865	308,520	562,068	361,544
Advances (contracts deposits).....	4,149	143	35,595	253,606	351,559	385,553	344,162	295,706
Refunds due United States.....						121,569	2,136	60,126
Reserve.....				715	304	77	1,000	4,600
Aceruals.....	822	901	617	3,036	6,971	16,562	50,155	27,796
Miscellaneous current liabilities.....	868	3,740	2,360	20,506	14,888	4,033	36,530	10,226
<b>Total current liabilities.....</b>	<b>\$21,305</b>	<b>\$17,934</b>	<b>\$ 59,836</b>	<b>\$331,820</b>	<b>\$581,957</b>	<b>\$1,133,908</b>	<b>\$1,444,614</b>	<b>\$1,235,350</b>
Bank loans, etc.....	1,100	1,715	1,596	15,998	64,746	13,918	109,475	5,030
Contingency reserve.....	492	1,759	893	1,450	12,809	45,969	87,845	126,344
Capital stock.....	16,981	17,617	20,807	23,225	22,806	26,729	27,401	26,816
Capital (paid) surplus.....	21,290	26,357	27,965	29,185	48,775	54,141	55,455	53,092
Earned surplus.....	4,239	8,359	19,426	37,922	74,772	119,488	155,717	178,529
Miscellaneous liabilities.....	261	240	639	31,483	267	15,228	2,379	2,397
<b>Total liabilities.....</b>	<b>\$65,668</b>	<b>\$73,981</b>	<b>\$131,162</b>	<b>\$471,083</b>	<b>\$806,132</b>	<b>\$1,409,381</b>	<b>\$1,882,886</b>	<b>\$1,627,558</b>
<b>Net current assets.....</b>	<b>\$21,369</b>	<b>\$30,816</b>	<b>\$ 37,527</b>	<b>\$ 46,003</b>	<b>\$ 80,346</b>	<b>\$ 122,962</b>	<b>\$ 258,837</b>	<b>\$ 225,069</b>

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-6. COMPOSITION OF 1944 CURRENT ASSETS, 12 MAJOR AIRCRAFT COMPANIES

1944 current assets	Amount, thousands	Per cent of total
Cash and securities (liquid funds).....	\$ 389,109	26.7
Inventories.....	331,828	22.7
Receivables.....	716,720	49.1
Miscellaneous.....	22,762	1.5
Total.....	\$1,460,419	100.0

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-7. BALANCE SHEETS, AVERAGE AIRCRAFT COMPANY, 1937-1944  
(Thousands of dollars)

	1937	1938	1939	1940	1941	1942	1943	1944
<b>Assets:</b>								
Current assets:								
Cash.....	\$ 614	\$1,302	\$ 2,970	\$14,994	\$ 9,289	\$ 24,512	\$ 25,378	\$ 24,315
Restricted cash.....				211	1,871	757	4,148	1,665
Securities.....	12	125	108	171	1,630	1,015	9,663	8,110
Receivables.....	1,658	1,230	1,067	4,046	13,442	42,864	65,116	59,726
Inventories.....	1,251	1,372	3,964	11,849	28,892	35,348	36,187	27,653
Miscellaneous current assets..	21	34	5	1,880	66	243	1,489	232
Total current assets.....	\$3,556	\$4,063	\$ 8,114	\$33,151	\$55,190	\$104,739	\$141,954	\$121,702
Net plant and property.....	\$1,276	\$1,391	\$ 1,952	\$ 3,494	\$ 5,557	\$ 5,536	\$ 6,491	\$ 2,960
Emergency plant expansion.....				1,045	3,635	2,183	2,152	2,864
Total net plant.....	\$1,276	\$1,391	\$ 1,952	\$ 4,539	\$ 9,192	\$ 7,719	\$ 8,643	\$ 5,824
Postwar tax refund.....	11			23		696	3,584	6,168
Investments.....	28	28	82	199	458	949	667	621
Development, etc., expenses..	129	303	256	365	590	9	56	78
Deferred charges.....	96	91	202	885	602	1,143	1,281	874
Miscellaneous assets.....	376	289	324	94	1,146	2,193	722	363
Total assets.....	\$5,472	\$6,165	\$10,930	\$39,257	\$67,178	\$117,448	\$156,907	\$135,629
<b>Liabilities:</b>								
Current liabilities:								
Payables.....	\$1,135	\$ 862	\$ 1,194	\$ 3,116	\$ 7,698	\$ 24,799	\$ 37,380	\$ 39,613
Accrued taxes-renegotiation provision.....	154	234	579	1,380	9,655	25,710	46,839	30,129
Advances (contracts de- posits).....	346	12	2,966	21,134	29,297	32,129	28,680	24,642
Refunds due United States Reserve.....						10,131	178	5,010
Reserve.....				60	25	6	83	383
Accruals.....	69	75	51	253	581	1,380	4,180	2,316
Miscellaneous current liabili- ties.....	71	312	197	1,709	1,240	336	3,044	852
Total current liabilities....	\$1,775	\$1,495	\$ 4,987	\$27,652	\$48,496	\$ 94,492	\$120,385	\$102,946
Bank loans, etc.....	92	143	133	1,333	5,396	1,160	9,123	419
Contingency reserve.....	41	147	74	121	1,067	3,831	7,320	10,529
Capital stock.....	1,415	1,468	1,734	1,935	1,901	2,227	2,283	2,235
Capital (paid) surplus.....	1,774	2,195	2,330	2,432	4,065	4,512	4,621	4,424
Earned surplus.....	353	697	1,619	3,160	6,231	9,957	12,976	14,877
Miscellaneous liabilities.....	22	20	53	2,624	22	1,269	199	200
Total liabilities.....	\$5,472	\$6,165	\$10,930	\$39,257	\$67,178	\$117,448	\$156,907	\$135,629
Net current assets.....	\$1,781	\$2,568	\$ 3,128	\$ 3,834	\$ 6,696	\$ 10,247	\$ 21,570	\$ 18,756

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-8. CURRENT ASSETS, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944

Year	Ratio current assets to current liabilities	Cash and securities to current assets, per cent	Net current assets to sales, per cent	Net current assets to inventories, per cent
1937	2.0	17.6	34.6	142.7
1938	2.7	35.1	34.9	187.3
1939	1.6	37.9	26.6	78.8
1940	1.2	45.8	18.6	32.4
1941	1.1	19.8	9.9	23.2
1942	1.1	24.4	4.4	29.0
1943	1.2	24.7	5.0	59.6
1944	1.2	26.6	3.9	67.8

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-9. 1944 BALANCE SHEET, 12 MAJOR AIRCRAFT COMPANIES  
(Thousands of dollars)

Assets:		Liabilities:	
Current assets:		Current liabilities:	
Cash.....	\$ 291,786	Payables.....	\$ 475,352
Restricted.....	19,976	Accrued taxes—renegotiation.....	361,544
Securities.....	97,323	Advances (contract deposits).....	295,706
Receivables.....	716,720	Refunds due United States.....	60,126
Inventories.....	331,828	Reserve.....	4,600
Miscellaneous.....	2,786	Accruals.....	27,796
Total current assets....	\$1,460,419	Miscellaneous.....	10,226
Net plant and property... \$	35,521	Total current liabilities	\$1,235,350
Emergency plant expansion.....	34,372	Bank loans, etc.....	\$ 5,030
Total net plant.....	\$ 69,893	Contingency reserve.....	126,344
Postwar tax refund.....	74,012	Capital stock.....	26,816
Investments.....	7,451	Capital (paid) surplus....	53,092
Development, etc., expense	934	Earned surplus.....	178,529
Deferred charges.....	10,496	Miscellaneous.....	2,397
Miscellaneous.....	4,353	Total liabilities.....	\$1,627,558
Total assets.....	\$1,627,558	Net current assets.....	\$ 225,069

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-10. EARNINGS, DIVIDENDS, AND PRICE RANGE OF STOCK, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944.

	Average earnings per share	Average dividend	Per cent dividend of earnings	Average high price	Average low price
1937	\$ .19	\$.11	56.9	26¼	7⅞
1938	.75	.42	55.9	27¾	9¼
1939	1.10	.64	55.6	28	14½
1940	3.15	1.10	35.1	32¼	18⅞
1941	5.97	1.71	28.6	24⅞	15¼
1942	5.66	1.65	29.1	21⅞	13½
1943	6.60	1.57	23.8	20¾	11¼
1944	5.63	1.63	29.0	21⅞	12¼

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports, except for price range figures.

TABLE 4-11. PER CENT NET PROFIT TO SALES, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944

Year	After contingencies	Before contingencies
1937	3.7	3.7
1938	9.1	9.1
1939	10.3	10.3
1940	12.9	13.0
1941	7.4	8.4
1942	2.2	3.2
1943	1.4	2.2
1944	1.0	1.7

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-12. PER CENT NET PROFIT TO SALES, 1941-1944  
(After taxes)

Industry	1941	1942	1943	1944
Nonferrous metals.....	12.3	12.1	9.0	8.6
Petroleum products.....	10.1	7.4	6.8	7.0
Autos (including aircraft sales).....	6.6	5.2	3.2	3.1
Railway equipment.....	6.6	3.2	3.1	3.1
Iron and steel.....	6.2	3.4	2.8	2.6
AIRCRAFT AND PARTS.....	7.4	3.2	1.8	1.2

Source: Condensed from National City Bank of New York, "Economic Conditions," April, 1943, p. 44; April, 1944, p. 45; April, 1945, p. 39.

TABLE 4-13. PER CENT NET PROFIT ON SALES  
(After taxes)

Industry	After contingencies		Before contingencies	
	1942	1943	1942	1943
Railroad equipment.....	3.5	2.6	4.6	3.3
Automobile parts and accessories.....	3.6	2.9	4.5	3.9
Automobiles.....	5.4	3.3	6.7	4.4
Shipbuilding.....	2.5	2.1	3.0	2.6
AIRCRAFT AND AIRCRAFT EQUIPMENT..	2.1	1.5	3.1	2.4

Source: Condensed from Securities and Exchange Commission, "Data on Profits and Operations, 1942-1943," Part II, pp. 9, 179; Part III, pp. 1, 66, 214.

TABLE 4-14. SALES, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944<sup>a</sup>

Year	Sales to company-owned net property, <sup>b</sup> per cent	Sales to company-owned total assets, per cent	Ratio sales to company-owned inventories	Ratio sales to receivables
1937	403.6	94.1	4.1	3.1
1938	530.1	119.6	5.4	6.0
1939	601.8	107.5	3.0	11.0
1940	454.1	52.5	1.7	5.1
1941	736.8	100.8	2.3	5.0
1942	3,010.9	197.9	6.6	5.4
1943	5,022.3	276.7	12.0	6.7
1944	8,249.8	354.2	17.4	8.0

<sup>a</sup> The data for the first three columns exclude government-owned assets.

<sup>b</sup> Gross property less accrued depreciation.

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-15. OPERATING EXPENSES TO SALES, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944

Year	Net sales, thousands	Operating expenses, thousands	Per cent of operating expenses to net sales
1937	\$ 61,764	\$ 56,528	91.5
1938	88,467	77,833	88.0
1939	140,955	119,192	84.6
1940	247,376	200,757	81.2
1941	812,607	634,555	78.1
1942	2,788,882	2,409,009	86.4
1943	5,209,019	4,437,250	85.2
1944	5,766,292	5,402,469	93.7

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.

TABLE 4-16.—RATIO OF CURRENT ASSETS TO CURRENT LIABILITIES, SELECTED INDUSTRIES, 1939-1944

Number of companies	Industry	December			
		1939	1941	1943	1944
1,290	Registered corporations	3.2	2.2	1.9	2.0
837	Manufacturing corporations (war and non-war)	4.5	2.4	2.0	2.1
408	War industry manufacturing corporations	4.2	2.1	1.7	1.8
51	Iron and steel	4.3	2.5	2.3	2.6
20	Autos and trucks	3.2	2.0	1.8	1.9
58	Auto parts and accessories	4.2	2.0	1.5	1.6
101	Machinery and equipment	5.7	2.8	2.0	2.1
25	AIRCRAFT AND AIRCRAFT EQUIPMENT	1.5	1.2	1.2	1.2

Source: Securities and Exchange Commission, condensed from "Working Capital of 1290 Registered Corporations, December, 1939-December, 1944," pp. 3-5, 12, 14, 15.

TABLE 4-17. STOCKHOLDERS' CAPITAL RATIOS, 12 MAJOR AIRCRAFT COMPANIES, 1937-1944

	1937	1938	1939	1940	1941	1942	1943	1944
Net worth (in thousands of dollars):								
Capital stock.....	\$16,981	\$17,617	\$20,807	\$23,225	\$ 22,806	\$ 26,729	\$ 27,401	\$ 26,816
Capital (paid) surplus....	21,290	26,557	27,965	29,185	48,775	54,141	55,455	53,092
Earned surplus.....	4,239	8,359	19,426	37,922	74,772	119,488	155,717	178,529
Contingency reserve.....	492	1,759	893	1,450	12,809	45,969	87,845	126,344
Total net worth.....	\$43,002	\$54,292	\$69,091	\$91,782	\$159,162	\$246,327	\$326,418	\$384,781
Per cent net worth to:								
Sales.....	69.6	61.4	49.1	37.1	19.6	8.8	6.1	6.7
Inventories.....	286.5	330.0	148.2	64.6	45.9	5.1	75.2	116.0
Total assets.....	65.5	73.3	52.7	19.5	19.7	17.5	17.3	23.6
Per cent:								
Net current assets to net worth.....	49.7	56.8	54.2	50.1	50.5	49.9	79.3	58.5
Net income (after contingencies) to net worth	5.3	14.8	21.1	34.6	37.7	24.6	22.3	15.2
Net income (before contingencies) to net worth	5.3	14.8	21.1	35.1	42.8	35.8	35.4	25.1

Source: Aircraft Industries Association, compiled from Moody's Industrial Manuals, 1938-1944. Data for 1944 from individual company reports.



## CHAPTER 5

### MILITARY AVIATION

**Organization.** Military aviation in the United States is under the jurisdiction of the War and Navy Departments.

**Army Air Forces.** The Secretary of War is aided by an Assistant Secretary of War for Air.

Under the direction of the Chief of Staff, the General Staff formulates plans and policies for the Army Air Forces and the two other principal commands of the Army. The Commanding General of the Army Air Forces is responsible for the execution of these plans and for the organization, training, equipment, and maintenance of the Army Air Forces.

The Commanding General of the Army Air Forces is a member of the Joint Chiefs of Staff (Army-Navy).

**Naval Air Forces.** The Secretary of the Navy has as one of his principal advisers an Assistant Secretary of the Navy for Air.

Procurement of Naval and Marine Corps aircraft is the responsibility of the Bureau of Aeronautics, which also conducts research, makes tests, and performs other activities.

Naval aeronautic operating forces are under the Deputy Chief of Naval Operations (Air). His duties include planning, personnel, training, flight, Naval Air Transport Service, and Aviation, Marine Corps.

**Joint Army-Navy Boards.** *The Joint Board* deals with matters calling for cooperation between Army and Navy. The Commanding General of the Army Air Forces and the Chief of the Bureau of Aeronautics are represented on this board.

*The Aeronautical Board* tries to prevent duplication of effort in matters affecting the Army Air Forces and Navy aviation. High officers of both services are represented on it.

**Cost of Military Aviation.** Budget officers of the Army and Navy Departments prepare estimates of the cost of department activities. These estimates go to the Bureau of the Budget, which revises them and prepares them for the President's consideration and for his presentation to Congress in the Annual Budget as "Budget Estimates." After review by the Congress, "Appropriations" are made through Appropriations Acts passed by the Congress. "Expenditures" under these acts are reported by the Treasury.

Considerable differences may occur between Budget Estimates and Appropriations (owing to changes made by the Congress) and between Appropriations and Expenditures (owing to changed requirements, inability to provide all the products or services, etc.). During both World Wars expenditures for some activities were way below the amounts appropriated.

Appropriations and expenditures for the Army Air Forces (Air Corps, Army) and for the Bureau of Aeronautics, Navy, are usually taken as indicative of cost of military aviation, although they do not cover some military aviation items.<sup>1</sup>

**Production.** Over-all production figures for military planes are given in the chapter on Production. Here are given only breakdowns of these over-all figures.

Figures on war production were published by the War Production Board and by the Aircraft Resources Control Office. The words acceptances, shipments, and production are used synonymously by these agencies and mean aircraft (or engines or propellers) produced for and accepted by the Army or Navy. There are slight differences in the quantities reported by the two agencies, but efforts are now being made to arrive at uniform results.

**Personnel and Equipment.** Production figures do not indicate how many planes are available to our military services at any given time. Data on planes "operating" or "on hand" are used for this purpose.

Before the war, statements at appropriations hearings gave a good indication of the status of our flying services. At present, such figures are again becoming available.

All data on personnel and equipment come from the Army Air Forces and the Navy.

**Achievements of Military Aviation.** Few comprehensive measurements of the achievements of the air forces are available. Number of sorties, bomb tonnage dropped, number of enemy airplanes destroyed, length of air transport routes, miles flown, etc., give some of the facts that can now be made available for publication.

<sup>1</sup> On Mar. 8, 1940, General Arnold presented to the Committee on Appropriations of the House a table listing the estimated cost of the military air services from appropriations other than Army Air Corps and Navy Bureau of Aeronautics. For the Army, the major items listed at the time were Pay, Quartermaster Corps, National Guard, Ordnance, Organized Reserve, Signal Corps, Travel, and Medical. For the Navy, the major items were Pay, Replacement of Naval Vessels, Naval Reserve, Yards and Docks, Ordnance, Pay of Marine Corps, Subsistence, Fuel, etc. The Navy data include maintenance, operation, and repair of aircraft carriers and tenders. In 1939, such indirect appropriations equaled direct appropriations for the two services.

TABLE 5-1. APPROPRIATIONS FOR ARMY AIR CORPS AND NAVAL AVIATION, 1909-1921

Year	Army Air Corps	Naval aviation
1909	\$ 30,000 <sup>a</sup>	\$ . . . . .
1910	. . . . .	. . . . .
1911	25,000	. . . . .
1912	100,000	25,000
1913	100,000	10,000
1914	175,000	10,000
1915	200,000	10,000
1916	301,000	1,000,000
1916-1917	500,000 <sup>b</sup>	. . . . .
1917	18,681,666 <sup>c</sup>	3,772,043
1918	681,250,000 <sup>c,e</sup>	61,526,251
1919	952,304,758 <sup>c,e</sup>	220,383,119 <sup>d</sup>
1920	28,123,503 <sup>e</sup>	25,694,260
1921	34,689,300 <sup>e</sup>	20,011,435

<sup>a</sup> Allotted to pay for Wright airplane, which completed tests in 1909.

<sup>b</sup> Emergency Act, Mar. 31, 1916.

<sup>c</sup> Of the 1917-1919 appropriations \$490,515,060.14 were revoked by act of Congress and \$290,479,474.98 expired by limitation of law (Col. Edgar S. Gorrell at Supplemental Military Appropriation Bill for 1940 Hearings, House of Representatives, May 18, 1939, pp. 293-294).

<sup>d</sup> In 1919, \$119,444,162 reverted to the Treasury as unexpended.

<sup>e</sup> From 1918 to 1921, civilian employes were paid a bonus or increased compensation from a special appropriation; amounts paid are not ascertainable.

Sources: (Army Air Corps), Bureau of the Budget, letter of Feb. 3, 1945.

(Naval Aviation), Navy Department, Bureau of Aeronautics.

TABLE 5-2. NUMBER OF AIRPLANES OF ALLIED AND ENEMY AIR SERVICES, NOV. 11, 1918

Air service	Pursuit	Observation	Day bombardment	Night bombardment	Total
<b>Allies:</b>					
American . . . . .	330	293	117	...	740
British . . . . .	759	503	306	190	1,758
French . . . . .	1,344	1,505	225	247	3,321
Italian . . . . .	336	360	36	80	812
Belgian . . . . .	45	100	...	8	153
Total Allies . . . . .	2,814	2,761	684	525	6,784
<b>Enemy:</b>					
German . . . . .	1,020	1,442	...	268	2,730
Austrian . . . . .	220	391	...	11	622
Total enemy . . . . .	1,240	1,833	...	279	3,352

Source: Col. Edgar S. Gorrell in Supplemental Military Appropriation Bill for 1940 Hearings, House Representatives, May 18, 1939, p. 318.

TABLE 5-3. TOTAL FEDERAL EXPENDITURES AND EXPENDITURES FOR ARMY AIR CORPS AND NAVY BUREAU OF AERONAUTICS, 1922-1944

Fiscal year	Total federal expenditures, thousands	Total Army and Navy expenditures, thousands	Air Corps and Bureau of Aeronautics, expenditures, thousands	Per cent Air Corps and Bureau of Aeronautics of Army and Navy	Per cent Air Corps and Bureau of Aeronautics of total
1922	\$ 3,372,608	\$ 934,531	\$ 36,975	3.96	1.10
1923	3,294,628	730,252	35,991	4.93	1.09
1924	3,048,678	689,266	27,998	4.06	.92
1925	3,063,105	717,123	25,065	3.50	.82
1926	3,097,612	676,833	30,810	4.55	.99
1927	2,974,030	688,023	32,316	4.70	1.09
1928	3,103,265	732,325	41,837	5.71	1.35
1929	3,298,859	790,509	51,864	6.56	1.57
1930	3,440,269	839,020	56,865	6.78	1.65
1931	3,651,516	832,490	68,572	8.24	1.88
1932	4,535,147	833,823	64,731	7.76	1.43
1933	3,863,545	783,994	53,311	6.80	1.38
1934	6,011,083	705,514	33,573	4.76	.56
1935	7,009,875	924,261	42,121	4.56	.60
1936	8,665,645	1,147,469	55,025	4.79	.64
1937	8,177,409	1,184,778	67,547	5.70	.83
1938	7,238,822	1,240,394	111,674	9.00	1.54
1939	8,707,092	1,367,979	130,625	9.54	1.50
1940	8,998,190	1,798,645	157,665	8.76	1.75
1941	12,710,630	6,252,001	796,141	12.89	6.26
1942	32,396,585	22,905,097	3,617,356	15.79	11.16
1943	78,178,885	63,153,386	11,780,477	18.61	14.94
1944	93,743,513	75,780,011	17,577,401	23.19	18.77

Sources: 1922-1942, Federal and Army and Navy: Department of Commerce, Statistical Abstract of the United States, 1943, p. 243.

1943-1944, Federal and Army and Navy: Treasury Department, Daily Statement of the United States Treasury, Jan. 15, 1945, p. 8.

1922-1933, Air Corps and Bureau of Aeronautics: Civil Aeronautics Administration, unpublished survey, Oct. 23, 1944.

1934-1944, Air Corps and Bureau of Aeronautics: Bureau of the Budget, Estimates Division, letter Oct. 11, 1944.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 5-4. BUDGET ESTIMATES, APPROPRIATIONS, AND EXPENDITURES FOR ARMY AIR CORPS AND NAVY BUREAU OF AERONAUTICS, 1934-1945

Fiscal year	Budget estimates (including supplementals)	Appropriations	Expenditures
Army Air Corps <sup>a</sup>			
1934	\$ 23,818,560	\$ 30,824,185 <sup>b</sup>	\$ 17,372,277
1935	31,450,253	27,396,453	20,337,871
1936	48,383,400	45,383,400	32,026,622
1937	62,000,000	59,397,714	41,055,082
1938	60,500,000	58,618,406	50,875,129
1939	71,681,976	70,856,972	83,164,156
1940	203,731,282	186,252,294	108,169,717
1941	2,113,554,404	2,173,090,961 <sup>c</sup>	605,409,020
1942	23,048,720,141	23,049,417,463	2,554,863,419
1943	11,043,270,000	11,316,898,910	7,933,185,583
1944	23,655,481,000	23,655,481,000	13,087,285,361
1945	12,610,200,000	11,592,559,677	11,210,000,000*
Navy Bureau of Aeronautics			
1934	\$ 21,642,750	\$ 29,657,459 <sup>d</sup>	\$ 16,200,754
1935	18,643,320	32,123,453 <sup>e</sup>	21,783,229
1936	52,000,000	40,732,310 <sup>f</sup>	22,998,381
1937	40,000,000	38,588,270	26,491,458
1938	51,500,000	51,500,000	60,799,198
1939	48,245,000	48,075,000	47,460,604
1940	123,334,000	111,459,000	49,494,860
1941	479,034,800	452,319,950	190,732,417
1942	6,194,616,600	6,189,444,100	1,062,492,294
1943	5,257,981,470	5,257,981,470	3,847,290,539
1944	6,574,725,000	4,583,725,000 <sup>g</sup>	4,490,116,275
1945	6,670,000,000	4,600,640,000	5,130,000,000*

\* Estimates based on checks issued.

<sup>a</sup> Amounts shown under Army Air Corps do not include funds for signal equipment and ordnance for planes.

<sup>b</sup> Includes \$7,500,000 allotted from appropriation for National Industrial Recovery.

<sup>c</sup> Includes \$840,000 transferred from appropriation for National Guard.

<sup>d</sup> Includes \$7,700,000 allotted from appropriation for National Industrial Recovery.

<sup>e</sup> Includes \$12,902,772 under Increase of the Navy, Emergency Construction (Aeronautics).

<sup>f</sup> Includes \$12,500,000 under Increase of the Navy, Emergency Construction (Aeronautics).

<sup>g</sup> In addition, there were unliquidated contract authorizations on June 30, 1944, totaling \$209,000,000.

Source: Bureau of the Budget, Estimates Division, letters Oct. 11, 1944, and Apr. 12, 1945.

"Budget for the Navy Department and Naval Services for the Fiscal Year 1946," House Document 116, Mar. 13, 1945, p. 22.

Treasury Department, Bureau of Accounts, Office of Assistant to the Commissioner, Aug. 25, 1945.

TABLE 5-5. PRODUCTION OF MILITARY AIRCRAFT, BY TYPE,<sup>a</sup> 1940-1944

Year	Bombers	Fighters and naval reconnaissance	Transports	Trainers	Communication and special purpose	Total
Number						
1940 <sup>b</sup>	626	1,162	164	1,808	10	3,770
1941	4,119	4,940	533	9,366	501	19,459
1942	12,637	12,240	1,984	17,632	3,367	47,860
1943	29,362	24,739	7,013	19,942	4,874	85,930
1944	35,008	39,136	9,854	7,578	4,783	96,359
Total.....	81,752	82,217	19,548	56,326	13,535	253,378
Per Cent						
1940 <sup>b</sup>	16.6	30.8	4.3	48.0	.3	100.0
1941	21.1	25.4	2.7	48.2	2.6	100.0
1942	26.4	25.6	4.1	36.8	7.1	100.0
1943	34.1	28.8	8.2	23.2	5.7	100.0
1944	36.3	40.7	10.3	7.8	4.9	100.0
Total.....	32.3	32.5	7.4	22.4	5.4	100.0

<sup>a</sup> War Production Board figures on military production differ slightly from figures published by Aircraft Resources Control Offices.

<sup>b</sup> 1940—July to December only.

Source: War Production Board, Military Division, Facts for Industry, Series 51-2-1 and 51-2-3, revised as of Mar. 1, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 5-6. AVERAGE AIRFRAME WEIGHT OF MILITARY AIRCRAFT PRODUCED, BY TYPE, 1940-1944  
(Pounds, excluding spares)

Year	Bombers	Fighters and naval reconnaissance	Transports	Trainers	Communication and special purpose
1940 <sup>a</sup>	9,056	3,233	7,070	1,770	1,300
1941	9,850	3,598	7,086	1,931	1,856
1942	12,900	4,420	9,200	2,220	594
1943	14,479	5,103	7,913	2,359	699
1944	17,433	5,586	11,297	2,515	876

<sup>a</sup> 1940—July to December only.

Computed by Aircraft Industries Association, Research and Statistics Service from War Production Board, Military Division, Facts for Industry 51-2-1 and 51-2-3, revised as of Mar. 1, 1945.

TABLE 5-7. AIRFRAME WEIGHT OF MILITARY AIRCRAFT PRODUCED, BY TYPE  
1940-1944

Year	Bombers	Fighters and naval reconnais- sance	Trans- ports	Trainers	Communi- cation and special purpose	Total
Thousands of Pounds, Excluding Spares						
1940 <sup>a</sup>	5,669	3,756	1,160	3,201	13	13,799
1941	40,573	17,776	3,776	18,089	930	81,144
1942	163,050	54,100	18,257	39,158	2,000	276,565
1943	425,151	126,254	55,496	47,053	3,407	657,361
1944	610,266	218,635	113,193	19,061	3,953	965,108
Total.....	1,244,709	420,521	191,882	126,562	10,303	1,993,977
Percentage of Total Weight Produced, Excluding Spares						
1940 <sup>a</sup>	41.0	27.2	8.4	23.3	.1	100.0
1941	50.0	21.9	4.7	22.3	1.1	100.0
1942	58.9	19.6	6.6	14.2	.7	100.0
1943	64.7	19.2	8.4	7.2	.5	100.0
1944	63.2	22.6	11.9	1.9	.4	100.0
Total.....	62.5	21.0	9.6	6.4	.5	100.0

<sup>a</sup> 1940—July to December only.

Source: War Production Board, Military Division, Facts for Industry, Series 51-2-1 and 51-2-3, revised as of Mar. 1, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 5-8. AIRFRAME WEIGHT OF U.S. MILITARY PLANES, BY TYPE, DECEMBER,  
1944

	Pounds
Heavy bombers, long range, 4 engine.....	49,000
Heavy bombers, 4 engine.....	18,700-28,900
Medium bombers, 2 engine.....	10,100-24,700
Light bombers, 2 engine.....	7,800-14,700
Light bombers, 1 engine.....	2,900- 8,700
Fighters, 2 engine.....	5,800-14,100
Fighters, 1 engine.....	2,400- 6,400
Heavy transports, 4 engine.....	20,100-61,800
Heavy transports, 2 engine.....	19,300-23,900
Medium transports, 2 engine.....	7,800-16,400
Light transports, 2 engine.....	2,300- 3,800
Light transports, 1 engine.....	1,000- 3,300
Advanced trainers, 2 engine.....	2,600-16,800
Advanced trainers, 1 engine.....	1,900- 2,700
Basic trainers, 1 engine.....	1,800- 2,200
Primary trainers, 1 engine.....	600- 1,600
Liaison.....	450- 1,800

Source: Computed by Aircraft Industries Association, Research and Statistics Service, from Aircraft Resources Control Office, "Model Designations of Military Aircraft," revised, December, 1944.

TABLE 5-9. VALUE OF MILITARY AIRCRAFT PRODUCED, BY TYPE (EXCLUDING SPARE PARTS), 1940-1944

Year	Bombers	Fighters and naval reconnaissance	Transports	Trainers	Communication and special purpose	Total
Millions of Dollars at August, 1943, Unit Costs						
1940 <sup>a</sup>	83	67	14	34	<sup>b</sup>	198
1941	572	306	47	192	11	1,128
1942	2,211	825	215	424	14	3,689
1943	5,619	1,913	604	486	62	8,684
1944	7,334	3,039	1,259	210	57	11,899
Total.....	15,819	6,150	2,139	1,346	144	25,598
Per Cent						
1940 <sup>a</sup>	41.9	33.8	7.1	17.2	...	100
1941	50.7	27.1	4.2	17.0	1.0	100
1942	59.9	22.4	5.8	11.5	.4	100
1943	64.7	22.0	7.0	5.6	.7	100
1944	61.6	25.5	10.6	1.8	.5	100
Total.....	61.8	24.0	8.4	5.2	.6	100

<sup>a</sup> July-December only.<sup>b</sup> Less than \$.5 million.

Source: War Production Board, Bureau of Program and Statistics, Military Division, Aircraft Branch, letter of Apr. 18, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.



TABLE 5-10. AIRPLANES IN THE ARMY AIR FORCES, AS OF OCT. 31, 1944

Overseas:	
Combat craft, in combat.....	12,000
Combat craft, in ready reserve.....	6,000
Combat craft, second-line.....	2,500
Combat craft, earmarked for return.....	300
	<u>20,800</u>
Transports.....	5,000
Miscellaneous.....	2,000
	<u>27,800</u>
En route.....	2,000
In United States:	
"Ready reserves" for theaters.....	1,000
Defense, advance training, transport.....	14,000
In maintenance and repair shops.....	5,000
Modification centers, etc.....	1,700
Trainer and communication.....	23,000
Total.....	<u>44,700</u>
Grand total.....	<u>74,500</u>

Sources: *The New York Times*, Nov. 2, 1944. *Washington Post*, Nov. 3, 1944. *Aviation News*, Jan. 15, 1945, p. 12. (Revised and approved by the War Department, Headquarters of the Army Air Forces, Statistical Control Division, letter of Apr. 27, 1945.)

TABLE 5-11. WARPLANE PROGRESS SINCE PEARL HARBOR

	December, 1941	May, 1945
	P-47B	P-47N (Thunderbolt)
Speed.....	420 mph	460 mph
Range.....	835 miles	Over 2,000 miles
Fire power.....	6, 50-cal. guns in wings	8, 50-cal. guns in wings. Can carry 10 5-in. HVAR (high velocity aircraft rockets) with zero launchers
	P-36	P-51 (Mustang)
Speed, approximate.....	320 mph	460 mph
Range, approximate.....	400 miles	Over 2,000 miles
Fire power.....	4, 30-cal. guns in wings	6, 50-cal. guns in wings. Can carry 10 5-in. HVAR with zero launchers
	B-18	B-29 (Superfortress)
Speed.....	215 mph	About 330 mph
Range.....	544 miles	3,300 miles
Fire power.....	3, 30-cal. guns	12, 50-cal. guns
Bomb load.....	2,496 lb	20,000 lb

Source: Maj. Gen. Oliver P. Echols, May 4, 1945. (War Department—Bureau of Public Relations Release.)

TABLE 5-12. OVERSEAS EQUIPMENT AND ACHIEVEMENTS OF THE AMERICAN AIR SERVICE IN THE FIRST WORLD WAR

Total airplanes received by American Expeditionary Forces up to Nov. 11, 1918.....	6,287
American-built planes used on front during war.....	482
Total planes in service, Nov. 11, 1918.....	740
Pilots, Nov. 11, 1918.....	767
Observers, Nov. 11, 1918.....	481
Aerial gunners, Nov. 11, 1918.....	23
Total officers, Nov. 11, 1918.....	7,726
Total officers on flying status in France, Nov. 11, 1918.....	4,088
Total soldiers.....	70,769
Enemy planes brought down on Western Front.....	781
American plane losses, Western Front.....	289

Source: Col. Edgar S. Gorrell in Supplemental Military Appropriation Bill for 1940 Hearings, House of Representatives, May 18, 1939, pp. 314, 318.

TABLE 5-13. OVERSEAS ACHIEVEMENTS OF THE ARMY AIR FORCES, AS OF DEC. 31, 1944

Combat crews overseas.....	26,863
Members of combat crews.....	131,346
AAF personnel overseas.....	1,138,264
Flying hours.....	17,057,756
Gasoline consumption (gals.).....	2,556,578,704
Bomb tonnage dropped.....	1,290,990
Ammunition expended, rounds.....	282,073,153

Source: War Department, Army Air Forces, Statistical Control Division, letters of Feb. 12, 1945, and Apr. 27, 1945.

TABLE 5-14. AIRCRAFT ON HAND, ARMY AIR FORCES, 1941-1944

Dec. 31	Tactical	Training	Transport	Other non-tactical	Total
1941	4,477	7,340	254	226	12,297
1942	11,607	17,044	1,857	2,796	33,304
1943	27,448	26,051	6,466	4,267	64,232
1944	41,961	17,060	10,456	3,249	72,726

Source: Howard Mingos, "The Aircraft Yearbook for 1945," p. 392.

TABLE 5-15. AVERAGE OVERSEAS FIRST-LINE LIFE OF AIRCRAFT IN THE ARMY AIR FORCES<sup>a</sup>

	Months
Heavy bomber.....	12
Medium and light bomber.....	16
Fighter.....	10
Transport (troop carrier).....	42

<sup>a</sup> Data include 2 months life from factory to first combat sortie. First line life is the average life before the airplane is lost or retired to second line.

Source: War Department, Army Air Forces, Statistical Control Division, letter of Apr. 27, 1945.

TABLE 5-16. PERSONNEL IN THE ARMY AIR FORCES, 1935-1944

Date	Officers	Aviation cadets	Enlisted men	Total
June 30, 1935.....	1,226	.....	14,719	15,945
June 30, 1936.....	1,223	.....	15,640	16,863
June 30, 1937.....	1,273	.....	17,299	18,572
June 30, 1938.....	1,287	.....	18,909	20,196
June 30, 1939.....	1,549	.....	20,838	22,387
June 30, 1940.....	3,361	1,894	45,910	51,165
June 30, 1941.....	10,611	8,621	132,887	152,125
June 30, 1942.....	55,926	50,213	658,246	764,415
June 30, 1943.....	205,874	99,672	1,891,568	2,197,114
June 30, 1944.....	333,401	82,647	1,956,244	2,372,292
Dec. 31, 1944.....	375,973	38,929	1,944,554	2,359,456

Source: Army Air Forces, Statistical Control Division Office of Management Control, letter of Feb. 12, 1945.

TABLE 5-17. OPERATIONS OF ARMY AIR FORCES—SORTIES FLOWN, BOMB TONNAGE DROPPED, ENEMY AIRCRAFT DESTROYED, DEC. 7, 1941-DEC. 31, 1944

	Vs. Germany	Vs. Japan	Total
Sorties flown:			
Dec. 7, 1941-Dec. 31, 1942.....	9,749	17,151	26,900
1943.....	232,492	132,418	364,910
1944.....	1,012,036	271,927	1,283,963
Total.....	1,254,277	421,496	1,675,773
Bomb tonnage dropped:			
Dec. 7, 1941-Dec. 31, 1942.....	6,123	4,080	10,203
1943.....	149,684	45,071	194,755
1944.....	938,949	147,083	1,086,032
Total.....	1,094,756	196,234	1,290,990
Enemy aircraft destroyed:			
Dec. 7, 1941-Dec. 31, 1942.....	351	855	1,206
1943.....	7,650	3,484	11,134
1944.....	15,664	3,778	19,442
Total.....	23,665	8,117	31,782

Source: War Department, Army Air Forces, Statistical Control Division, letters of Feb. 12, 1945, and Apr. 24, 1945.

TABLE 5-18. ARMY AIR FORCES LOSSES,<sup>a</sup> DEC. 7, 1941-DEC. 31, 1944

	Number of Airplanes
On combat missions.....	17,619
Overseas—not on combat missions.....	12,915
In continental United States.....	18,500
Total.....	49,034

<sup>a</sup> Includes losses in combat, on the ground, by accident, and by obsolescence.

Source: War Department, Army Air Forces, Statistical Control Division, letters of Feb. 12, 1945 and Apr. 24, 1945.

TABLE 5-19. AIR TRANSPORT COMMAND, TOTAL FOREIGN AND DOMESTIC TRANSPORT OPERATIONS,<sup>a</sup> JULY, 1942-DECEMBER, 1944

Year and month	Plane-miles flown	Passengers loaded	Cargo and mail lifted, tons	Total ton-miles flown	Total passenger-miles flown
<b>1942:</b>					
July.....	4,545,838	.....	.....	6,439,011	15,694,644
Aug.....	4,740,203	.....	.....	8,106,280	18,537,845
Sept.....	4,433,051	.....	.....	8,414,636	16,779,672
Oct.....	5,893,587	.....	.....	12,532,323	30,479,176
Nov.....	5,688,976	.....	.....	13,482,954	33,287,870
Dec.....	6,004,468	.....	.....	15,392,310	42,941,189
Total.....	31,306,123	.....	.....	64,367,514	157,720,396
<b>1943:</b>					
Jan.....	6,695,060	.....	.....	15,461,644	40,306,170
Feb.....	7,481,051	.....	.....	17,081,002	44,566,539
Mar.....	8,534,802	.....	.....	21,756,425	51,909,314
Apr.....	8,753,699	.....	.....	23,354,362	59,264,993
May.....	9,698,358	.....	.....	25,581,619	68,796,963
June.....	10,518,528	.....	.....	27,059,958	82,224,635
July.....	11,206,556	.....	.....	30,855,900	80,249,576
Aug.....	11,633,242	.....	.....	30,789,109	83,538,010
Sept.....	12,489,526	.....	.....	31,046,345	89,969,385
Oct.....	13,339,525	.....	.....	31,172,218	89,905,606
Nov.....	13,072,578	.....	.....	30,263,866	93,527,379
Dec.....	15,194,973	.....	.....	35,939,212	99,234,660
Total.....	128,617,898	.....	.....	320,361,660	883,493,230
<b>1944:</b>					
Jan.....	16,233,990	57,522	22,482	39,632,935	111,127,788
Feb.....	17,641,492	53,648	21,919	42,922,452	117,178,585
Mar.....	19,348,389	58,055	22,086	47,983,152	122,905,123
Apr.....	19,353,603	87,489	25,092	48,653,127	140,318,587
May.....	22,624,972	86,498	25,559	56,066,936	161,909,473
June.....	24,892,700	95,420	32,467	61,773,539	166,344,388
July.....	30,588,473	110,089	36,825	74,248,598	198,797,183
Aug.....	35,140,395	135,987	47,422	88,470,569	247,418,768
Sept.....	35,610,489	156,629	44,147	88,391,991	267,900,616
Oct.....	39,271,244	160,229	50,261	100,704,723	304,561,125
Nov.....	40,128,778	158,410	57,767	104,238,731	296,691,803
Dec.....	39,832,968	162,719	53,526	104,424,778	304,541,848
Total.....	340,667,493	1,322,695	439,553	857,511,531	2,439,695,287

<sup>a</sup> Excludes foreign and domestic ferrying operations.

Source: Army Air Forces, Air Transport Command, Statistical Control Division, letters of Feb. 10, 1945, and Apr. 16, 1945.

TABLE 5-20. BOMB TONNAGE, ENEMY AIRCRAFT DESTROYED, NAVY, 1942-1944

Bomb tonnage dropped:	
1942	3,000
1943	12,000
1944	50,000 <sup>a</sup>
Enemy airplanes destroyed:	
1942	1,134
1943	2,212
1944	6,500 <sup>a</sup>

<sup>a</sup> Last three months of 1944 are estimated and preliminary.

Source: Navy Department, Office of Public Relations, letter of Jan. 17, 1945.

TABLE 5-21. AIRCRAFT ON HAND, NAVY, 1935-1944

Year	Units
June 30, 1935.....	1,456
June 30, 1936.....	1,676
June 30, 1937.....	1,639
June 30, 1938.....	2,050
June 30, 1939.....	2,098
Dec. 31, 1940.....	2,199
Dec. 31, 1941.....	5,260
Dec. 31, 1942.....	11,813
Dec. 31, 1943.....	25,892
Nov. 30, 1944.....	37,352

Source: Navy Department, Office of Public Relations, letter of Jan. 17, 1945.

TABLE 5-22. AIRCRAFT ACCEPTED BY THE NAVY, BY TYPE

Year	Tactical combat	Tactical non-combat	Training	Miscellaneous	Total accepted	Retained for Navy use <sup>a</sup>
1941	1,593	146	1,898	1	3,638	3,500
1942	5,584	389	3,718	17	9,708	8,391
1943	16,371	833	5,627	313	23,144	20,277
1944	26,401	1,278	1,782	609	30,070	26,081
Total.....	49,949	2,646	13,025	940	66,560	58,249

Sources: "Investigations of the Progress of the War Effort," House Report 2056, Union Calendar No. 690, Dec. 11, 1944, p. 44.

Navy Department, Press Release, Jan. 31, 1945.

Navy Department, Office of Public Relations by telephone.

TABLE 5-23. AIRCRAFT CARRIERS COMPLETED, 1941-1944

Year	Aircraft carriers		Escort aircraft carriers	
	Number	Tonnage	Number	Tonnage
1941	1	19,800	2	13,336
1942	1	27,100	13	94,321
1943	15	261,600	50	380,213
1944 <sup>a</sup>	8	216,800	37	262,295

<sup>a</sup> 1944 represents preliminary data on commissionings.

Source: Navy Department, Press Release, Dec. 29, 1944.

75  
33  
2  
11

TABLE 5-24. NAVAL AVIATION PERSONNEL, 1941 and 1944

Navy and marine pilots:	
1941.....	6,300
Aug. 31, 1944.....	47,276
Enlisted aviation rates:	
1941.....	14,848
October, 1944.....	228,356
Ground officers:	
1941.....	2,000
October, 1944.....	24,336
Civilian personnel:	
1940.....	5,587
October, 1944.....	109,153

Sources: Navy Department, Office of Public Relations, letter of Jan. 17, 1945.

"Investigations of the Progress of the War Effort," House Report 2056, Union Calendar No. 690, Dec. 11, 1944, p. 33.

TABLE 5-25. NAVAL AIR TRANSPORT COMMAND, OPERATING DATA, JULY, 1943-DECEMBER, 1944<sup>a</sup>

Month	Number of planes <sup>b</sup>	Plane-miles flown	Passengers loaded	Cargo and mail loaded, tons	Total ton-miles flown <sup>c</sup>
1943:					
July.....	140	2,783,499	17,736	2,980.4	6,107,966
Aug.....	145	2,991,847	18,163	3,315.0	6,962,022
Sept.....	153	3,125,857	18,487	3,276.8	7,167,495
Oct.....	159	3,258,347	20,204	3,571.7	7,761,677
Nov.....	173	3,426,678	21,640	3,944.9	8,514,185
Dec.....	179	3,611,329	22,363	4,128.8	9,286,471
Total for 6 months.....	...	19,197,557	118,593	21,217.6	45,799,816
1944:					
Jan.....	201	4,205,644	25,385	4,533.8	10,848,443
Feb.....	209	4,135,079	24,610	4,263.0	10,549,839
Mar.....	220	5,095,248	30,918	5,033.6	12,283,441
Apr.....	245	5,643,252	38,152	5,271.6	14,171,198
May.....	270	6,632,495	44,409	6,047.0	16,454,734
June.....	288	6,937,388	49,044	6,667.1	18,157,466
July.....	307	7,346,459	54,877	7,175.5	19,705,756
Aug.....	324	7,597,892	57,864	7,950.3	21,527,121
Sept.....	327	7,443,278	56,166	7,529.8	22,120,699
Oct.....	349	6,960,937	56,357	6,846.4	19,254,540
Nov.....	352	7,497,465	56,275	7,496.2	21,063,500
Dec.....	351	7,933,204	55,336	7,847.3	23,336,444
Total 1944.....	...	77,428,341	549,393	76,664.6	209,473,181

<sup>a</sup> Including contract operators.

<sup>b</sup> Including transport planes used for training.

<sup>c</sup> Includes ton-miles of passengers carried.

Source: Navy Department, Naval Air Transport Command, January, 1945.

## CHAPTER 6

### AIRLINES

Federal responsibility for all civilian flying is divided between the Civil Aeronautics Board and the Civil Aeronautics Administration.

The board is concerned mostly with economic and safety regulation and the investigation of accidents.

The CAA encourages and fosters the development of civil aeronautics and air commerce. It enforces the civil air regulations.

It was not until about 1926 that civil aviation in this country began to gain significance. In that year, the Aeronautics Branch of the Department of Commerce was created. Most of the earlier data included in this chapter originated in this bureau, which was the forerunner of the Civil Aeronautics Authority and the present civilian aviation agencies.

The Air Transport Association represents the Scheduled Air Transport Industry.

Other data on civilian flying will be found in the chapters on Personal Flying, Service Facilities, Training, Accidents, and Other Means of Transportation.

TABLE 6-1. DOMESTIC AIRLINES: PERSONNEL, 1928-1944

Year	Pilots	Co-pilots	Stew- ardesses and stew- ards	Me- chanics and riggers	Other hangar and field personnel	Office em- ployees	All others	Total
1928	294 <sup>a</sup>	"	.....	503	654	.....	.....	1,451
1929	509 <sup>a</sup>	"	.....	945	482	.....	.....	1,936
1930	580 <sup>a</sup>	"	.....	1,377	783	.....	.....	2,740
1931	621 <sup>a</sup>	"	.....	1,662	1,003	1,014	.....	4,300
1932	489	143	.....	1,634	931	801	.....	3,998
1933	468	206	.....	1,804	1,087	796	.....	4,361
1934	411	248	.....	1,643	918	958	.....	4,178
1935	528	335	213	2,009	467	2,365	.....	5,917
1936	574	468	333	2,152	543	2,975	.....	7,045
1937	629	420	339	2,206	651	3,284	.....	7,529
1938	671	456	358	2,397	891	3,710	472	8,955
1939	691	694	530	2,779	1,042	4,548	225	10,509
1940	893	1,017	910	3,995	2,048	5,815	1,122	15,800
1941	1,065	1,119	1,024	4,333	2,400	7,759	1,284	18,984
1942	974	1,415	788	7,770	3,602	9,883	2,015	26,447
1943	994	1,103	835	8,090	4,939	10,857	2,332	29,150
1944	1,282	1,567	1,304	7,419	5,246	12,056	2,220	31,094

<sup>a</sup> Copilots for the years 1928-1931 were included with pilots.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 33. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, letter of May 4, 1945, and later revisions.)

TABLE 6-2. DOMESTIC AIRLINES: OPERATORS AND EQUIPMENT, 1926-1944

Year	Operators	Route mileage	Aircraft in service	Average available seats	Average speed, mph
1926	11	8,252	N.A.	N.A.	N.A.
1927	16	8,865	N.A.	N.A.	N.A.
1928	31	15,590	268	N.A.	N.A.
1929	34	24,874	442	N.A.	N.A.
1930	38	29,887	497	N.A.	N.A.
1931	35	30,451	490	N.A.	N.A.
1932	29	28,550	456	6.58	109
1933	21	27,812	408	7.59	116
1934	22	28,084	417	8.85	127
1935	23	28,267	356	10.34	142
1936	21	28,874	272	10.67	149
1937	17	31,084	282	12.53	153
1938	18	35,492	253	13.63	153
1939	17	35,213	265	14.63	153
1940	16	41,054	358	16.52	155
1941	17	41,915	359	17.41	159
1942	16	36,442	179	17.60	159
1943	16	36,982	194	17.61	160
1944	16	40,392	279	17.53	162

N.A. Not available.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 26. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, letter of May 4, 1945, and later revisions.)

TABLE 6-3. DOMESTIC AIRLINES: MAIL, EXPRESS, AND FREIGHT, 1934-1944

Year	Mail, ton-miles	Express and freight	
		Ton-miles	Tons <sup>a</sup>
1934	2,461,411	N.A.	1,067
1935	4,132,708	1,089,802	1,911
1936	5,741,436	1,860,809	3,479
1937	6,698,230	2,156,070	3,564
1938	7,422,860	2,173,706	3,668
1939	8,584,891	2,705,614	4,757
1940	10,035,638	3,469,485	6,253
1941	12,900,405	5,242,529	9,605
1942	21,066,627	11,691,208	19,984
1943	35,927,042	15,117,925	28,772
1944	50,800,000 <sup>b</sup>	17,066,376	32,933

N.A. Not available.

<sup>a</sup> Contains some duplication since express poundage may be counted for more than one route by an air carrier.

<sup>b</sup> Estimated by Civil Aeronautics Administration.

Source: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 29. (Brought up-to-date by Civil Aeronautics Administration, Information and Statistics Service.)

Tons computed by Aircraft Industries Association, Research and Statistics Service.



TABLE 6-4. DOMESTIC AIRLINES: PASSENGER SERVICE, 1926-1944

Year	Total revenue and nonrevenue passengers carried	Total revenue and nonrevenue passenger-miles flown <sup>a</sup>	Average length of passenger trip, miles	Passenger fare per mile	Revenue and nonrevenue passenger load factor, per cent <sup>b</sup>
1926	5,782	1,000,000	N.A.	\$0.12	N.A.
1927	8,661	3,000,000	N.A.	.106	N.A.
1928	47,840	13,000,000	N.A.	.11	N.A.
1929	159,751	41,000,000	N.A.	.12	N.A.
1930	374,935	84,014,572	224	.083	N.A.
1931	469,981	106,442,375	226	.067	N.A.
1932	474,279	127,038,798	268	.061	42.34
1933	493,141	173,492,119	352	.061	46.87
1934	461,743	187,858,629	407	.059	51.82
1935	746,946	313,905,508	420	.057	54.83
1936	1,020,931	435,740,253	427	.057	64.01
1937	1,102,707	476,603,165	432	.056	57.55
1938	1,343,427	557,719,268	415	.057	58.74
1939	1,876,051	749,787,096	400	.051	62.08
1940	2,959,480	1,147,444,948	388	.0506	63.84
1941	4,060,545	1,491,734,671	367	.0503	64.40
1942	3,551,833	1,481,976,329	454 <sup>c</sup>	.0527	76.11
1943	3,454,040	1,642,596,640	538 <sup>c</sup>	.0535	90.01
1944 <sup>d</sup>	4,668,330 <sup>e</sup>	2,264,282,453	560 <sup>c</sup>	.0514	90.83

N.A. Not available.

<sup>a</sup> 1926-1929 passenger-miles are estimates by E. E. Hale of the Equitable Life Assurance Society (quoted in Geisse-Williams, "Postwar Outlook," p. 28).

<sup>b</sup> Passenger load factor indicates what percentage of the available passenger seat-miles flown were actually used by passengers.

<sup>c</sup> The increase is due, in part, to the use of the unduplicated count of passengers carried by the individual air carrier.

<sup>d</sup> Preliminary figures.

<sup>e</sup> Total passengers carried (unduplicated) 3,977,789.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, pp. 28, 29, 31. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 6-5. TYPE OF AIRCRAFT AVAILABLE TO DOMESTIC AIRLINES

Type	Owned Dec. 31, 1941	May, 1942	Available March, 1945
DC-3.....	267	156	335
DC-2.....	13	...	2
Lodestar.....	13	10	22
Electra.....	16	...	3
247-D.....	27	...	...
B307.....	5	...	5
Total.....	341	166	367 <sup>a</sup>

<sup>a</sup> About 70 of these aircraft were still in the process of conversion for commercial use.

Source: Civil Aeronautics Board, "Changes in War Air Service Pattern, October 2, 1944-April 1, 1945," May, 1945, Tables 2 and 5.

TABLE 6-6. DOMESTIC AIRLINES: OPERATIONS, 1926-1944

Year	Route mileage (unduplicated)	Daily average revenue-miles flown	Percentage of scheduled trips completed	Fuel consumed, gallons	
				Gas	Oil
1926	8,252	11,668	N.A.	N.A.	N.A.
1927	8,865	15,835	87.22	N.A.	N.A.
1928	15,590	28,416	89.67	N.A.	N.A.
1929	24,874	61,315	88.10	N.A.	N.A.
1930	29,887	87,651	89.08	N.A.	N.A.
1931	30,451	117,138	86.37	N.A.	N.A.
1932	28,550	124,608	83.85	19,643,964	584,842
1933	27,812	133,621	85.28	21,776,156	803,538
1934	28,084	112,207	86.61	18,786,587	665,768
1935	28,267	151,727	87.73	27,065,717	707,066
1936	28,874	174,255	90.08	30,392,923	675,655
1937	31,084	181,018	89.51	33,606,770	629,127
1938	35,492	190,873	90.48	37,218,743	644,768
1939	35,213	226,223	92.59	46,554,856	726,507
1940	41,054	297,269	91.07	64,906,284	1,087,208
1941	41,915	364,446	91.24	80,757,892	1,258,983
1942	36,442	301,652	89.29	68,030,246	989,103
1943	36,982	283,840	91.02	63,908,388	878,923
1944	40,392	388,620	89.79 <sup>a</sup>	88,134,088 <sup>a</sup>	1,240,238 <sup>a</sup>

N.A. Not available.

<sup>a</sup> Preliminary.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, pp. 26, 28, 29. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, letter of May 4, 1945.)

TABLE 6-7. ESTIMATED COSTS OF AIR TRANSPORT

Period and aircraft	Payload, pounds	Total cost (direct and indirect), <sup>a</sup> capacity payload, <sup>b</sup> cents	
		Per mile	Per ton-mile
1920 (DH).....	600	45.3	161.0
Mid-1920's (Boeing 40).....	1,200	43.6	72.7
1925 (Ford).....	3,200	69.3	43.3
1929 (Lockheed Vega).....	1,350	38.1	56.5
1933 (Boeing 247).....	2,800	51.9	37.2
1936 (Douglas DC3).....	5,000	68.6	27.4

<sup>a</sup> Costs include sales, traffic, advertising, administration, and other overhead costs.

<sup>b</sup> Adjustments for the average cargo load factor, for pickup and delivery cost and for profit have to be made before these figures can be used as indications of cost of air freight. The base rate for air express effective July 15, 1943, was 70 cents per ton-mile, the previous rate was 80 cents.

Source: Edward Warner, "Technical Development and Its Effect on Air Transportation," Norwich University lecture (York, Pa., 1938); quoted in *Quarterly Journal of Economics*, February, 1945, p. 150.

TABLE 6-8. DOMESTIC AIRMAIL REVENUES AND PAYMENTS, 1918-1944

Fiscal year ending June 30	Postal revenue, thousands	Expenditures from appropriations* or payment to airlines,** thousands	Total cost of airmail, thousands	Airmail revenue as per cent of total airline revenue <sup>a</sup>
1918	\$ 42.8	\$ 13.6	N.A.	N.A.
1919	552.6	717.2 <sup>b</sup>	N.A.	N.A.
1920	1,263.8	1,264.5 <sup>b</sup>	N.A.	N.A.
1921	2,690.0	2,653.9 <sup>b</sup>	N.A.	N.A.
1922	2,939.3	1,418.1	N.A.	N.A.
1923	4,072.6	1,897.2	N.A.	N.A.
1924	3,600.1	1,498.7	N.A.	N.A.
1925	558.0	2,743.8	N.A.	N.A.
1926	855.9	2,872.2	N.A.	N.A.
1927	1,135.4	3,619.1	N.A.	N.A.
1928	4,468.3	4,209.1	N.A.	N.A.
1929	4,250.5	11,169.0	\$12,649.8	N.A.
1930	5,272.6	14,670.9	15,168.8	N.A.
1931	6,210.3	16,991.3	17,593.4	82.5
1932	6,016.3	19,995.2	23,771.4	77.2
1933	6,116.4	19,449.6	23,033.9	65.0
1934	5,737.5	11,782.3	15,290.0	42.0
1935	6,589.5	8,891.0	12,584.8	39.6
1936	9,702.7	12,239.4	16,879.3	36.3
1937	12,439.6	13,229.4	19,177.1	36.7
1938	15,301.2	14,817.2	21,790.3	36.9
1939	16,326.4	17,020.2	25,061.3	33.0
1940	19,122.9	19,425.7	28,039.2	26.1
1941	23,920.5	20,687.2	30,881.8	23.3
1942	33,417.4	23,473.2	36,508.6	21.7
1943	62,818.6	23,308.5	44,463.2	19.6
1944	103,359.6 <sup>c</sup>	28,401.4 <sup>c</sup>	52,796.1 <sup>c</sup>	20.2 <sup>d</sup>

N.A. Not available.

\* 1918-1938.

\*\* 1939-1944.

<sup>a</sup> Calendar years.

<sup>b</sup> In the fiscal years 1919, 1920, and 1921, appropriations made for star route, power boat and railroad service were used by the Air Mail Service.

<sup>c</sup> 1944 estimate only.

<sup>d</sup> Twelve months ending Nov. 30, 1944.

Sources: Congressional Record, Friday, Sept. 8, 1944, p. A4265. (Brought up to date from data in the files of the Post Office Department, Air Mail Division.)

Post Office Department Appropriation Bill for 1946 Hearings, House of Representatives, Jan. 9, 1945, p. 169.

Air Transport Association, "Little Known Facts about the Scheduled Air Transport Industry," Sept. 1, 1944, revised by letter Apr. 23, 1945.

TABLE 6-9. DOMESTIC AIRMAIL RATES, SINCE 1918

Effective date	Rate	Note
1918, May 15.....	24¢ per ounce or fraction	10¢ of this for special delivery
July 15.....	16¢ for first ounce or fraction	10¢ of this for special delivery
Dec. 15.....	6¢ per ounce or fraction	
1919, July 18.....	2¢ per ounce	
1924, July 1.....	8¢ per ounce or fraction per zone	3 zones established
1925, July 1.....	10¢ per ounce or fraction	Overnight air mail New York-Chicago
1926, Jan. 19.....	10¢ per ounce or fraction up to 1,000 miles	More for greater distances
Sept. 4-11.....	Special rates for special services	Varying from 8 to 32¢
1927, Feb. 1.....	10¢ per half ounce or fraction	Zoning abandoned
1928, Aug. 1.....	5¢ for first ounce or fraction	
1932, July 6.....	8¢ for first ounce or fraction	
1934, July 1.....	6¢ per ounce or fraction	
1944, Apr. 2.....	8¢ per ounce or fraction	Overseas mail to servicemen 6¢ per half ounce

Source: Interstate Commerce Commission, "Some Aspects of Postwar Air and Surface Transportation," January, 1945, pp. 12-13.

TABLE 6-10. UNITED STATES INTERNATIONAL AND TERRITORIAL AIRLINES: PERSONNEL, 1936-1942

Year	Pilots	Co-pilots	Stewards and stewardesses	Mechanics and riggers	Dispatchers, other hangar and field personnel	Office	Other	Total
1936	121	78	57	722	1,224	748	N.A.	2,950
1937	126	182	81	1,074	1,705	895	N.A.	4,063
1938	149	149	93	1,018	1,931	1,014	N.A.	4,354
1939	145	178	109	1,227	2,156	1,596	3	5,414
1940	153	215	130	1,414	2,393	1,922	29	6,256
1941	217	263	186	2,056	2,751	1,951	50	7,474
1942	377	633	386	3,649	4,510	3,473	186	13,214

N.A. Not available. See Chap. 5 for Air Transport Command and Naval Air Transport Service.  
Source: Civil Aeronautics Administration, *Civil Aeronautics Journal*, Jan. 15, 1944, p. 11.

TABLE 6-11. UNITED STATES INTERNATIONAL AND TERRITORIAL AIRLINES: PASSENGER SERVICE, 1926-1943

Dec. 31	Operators	Route mileage	Aircraft in service	Passengers carried	Passenger-miles flown
1926	2	152	N.A.	N.A.	N.A.
1927	3	257	N.A.	18	N.A.
1928	5	1,077	57	1,873	N.A.
1929	6	11,456	83	13,654	N.A.
1930	7	19,662	103	42,570	19,732,677
1931	7	19,949	100	61,681	14,680,402
1932	6	19,980	108	73,281	21,147,539
1933	7	19,875	96	83,471	26,283,915
1934	4	22,717	101	110,522	38,792,228
1935	7	32,184	103	127,170	48,465,412
1936	7	30,567	108	108,834	45,078,586
1937	7	30,481	104	139,955	58,255,487
1938	8	32,804	92	144,686	60,110,655
1939	8	44,896	74	168,970	85,031,146
1940	8	53,025	82	225,798	117,719,111
1941	7	N.A.	94 <sup>a</sup>	320,065 <sup>a</sup>	185,214,555 <sup>a</sup>
1942	7	N.A.	75 <sup>a</sup>	392,146 <sup>a</sup>	268,252,356 <sup>a</sup>
1943	8	N.A.	79 <sup>a</sup>	N.A.	N.A.

N.A. Not available. See Chap. V for Air Transport Command and Naval Air Transport Service.

<sup>a</sup> Data for years 1941, 1942, and 1943 include figures on operations of contract carriers operated for the Services.

Sources: 1926-1935: Civil Aeronautics Administration, "Progress of Civil Aeronautics in the United States," No. 5-23407 (undated), pp. 1, 2.

1936-1943: Civil Aeronautics Administration, *Civil Aeronautics Journal*, Jan. 15, 1944 (revised).

TABLE 6-12. UNITED STATES INTERNATIONAL AND TERRITORIAL AIRLINES: OTHER OPERATIONS, 1926-1942

Year	Daily average revenue miles flown	Gasoline consumed, gallons	Oil consumed	Mail carried, pounds	Express and freight carried, pounds
1926	162 <sup>a</sup>	N.A.	N.A.	107,535	
1927	248 <sup>a</sup>	N.A.	N.A.	204,801	
1928	746 <sup>a</sup>	N.A.	N.A.	517,648	6,240
1929	7,566 <sup>a</sup>	N.A.	N.A.	672,433	7,809
1930	13,569 <sup>a</sup>	N.A.	N.A.	528,665	109,048
1931	13,400 <sup>a</sup>	N.A.	N.A.	545,800	412,184
1932	15,206 <sup>a</sup>	4,042,984 <sup>b</sup>	117,179 <sup>b</sup>	515,466	638,836
1933	16,730 <sup>a</sup>	4,550,640 <sup>b</sup>	120,873 <sup>b</sup>	173,828	979,504
1934	22,217 <sup>a</sup>	6,349,687 <sup>b</sup>	172,988 <sup>b</sup>	206,606	1,349,272
1935	23,253 <sup>a</sup>	6,194,892 <sup>b</sup>	172,709 <sup>b</sup>	252,244	1,742,740
1936	20,313	6,760,898	197,917	328,295	873,244 <sup>d</sup>
1937	23,640	7,817,614	215,443	426,261	1,114,008 <sup>d</sup>
1938	23,366	8,091,449	185,102	484,712	1,269,980 <sup>d</sup>
1939	23,026	9,382,279	194,689	675,422	1,397,956 <sup>d</sup>
1940	29,281	9,628,645	200,599	1,045,376	1,682,002 <sup>d</sup>
1941	41,613	12,201,504	299,535 <sup>c</sup>	1,637,361	3,105,416 <sup>d</sup>
1942	55,864	17,652,754	348,032 <sup>c</sup>	3,355,505	8,509,436 <sup>d</sup>

N.A. Not available; see Chap. V for Air Transport Command and Naval Air Transport Service.

<sup>a</sup> Computed by Aircraft Industries Association, Research and Statistics Service (daily average revenue-miles flown domestic, international, and territorial minus domestic).

<sup>b</sup> Computed by Aircraft Industries Association, Research and Statistics Service (total consumption minus domestic consumption).

<sup>c</sup> Estimated.

<sup>d</sup> Does not include foreign subsidiaries of American flag operators.

Source: Civil Aeronautics Administration.

1926-1935: "Progress of Civil Aeronautics in the United States," No. 5-23407 (undated), pp. 1, 2.

1936-1942: "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 29.

1936-1942: *Civil Aeronautics Journal*, Jan. 15, 1944, pp. 10, 11.

## CHAPTER 7

### PERSONAL FLYING

Personal or private flying includes all flying that is not military or scheduled air transport. It therefore covers not only flying by individuals for pleasure or for business travel, but also commercial non-scheduled flying.

Because of the dislocation caused by the war, most statistics on private flying during the war years are incomplete and prewar data are given for many items.

The Civil Aeronautics Administration determines the airworthiness of aircraft and the competency of airmen. It gathers and publishes most of the statistical data available on personal flying.

Data on airports and airways and accidents are presented in other chapters.

TABLE 7-1. CIVIL AIRMEN CERTIFICATES: PILOTS, 1927-1944

Dec. 31	Certificated airplane pilots				Glider pilots
	Total	Airline transport	Commercial	Private	
1927	1,572	.....	.....	.....	.....
1928	4,887	.....	.....	.....	.....
1929	10,287	.....	6,053	4,162	.....
1930	15,280	.....	7,847	7,433	178
1931	17,739	.....	8,513	9,226	267
1932	18,594	330	7,967	10,297	209
1933	13,960	554	7,635	5,771	149
1934	13,949	676	7,484	5,789	109
1935	14,805	736	7,362	6,707	145
1936	15,952	842	7,288	7,822	138
1937	17,681	1,064	6,411	10,206	161
1938	22,983	1,159	7,839	13,985	172
1939	31,264	1,197	8,280	21,787	170
1940	63,113	1,431	10,151	51,531	138
1941	100,787	1,587	15,429	83,771	160
1942 <sup>a</sup>	110,510	2,177	18,808	89,525	211
1943 <sup>a</sup>	122,884	2,315	20,587	99,982	1,435
1944 <sup>a</sup>	132,432	3,046	22,059	107,327	2,412

<sup>a</sup> The count of certificated pilots for 1942, 1943, and 1944 is not directly comparable with the previous years as the Civil Aeronautics Regulations were amended to permit pilot certificates currently effective on Apr. 1, 1942, to continue in effect indefinitely.

Source: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 75. (Brought up to date by Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 7-2. CERTIFICATED CIVIL AIRCRAFT AND PILOTS, BY STATES, JAN. 1, 1945

State	Civil aircraft <sup>a</sup>	Pilots			
		Airline	Commercial	Private	Total
Ala.	193	2	244	1,072	1,318
Ariz.	258	1	238	830	1,069
Ark.	272	3	295	1,434	1,732
Calif.	1,183	363	3,059	12,017	15,439
Colo.	236	79	282	1,690	2,051
Conn.	203	8	198	1,009	1,215
Del.	45	2	59	279	340
D.C.	342	41	199	821	1,061
Fla.	525	384	923	2,269	3,576
Ga.	328	113	502	1,563	2,178
Idaho.	204	.....	106	907	1,013
Ill.	1,143	295	1,026	5,055	6,376
Ind.	672	8	405	2,339	2,752
Iowa.	534	7	358	2,647	3,012
Kans.	496	30	425	2,815	3,270
Ky.	156	1	114	822	937
La.	212	26	286	1,635	1,947
Maine.	116	5	127	563	695
Md.	225	9	220	1,282	1,511
Mass.	370	53	489	2,782	3,324
Mich.	1,200	42	664	4,221	4,927
Minn.	439	117	477	2,244	2,838
Miss.	125	3	160	927	1,090
Mo.	596	164	712	3,292	4,168
Mont.	170	11	169	935	1,115
Neb.	280	3	178	1,609	1,790
Nev.	181	4	35	266	305
N.H.	81	.....	62	452	514
N.J.	331	37	475	2,778	3,290
N.M.	164	4	105	670	779
N.Y.	1,387	424	1,758	7,618	9,800
N.C.	345	4	258	1,610	1,872
N.D.	134	.....	76	666	742
Ohio.	1,111	30	777	4,704	5,511
Okla.	577	4	751	2,677	3,432
Ore.	177	31	237	1,782	2,050
Pa.	1,454	46	964	5,922	6,932
R.I.	49	1	60	413	474
S.C.	188	3	231	1,173	1,407
S.D.	114	.....	70	841	911
Tenn.	266	65	332	1,726	2,123
Tex.	1,823	306	1,879	6,991	9,176
Utah.	147	31	138	1,077	1,246
Vt.	57	1	57	333	391
Va.	327	66	278	1,580	1,924
Wash.	393	110	561	2,690	3,361
W. Va.	193	2	146	1,262	1,410
Wis.	508	7	327	1,879	2,213
Wyo.	79	19	74	452	545
Foreign, territorial, misc.	298	81	493	706	1,280
Totals.....	21,893 <sup>b</sup>	3,046	22,059	107,327	132,432

<sup>a</sup> Includes aircraft operated by domestic airlines (279), personal aircraft in operation (21,212), plus the aircraft of American registry operated by international and territorial airlines and government-owned aircraft. Also includes 12 autogiros and 13 helicopters.

<sup>b</sup> Total includes 986 government-owned aircraft formerly used for pilot training, not listed in states breakdown.

Source: Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, unpublished data from files and letter of May 4, 1945.



TABLE 7-3. CIVIL AIRMEN CERTIFICATES: MECHANICS AND OTHERS, 1928-1944

Dec. 31	Mechanics	Parachute riggers	Ground instructors
1928	4,383	N.A.	N.A.
1929	7,701.	N.A.	154
1930	8,993	93	269
1931	9,016	224	138
1932	8,373	305	86
1933	8,226	335	63
1934	8,156	358	59
1935	8,432	381	55
1936	8,738	393	48
1937	9,314	362	55
1938	9,884	397	92
1939	10,296	425	446
1940	11,177	444	1,948
1941	14,047	618	4,815
1942	18,097	1,004	7,604
1943	20,805 <sup>a</sup>	1,637 <sup>a</sup>	12,739
1944	23,152	939 <sup>b</sup>	14,647

N.A. Not available.

<sup>a</sup> Includes 473 parachute technicians; duplication inflates total as compared with 1942.

<sup>b</sup> Parachute technicians under new and more stringent requirements.

Source: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 75. (Brought up to date by Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 7-4. PERSONAL FLYING: AVERAGE PERFORMANCE, 1930-1940

Year	Certificated and uncertificated aircraft in use, Dec. 31	Miles per plane	Cruising speed, mph	Plane-hours flown per year
1930	9,218	11,800	N.A.	N.A.
1931	10,090	9,400	95.7	98
1932	9,760	8,000	96.3	83
1933	8,780	8,100	97.1	83
1934	7,752	9,800	96.2	102
1935	8,613	9,900	95.7	103
1936	8,849	10,500	94.6	111
1937	10,446	9,900	94.1	105
1938	10,718	12,100	93.2	130
1939	13,217	13,500	93.9	155
1940	17,253	15,300	89.8	173

N.A. Not available.

Source: John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943 (revised for 1939 and 1940), p. 144.

TABLE 7-5. WOMEN HOLDING AIRMEN CERTIFICATES, JAN. 1, 1945

State	Pilots			Instructors		Parachute technicians	Air traffic control tower operators
	Private	Commercial	Total	Flight	Ground		
Ala.....	32	6	38	1	9	13	23
Ariz.....	52	26	78	8	10	9	4
Ark.....	42	5	47	2	7	2	6
Calif.....	475	97	572	30	89	40	217
Colo.....	72	6	78	0	37	8	20
Conn.....	43	6	49	3	7	1	20
Del.....	13	5	18	0	2	0	0
D.C.....	40	7	47	11	8	1	8
Fla.....	125	29	154	13	46	13	31
Ga.....	55	6	61	4	5	3	154
Idaho.....	42	6	48	3	7	1	13
Ill.....	217	26	243	7	39	3	120
Ind.....	94	10	104	2	14	4	24
Iowa.....	99	11	110	2	20	4	40
Kans.....	102	8	110	6	18	2	26
Ky.....	32	4	36	1	8	0	13
La.....	61	9	70	6	10	2	9
Maine.....	15	4	19	1	6	5	4
Md.....	57	13	70	7	12	0	10
Mass.....	87	13	100	5	24	0	31
Mich.....	160	21	181	5	20	3	40
Minn.....	78	7	85	1	10	5	48
Miss.....	21	2	23	0	7	4	2
Mo.....	108	15	123	6	27	9	71
Mont.....	40	2	42	1	5	4	26
Neb.....	58	3	61	1	10	3	12
Nev.....	17	5	22	3	8	5	3
N.H.....	11	3	14	2	6	0	2
N.J.....	89	17	106	7	29	5	35
N.M.....	44	4	48	0	6	2	3
N.Y.....	356	73	429	22	75	5	76
N.C.....	47	2	49	1	12	1	18
N.D.....	24	1	25	0	3	2	7
Ohio.....	181	13	194	3	38	3	71
Okla.....	112	15	127	5	41	12	11
Ore.....	80	7	87	4	3	9	23
Pa.....	211	28	239	14	47	3	49
R.I.....	15	2	17	2	4	5	1
S.C.....	39	4	23	0	9	0	3
S.D.....	29	1	30	0	8	1	7
Tenn.....	43	10	53	4	14	7	31
Tex.....	281	35	316	17	92	58	136
Utah.....	32	1	33	1	6	0	14
Vt.....	15	0	15	0	3	1	5
Va.....	57	8	65	3	8	1	7
Wash.....	140	22	162	9	13	3	71
W.V.....	57	7	64	4	10	1	4
Wis.....	81	6	87	1	21	1	41
Wyo.....	14	0	14	0	2	3	4
Foreign and territorial.....	16	7	23	2	0	0	1
Totals.....	4,211	618	4,829	230	915	267	1,595

Source: Civil Aeronautics Administration, Information and Statistics Service, unpublished data.

TABLE 7-6. PRODUCTION OF PERSONAL AIRCRAFT, 1933-1942

Year	Total civil aircraft	Total personal aircraft	Light personal aircraft <sup>a</sup>	Large personal aircraft <sup>b</sup>
1933	591	467	2	465
1934	772	618	1	617
1935	1,109	917	436	481
1936	1,559	1,423	889	534
1937	2,281	2,042	1,523	519
1938	1,823	1,711	1,363	348
1939	3,715	3,555	3,029	526
1940	6,785	6,472	4,455	2,017
1941	6,844	6,597	4,312	2,285
1942	985	923	535	388

<sup>a</sup> Selling for under \$2,000 (airframe \$1,200, engine \$300, dealer \$500) or less than 1,300 lb gross weight.

<sup>b</sup> Selling for \$2,000 to \$10,000 (airframe \$6,000, engine \$1,500, dealer \$2,500) or more than 1,300 lb and less than 4,000 lb gross weight with single engine.

Sources: 1933-1937: Civil aircraft: Aeronautical Chamber of Commerce, *Aircraft Yearbook*, 1935, p. 454; and 1938, p. 442.

1938-1942: Civil aircraft: Civil Aeronautics Administration, *Civil Aeronautics Journal*, Jan. 15, 1944, p. 12. (Brought up to date by Civil Aeronautics Administration, Information and Statistics Service.)

Personal aircraft: John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943, pp. 11, 97. (Brought up to date by Civil Aeronautics Administration, Information and Statistics Service, letter of Apr. 18, 1945.)

TABLE 7-7. CIVIL AIRCRAFT PRODUCED AND REGISTERED,<sup>a</sup> BY HORSEPOWER 1936-1941

Year	Total	50 hp or under	51-100 hp	101-225 hp	226-600 hp	601-1800 hp	Unclassified
1936	1,637	772	231	246	323	65	..
1937	2,289	1,393	227	240	341	88	..
1938	1,823	1,350	84	165	176	48	..
1939	3,715	1,686	1,660	129	162	78	..
1940	6,785	490	5,464	529	109	137	56
1941	6,844	7	6,108	515	46	118	50

<sup>a</sup> Totals for 1936 and 1937 differ from production figures collected by the Aeronautical Chamber of Commerce used in other tables.

Source: Condensed from Civil Aeronautics Administration, *Civil Aeronautics Journal*, Jan. 15, 1944, p. 12 (revised).

TABLE 7-8. CIVIL AIRCRAFT PRODUCED AND REGISTERED,<sup>a</sup> BY NUMBER OF ENGINES 1936-1941

Year	Total	Single engine	Multiengine	Unclassified
1936	1,637	1,526	111	..
1937	2,289	2,171	118	..
1938	1,823	1,770	53	..
1939	3,715	3,613	102	..
1940	6,785	6,562	167	56
1941	6,844	6,629	165	50

<sup>a</sup> Totals for 1936 and 1937 differ from production figures collected by the Aeronautical Chamber of Commerce used in other tables.

Source: Civil Aeronautics Administration, *Civil Aeronautics Journal*, Jan. 15, 1944, p. 12 (revised).

TABLE 7-9. CIVIL AIRCRAFT PRODUCED AND REGISTERED,<sup>a</sup> BY PASSENGER CAPACITY 1936-1941

Year	Total	Land planes				Seaplanes, amphibians, unclassified
		1-2 place	3-5 place	6-20 place	21 place and over	
1936 <sup>b</sup>	1,637	1,083	443	50	28	33
1937	2,289	1,668	460	48	57	56
1938	1,823	1,487	258	25	17	36
1939	3,715	3,118	465	21	55	56
1940	6,785 <sup>c</sup>	5,527	1,031	8	132	77
1941	6,844	6,060	573	3	112	96

<sup>a</sup> Totals for 1936 and 1937 differ from production figures collected by the Aeronautical Chamber of Commerce used in other tables.

<sup>b</sup> From unpublished data in the Aircraft Industries Association files.

<sup>c</sup> Ten aircraft not accounted for in official sources.

Source: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 83.

TABLE 7-10 PERSONAL FLYING: AIRCRAFT, PASSENGERS, MILEAGE

Year	Certificated and uncertificated aircraft in operation, Dec. 31 <sup>a</sup>	Passengers carried			Miles flown
		Total	For hire	Not for hire	
1926	N.A.	771,010	676,657	94,353	18,746,640
1927	2,612	N.A.	N.A.	N.A.	30,000,000
1928	4,779	N.A.	N.A.	N.A.	60,000,000
1929	9,315	2,189,431	1,732,752	456,679	110,000,000
1930	9,218	2,298,341	1,840,492	457,849	108,269,760
1931	10,090	1,867,517	1,430,052	437,465	94,343,115
1932	9,760	1,255,809	879,225	376,584	78,178,700
1933	8,780	1,246,134	906,970	339,164	71,222,845
1934	7,752	1,397,288	1,044,079	353,209	75,602,152
1935	8,613	1,287,375	1,014,957	272,418	84,755,630
1936	8,849	1,466,058	1,215,405	250,653	93,320,375
1937	10,446	1,580,412	1,295,904	284,508	103,196,355
1938	10,718	1,575,151	1,238,133	337,018	129,359,095
1939	13,217	1,594,086	1,161,292	432,794	177,868,157
1940	17,253	1,600,000	1,175,000	425,000	264,000,000
1941	24,124	N.A.	N.A.	N.A.	346,303,400
1942	22,329	N.A.	N.A.	N.A.	293,592,580
1943	22,323	N.A.	N.A.	N.A.	N.A.
1944	21,212 <sup>b</sup>	N.A.	N.A.	N.A.	N.A.

N.A. Not available.

<sup>a</sup> Includes uncertificated aircraft through 1941, excludes planes operated by air carriers and Federal, state, and municipal owned aircraft.

<sup>b</sup> Includes 986 government-owned aircraft formerly used for pilot training.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 61. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 7-11. THE TYPICAL PERSONAL PLANE USED IN 1943

Wing span.....	35-36 ft
Length.....	21-22 ft
Height.....	7 ft
Wing area.....	170-180 sq ft
Gross weight.....	1,100-1,300 lb
Wing loading.....	6-7 lb per sq ft
Power loading.....	18-22 lb per hp
Engine.....	65-75 hp
Empty weight.....	600-700 lb
Useful load.....	480-540 lb.
Fuel capacity.....	16-18 gal
Cruising speed.....	80-100 mph
Service ceiling.....	12,000-16,000 ft
Rate of climb.....	500-600 ft per min
Cruising range.....	250-350 miles
Fuel consumption.....	20-25 miles per gal

Source: John H. Geisse and Samuel C. Williams, "Report on Postwar Outlook for Private Flying," Sept. 30, 1943, p. 82.

TABLE 7-12. ESTIMATED ANNUAL COST OF OPERATING A LIGHT PERSONAL AIRPLANE (60-75 HP, \$2,000)

Use per year	100 hr	200 hr	1,000 hr
Direct operating cost.....	\$ 177	\$ 354	\$1,770
Hangar rent.....	180	180	180
Depreciation.....	200	200	200
Hull insurance.....	310	310	310
Liability and property damage.....	148	148	148
Total cost per year.....	\$1,015	\$1,192	\$2,608
Cost per hour.....	\$ 10.15	\$ 5.96	\$ 2.61
Cost per mile (80 mph).....	.127	.074	.033

Source: J. H. Geisse, "Suggestions for Furthering Private Flying," *Aeronautical Engineering Review*, August, 1944, p. 49.

TABLE 7-13. USES OF CIVIL AIRCRAFT

Use	Per cent of aircraft Jan. 1,	
	1939 <sup>a</sup>	1942
Nonscheduled commercial operation.....	41.6	41.6
Airline operations.....	3.1	1.8
Federal and state.....	1.1	1.0
Flying in connection with a business.....	11.7	10.5
Pleasure.....	42.5	45.1
Total.....	100.0	100.0

<sup>a</sup> Certificated aircraft.

Sources: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 81. "Statistical Study of Registered Civil Aircraft as of January 1, 1939," July, 1939, p. 37.

TABLE 7-14. PERSONAL PLANE MILES FLOWN, BY USE

Year	Total plane-miles, millions	Percentage of total plane mileage				
		Total	Instruc-tional	Commer-cial (for hire)	Business (not for hire)	Pleasure
1931	94.3	100.0	26.8	28.1	14.2	30.9
1932	78.2	100.0	22.8	27.7	15.8	33.7
1933	71.2	100.0	22.3	28.4	17.4	31.9
1934	75.6	100.0	23.0	27.7	15.5	33.8
1935	84.8	100.0	27.6	27.3	14.9	30.2
1936	93.3	100.0	32.6	26.4	12.6	28.4
1937	103.2	100.0	33.5	21.9	15.1	29.5
1938	129.4	100.0	35.7	19.6	14.6	30.1
1939	177.9	100.0	37.3	19.3	14.3	29.1
1940	264.0	100.0	47.8	12.1	9.8	30.3

Source: Condensed from John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943, p. 86, revised by Civil Aeronautics Administration, Information and Statistics Service.

TABLE 7-15. VALUE OF CIVIL PLANE ENGINES PRODUCED 1933-1937, BY HORSE-POWER

Horsepower	Engines produced 1933-1937, units	Total value	Value per engine
Under 75.....	2,788	\$ 1,082,984	\$ 388
76-125.....	1,022	1,094,290	1,071
126-175.....	634	923,730	1,457
176-225.....	842	1,805,613	2,144
226-300.....	1,000	2,703,328	2,703
301-400.....	220	913,090	4,150
401-500.....	833	3,779,618	4,537
501-600.....	653	3,754,840	5,750
Total through 600.....	7,992	\$16,057,493	\$2,009
601 and up.....	3,530	27,675,843	7,840
Total civil engines.....	11,522 <sup>a</sup>	\$43,733,336 <sup>a</sup>	\$3,796 <sup>a</sup>

<sup>a</sup> Excludes 148 units valued at \$584,623 not included in above breakdown.

Source: Condensed from John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943, p. 102.

TABLE 7-16. PRICE RANGE OF CIVIL AIRCRAFT (LESS ENGINES) PRODUCED, 1933-1937

Price range	Aircraft (less engines) produced 1933-1937	Total value, thousands	Average value per aircraft (less engines)
Under \$1,000.....	3	\$ 3	\$ 858
\$1,000-\$1,500.....	2,848	3,465	1,217
\$1,500-\$2,000.....	137	229	1,672
\$2,000-\$2,500.....	159	365	2,296
\$2,500-\$3,000.....	443	1,235	2,788
\$3,000-\$3,500.....	366	1,235	3,374
\$3,500-\$4,000.....	105	380	3,619
\$4,000-\$4,500.....	621	2,632	4,238
\$4,500-\$5,000.....	27	126	4,667
\$5,000-\$6,000.....	758	4,354	5,744
Total personal aircraft <sup>a</sup> .....	5,467	\$14,024	\$2,565
\$6,000 and up.....	845		
Total civil aircraft.....	6,312	.....	.....

<sup>a</sup> Personal aircraft is all aircraft with an airframe value of \$6,000 or less which is assumed to represent a sales price of the complete aircraft of \$10,000 or less.

Source: Condensed from John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943, pp. 11, 95, 103.

TABLE 7-17. VALUE OF PERSONAL AIRCRAFT (LESS ENGINES)<sup>a</sup> PRODUCED 1933-1937 BY SEATING CAPACITY (All types under \$6,000)

Number of places	Aircraft (less engines) produced 1933-1937	Total value, thousands	Value per aircraft (less engines)
1 place—all types.....	45	\$ 133	\$2,958
2 place—single-engine cabin mono- plane.....	3,045	3,972	1,304
2 place—all other types.....	491	1,506	3,066
3 place—all types.....	457	1,729	3,783
4 place—all types.....	645	2,454	3,805
All place—single-engine cabin bi- planes.....	771	4,163	5,400
Total.....	5,454 <sup>b</sup>	\$13,957	\$2,559

<sup>a</sup> Personal aircraft is all aircraft with an airframe value of \$6,000 or less which is assumed to represent a sales price of the complete aircraft of \$10,000 or less.

<sup>b</sup> Excludes 13 planes unclassified.

Source: John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943, p. 105.

TABLE 7-18. TOTAL CERTIFICATED CIVIL AIRCRAFT AS OF AUG. 1, 1937, and JAN. 1, 1939, BY SEATING CAPACITY AND HORSEPOWER<sup>a</sup>

	Aug. 1, 1937	Jan. 1, 1939
Seats:		
1.....	104	66
2.....	3,183	5,031
3.....	2,287	2,090
4.....	1,086	1,214
5.....	525	614
Total.....	7,185	9,015
6-9.....	155	241
10-15.....	206	185
16-18.....	82	75
19 and over.....	51	119
Total.....	7,679	9,635
Unclassified.....	103	
Grand total.....	7,782	
Horsepower:		
40 and under.....	1,543	2,485
41-89.....	669	1,245
90-150.....	2,603	2,756
151-200.....	579	531
201-300.....	1,533	1,793
301-400.....	282	246
Total.....	7,209	9,056
401-500.....	127	130
501-600.....	63	49
601-800.....	131	104
801-1,300.....	109	86
1,301 and over.....	143	210
Grand total.....	7,782	9,635

<sup>a</sup> Restricted, experimental, and uncertificated aircraft are not included in these breakdowns.

Total certificated aircraft: Aug. 1, 1937—7,724 (revised); Jan. 1, 1939—9,635.

Source: John H. Geisse and Samuel C. Williams, "Postwar Outlook for Private Flying," Sept. 30, 1943, p. 88, based on Civil Aeronautics Authority, "Statistical Study of Registered Aircraft as of January 1, 1939," July, 1939, pp. 33-35.



TABLE 7-19. REGISTERED CIVIL AIRCRAFT, BY HORSEPOWER CLASSIFICATION AND BY SEATING CAPACITY, AS OF JULY 15, 1941

Horsepower class	Total number of registered aircraft	Distribution by power class, per cent
50 hp and under	5,035	23
51-70 hp	8,122	36
71-100 hp	3,819	17
101-165 hp	1,618	7
166-225 hp	1,791	8
226-300 hp	766	3
301-600 hp	519	2
601 hp and over	684	4
Total	22,354	100

  

Seating capacity	Total number of registered aircraft	Distribution by seating capacity, per cent
1 to 2 place	15,592	70
3 to 5 place	5,967	27
6 to 17 place	444	2
18 place and over	351	1
Total	22,354	100

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Study of Registered Civil Aircraft as of July 15, 1941," December, 1941, p. 27.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 7-20. REGISTERED CIVIL AIRCRAFT, BY GROSS WEIGHT, AS OF JULY 15, 1941

Gross weight classification, pounds	Total number of registered aircraft	Distribution by weight classification, per cent
1,300 and under	12,229	54.7
1,301-4,000	9,018	40.3
4,001-10,000	554	2.5
10,001-25,000	502	2.2
25,001 and over	51	.3
Total	22,354	100.0

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Study of Registered Civil Aircraft as of July 15, 1941," December, 1941, p. 27.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 7-21. TOTAL CERTIFICATED AIRCRAFT IN SERVICE AS OF JULY 15, 1941, BY YEAR OF MANUFACTURE, SINGLE AND MULTIENGINE

Year of manufacture	Single engine	Multiengine	Total
1927	91	2	93
1928	467	13	480
1929	1,239	19	1,258
1930	761	10	771
1931	526	19	545
1932	190	5	195
1933	250	32	282
1934	400	32	432
1935	523	43	566
1936	1,001	58	1,059
1937	1,717	89	1,806
1938	1,427	32	1,459
1939	3,194	75	3,184
1940	6,280	163	6,443
1941 <sup>a</sup>	3,596	100	3,696
Total.....	21,662	692	22,354

<sup>a</sup> January 1 to July 15 only.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Study of Registered Civil Aircraft, as of July 15, 1941," December, 1941, p. 26.

TABLE 7-22. TOTAL CERTIFICATED CIVIL AIRCRAFT AS OF JAN. 1, 1939, BY YEAR OF MANUFACTURE, OPEN AND CLOSED<sup>a</sup>

Year of manufacture	Open cockpit	Closed cockpit	Total
1926	39	2	41
1927	98	19	117
1928	421	199	620
1929	944	510	1,454
1930	524	302	826
1931	371	239	610
1932	92	149	241
1933	57	254	311
1934	67	389	456
1935	28	569	597
1936	24	1,081	1,105
1937	69	1,715	1,784
1938	7	1,466	1,473
Total.....	2,741	6,894	9,635

<sup>a</sup> Of 11,159 aircraft in operation on Jan. 1, 1939, 137 experimental, 228 restricted, and 1,159 uncertificated were excluded from this study, leaving 9,635 aircraft.

Source: Civil Aeronautics Authority, "Statistical Study of Registered Civil Aircraft as of January 1, 1939," July, 1939, pp. 33-35.

TABLE 7-23. TOTAL CERTIFICATED AIRCRAFT IN SERVICE AS OF JULY 15, 1941, BY YEAR OF MANUFACTURE, MONOPLANES AND BIPLANES

Year of manufacture	Monoplanes	Biplanes	Total
1927	10	83	93
1928	157	323	480
1929	422	836	1,258
1930	304	467	771
1931	308	237	545
1932	108	87	195
1933	204	78	282
1934	324	108	432
1935	462	104	566
1936	900	159	1,059
1937	1,672	134	1,806
1938	1,370	89	1,459
1939	3,184	85	3,269
1940	6,124	319	6,443
1941 <sup>a</sup>	3,578	118	3,696
Total.....	19,127	3,227	22,354

<sup>a</sup> Jan. 1 to July 15 only.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Study of Registered Civil Aircraft, as of July 15, 1941," December, 1941, p. 26.

TABLE 7-24. TOTAL CERTIFICATED AIRCRAFT IN SERVICE AS OF JULY 15, 1941, BY YEAR OF MANUFACTURE, LAND PLANES, SEAPLANES, AND AMPHIBIANS

Year of manufacture	Land planes	Seaplanes and amphibians	Total
1927	93	0	93
1928	478	2	480
1929	1,244	14	1,258
1930	740	31	771
1931	533	12	545
1932	190	5	195
1933	279	3	282
1934	418	14	432
1935	559	7	566
1936	1,038	21	1,059
1937	1,790	16	1,806
1938	1,440	19	1,459
1939	3,232	37	3,269
1940	6,412	31	6,443
1941 <sup>a</sup>	3,675	21	3,696
Total.....	22,121	233	22,354

<sup>a</sup> Jan. 1 to July 15 only.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Study of Registered Civil Aircraft, as of July 15, 1941," December, 1941, p. 26.

## CHAPTER 8

### EXPORTS AND LEND-LEASE

Tabulations of data on the United States foreign trade and lend-lease exports are collected by the Bureau of the Census. Detailed publications on exports from 1912 to 1942 are available. They had, however, been discontinued during the early stages of the war. Revised security regulations now permit the publication of selected data on a delayed basis. Aircraft, parts, and accessories are classified according to schedules published by the U.S. Department of Commerce (latest edition, "Schedule B, Statistical Classification of Domestic and Foreign Commodities exported from the United States," Jan. 1, 1945). Data published unfortunately do not include breakdowns into new and used exports, but efforts are under way to achieve such a separation.

In March, 1941, the Lend-Lease Act was adopted. This act provided for the manufacture, procurement, lending, leasing, transferring, or selling of defense articles for export to nations whose defense the President found to be vital to the defense of the United States.

Requests for lend-lease aid originally went to the Division of Defense Aid Reports of the Office for Emergency Management. From October, 1941, to September, 1943, lend-lease was administered by the Office of Lend-Lease Administration, from then until its cessation in August, 1945, by the Foreign Economic Administration.

From Mar. 11, 1941, to Sept. 30, 1944, 34,500 airplanes have been lend-leased to our Allies. Aircraft and parts were valued at more than 5 billion dollars. Lend-lease data were published by the Foreign Economic Administration and by the Office of War Mobilization and Reconversion.

The value of total lend-lease *aid* exceeds the value of lend-lease *exports*. Lend-lease *exports* do not include goods transferred and awaiting export, services, ships leased for the duration, supplies purchased outside the United States and goods transferred for use in the United States. All these items are included in lend-lease *aid*.

Imports and reverse lend-lease to this country of aeronautic products have not been of sufficient importance to warrant inclusion in this presentation. Exports of foreign countries are listed in Chapter 16.

TABLE 8-1. UNITED STATES EXPORTS, 1912-1944 (MILLIONS OF DOLLARS)

Year	Total United States merchandise	Total aeronautic products <sup>a</sup>	Per cent of total
1912	2,170.3	.1	b
1913	2,428.5	.1	b
1914	2,329.7	.2	b
1915-1918	22,176.7	31.5	.14
1919	7,749.8	3.5	b
1920	8,080.5	1.1	b
1921	4,378.9	.5	b
1922	3,765.1	.5	b
1923	4,090.7	.4	b
1924	4,497.6	.8	b
1925	4,818.7	.8	b
1926	4,711.7	1.0	b
1927	4,758.9	1.9	b
1928	5,030.1	3.7	b
1929	5,157.1	9.1	.18
1930	3,781.2	8.8	.23
1931	2,378.0	4.9	.2
1932	1,576.2	7.9	.5
1933	1,647.2	9.2	.6
1934	2,100.1	17.7	.8
1935	2,243.1	14.3	.6
1936	2,419.0	23.1	1.0
1937	3,298.9	39.4	1.2
1938	3,057.2	68.2	2.2
1939	3,123.3	117.8	3.8
1940	3,934.2	311.9	7.9
1941	5,019.9	626.9	12.5
1942	8,003.6	1,357.3	17.0
1943	12,839.7	2,142.1	16.7
1944	14,144.1	2,818.2	19.9

<sup>a</sup> Export figures includes both new and secondhand equipment. <sup>b</sup> Less than .1 per cent.

Source: Department of Commerce: "Statistical Abstract of the United States, 1943," p. 509, and "Foreign Commerce and Navigation of the United States," annually; Bureau of the Census, Press Release FT930, May 25, 1945, p. 5; "Foreign Commerce and Navigation of the United States, Calendar Year 1942, Table No. 4," preliminary copy, pp. 196-199. (Brought up to date by unpublished data from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, Machinery and Motive Products Unit.)

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 8-2. UNITED STATES EXPORTS, 1941-1944  
(Millions of dollars)

Year	Total United States exports	Total lend-lease	Other	Per cent of lend-lease to exports <sup>a</sup>
1941	\$ 5,147	\$ 741	\$4,406	14
1942	8,035	4,894	3,141	61
1943	12,714	10,107	2,607	80
1944	14,230	11,284	2,946	79

<sup>a</sup> Based on monthly average. Source: Department of Commerce, Bureau of the Census, Press Release FT900, Feb. 7 and Apr. 10, 1945, Table 1. "Other" computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 8-3. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS<sup>a</sup>

Year <sup>b</sup>	Aircraft <sup>c</sup>		Engines		Parts and accessories, dollars	Parachutes and parts, dollars	Total value, dollars
	No.	Value, dollars	No.	Value, dollars			
1912	29	105,805	Not reported prior to		.....	Not reported	105,805
1913	29	81,750	1922; probably in-		25,802	until 1932	107,552
1914	34	188,924	cluded with "other"		37,225		226,149
1915	152	958,019	internal-combustion		583,427		1,541,446
1916	269	2,158,395	engines or "parts" of		4,843,610		7,002,005
1917	135	1,001,542	aircraft		3,133,903		4,135,445
1918	20	206,120			8,877,977		9,084,097
1918 (Second half)	41	562,600			9,139,781		9,702,381
1919	44	215,300	.....	.....	3,249,226	.....	3,464,526
1920	65	598,274	.....	.....	554,375	.....	1,152,649
1921	48	314,940	.....	.....	157,608	.....	472,548
1922	37	156,630	147	72,819	265,481	.....	494,930
1923	48	309,051	80	65,558	58,949	.....	433,558
1924	59	412,738	146	219,609	165,926	.....	798,273
1925	80	511,282	73	170,793	101,584	.....	783,659
1926	50	303,149	297	573,732	150,329	.....	1,027,210
1927	63	848,568	84	484,875	570,117	.....	1,903,560
1928	162	1,759,653	179	664,826	1,240,244	.....	3,664,723
1929	348	5,484,600	322	1,383,197	2,257,548	.....	9,125,345
1930	321	4,819,669	376	1,634,885	2,363,456	.....	8,818,010
1931	140	1,812,809	307	1,432,229	1,622,649	.....	4,867,687
1932	280	4,358,967	2,356 <sup>d</sup>	1,517,682	1,756,421	313,463	7,946,533
1933	406	5,391,493	2,903 <sup>d</sup>	1,452,341	2,249,172	87,322	9,180,328
1934	490	8,195,484	1,009	4,458,701	4,860,567	148,186	17,662,938
1935	333	6,598,515	568	2,459,317	5,069,810	163,201	14,290,843
1936	527	11,601,893	933	5,182,469	6,060,483	298,358	23,143,203
1937	631	21,085,170	1,048	5,946,054	12,105,474	267,771	39,404,469
1938	876	37,977,924	1,309	7,899,844	21,948,982	400,939	68,227,689
1939	1,221	67,111,866	1,880	14,120,035	35,798,922	775,389	117,806,212
1940	3,531	196,265,646	4,986	49,873,823	64,663,225	1,068,779	311,891,197
1941 <sup>e</sup>	6,011	422,763,907	8,144	81,692,907	121,757,029	715,509	626,929,352
1942 <sup>e</sup>	10,500	884,766,298	14,603	160,575,340	311,536,776	466,952	1,357,345,366
1943 <sup>e</sup>	13,897	1,217,037,985	21,803	243,649,570	680,109,199	1,814,740	2,142,611,494
1944 <sup>e</sup>	24,405	1,646,168,884	25,751	335,081,201	830,219,433	6,701,129	2,818,170,647

<sup>a</sup> No breakdown available between new and secondhand exports.

<sup>b</sup> Fiscal years (ending June 30) prior to 1919; later data for calendar years.

<sup>c</sup> Complete aircraft including engines, propellers, etc.

<sup>d</sup> Russia bought 2,010 engines for \$261,344 in 1932 and 2,576 for \$255,400 in 1933.

<sup>e</sup> Includes lend-lease shipments.

Source: Department of Commerce, "Foreign Commerce and Navigation of the United States," annually; Foreign Commerce and Navigation of the United States, Calendar Year 1942, Table No. 4," preliminary copy, pp. 196-199. (Brought up to date by data from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, Machinery and Motive Products Unit.)

TABLE 8-4. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, BY TYPE OF PRODUCT, BY NUMBER AND VALUE, 1942<sup>a</sup>

Type of product	Number exported	Value of products exported, in thousands
Aircraft.....	10,500	\$ 884,766
Land planes—powered:		
Bombardment.....	3,808	536,347
Pursuit, interceptor and fighter.....	4,004	254,585
Observation.....	85	5,282
Training.....	1,918	41,890
Transport.....	400	28,570
Other land planes—n.e.s.....	145	1,414
Partial shipment of land planes to be assembled abroad.....	50	4,611
Seaplanes:		
Flying boats.....	25	5,766
Amphibians.....	33	3,741
Other seaplanes and amphibians—n.e.s.....	30	2,399
Partial shipments of seaplanes and amphibians to be assembled abroad.....		41
Glider and lighter than aircraft.....	2	120
Aircraft engines.....	14,603	160,575
Aircraft engine parts.....		84,731
Carburetors, cowls, crank cases, cylinders, generators, magnetos, spark plugs, starters, superchargers and valves.....		28,155
Other parts and accessories.....		56,586
Parachutes and parts.....		467
Parachutes.....	1,643	328
Parachute parts and fittings and shrouds.....		41
Other.....		98
Aircraft instruments and parts.....		23,851
Automatic pilot controls.....		35
Automatic pilots for aircraft.....	24	70
Aircraft gyro instruments.....	8,315	2,162
Aircraft radio transmitting and receiving sets.....	17,598	6,643
Aircraft navigation instruments.....	25,923	1,986
Parts of aircraft radio transmitting and receiving sets.....		6,706
Director and range finders.....	148	14
Self-synchronous transmitters and indicators, such as selyas and synchro units and switch boards.....		533
Sound locators for aircraft.....		45
Tachometers.....	12,321	455
Other instruments and parts.....		5,202
Propellers and parts.....		40,825
Bomb-rack controls, control columns, deicers, frame assemblies, fuel tanks, oxygen regulators and tanks, rudder pedals, struts, braces and wing tips..		23,145
Bomb sights.....	228	861
Other aircraft parts and accessories.....		138,113
<b>TOTAL VALUE</b>		<b>\$1,357,344</b>

<sup>a</sup> Includes lend-lease shipments.

Source: Department of Commerce, "Foreign Commerce and Navigation of the United States, Calendar Year, 1942, Table No. 4," preliminary copy, pp. 196-199.

TABLE 8-5. UNITED STATES EXPORTS<sup>a</sup> OF AERONAUTIC PRODUCTS, BY DESTINATION

	Other Americas	Europe	U.S.S.R.	Rest of the world	Total
<b>AIRCRAFT</b>					
Number:					
1929	281	13	.....	54	348
1938	324	131	13	408	876
1941	1,885	1,756	210	2,160	6,011
1942	1,738	3,114	2,570	3,078	10,500
1943	1,746	2,414	4,947	4,790	13,897
1944	1,207	11,874	4,585	6,739	24,045
Value, thousands:					
1929	\$ 4,315	\$ 237	.....	\$ 933	\$ 5,485
1938	10,390	4,648	\$ 1,970	20,970	37,978
1941	57,560	212,524	13,978	138,701	422,763
1942	54,807	314,485	262,596	252,878	884,766
1943	105,866	293,049	433,943	384,179	1,217,037
1944	88,161	512,768	399,989	645,250	1,646,168
<b>ENGINES</b>					
Number:					
1929	144	130	2	46	322
1938	436	535	19	319	1,309
1941	3,908	3,048	9	1,179	8,144
1942	7,151	4,916	330	2,206	14,603
1943	8,475	9,631	514	3,183	21,803
1944	7,780	12,008	2,699	3,264	25,751
Value, thousands:					
1929	\$ 568	\$ 617	\$ 20	\$ 179	\$ 1,384
1938	1,331	3,951	172	2,446	7,900
1941	19,288	49,129	151	13,125	81,693
1942	46,944	86,222	5,188	22,222	160,576
1943	60,861	135,677	6,739	40,373	243,650
1944	87,396	170,726	36,128	40,831	335,081
<b>AIRCRAFT PARTS</b>					
Value, thousands:					
1929	\$ 1,390	\$ 304	\$ 225	\$ 339	\$ 2,258
1938 <sup>b</sup>	4,408	4,442	3,030	10,471	22,351
1941 <sup>b</sup>	29,362	59,878	45 <sup>c</sup>	32,780	122,472
1942 <sup>b</sup>	72,772	118,057	47,137	74,037	312,003
1943 <sup>b</sup>	131,260	266,302	108,264	176,098	681,924
1944 <sup>b</sup>	133,983	409,591	121,988	171,359	836,920

<sup>a</sup> Includes lend-lease.<sup>b</sup> Includes parachutes and parts.

Source: Condensed from Department of Commerce, "Foreign Commerce and Navigation of the United States," 1929, p. 174, 1938, pp. 603-604, 1941, pp. 456-458; "Foreign Commerce and Navigation of the United States, Calendar Year 1942, Table No. 4," preliminary copy, pp. 196-199. (Brought up to date by data from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, Machinery and Motive Products Unit.)



TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Para-chutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
Australia	1934	1	20	9	13	.....	72	105
	1935	.....	.....	16	18	.....	49	67
	1936	21	492	16	59	.7	93	645
	1937	23	914	15	90	.5	385	1,390
	1938	11	341	9	64	.....	835	1,241
	1939	22	1,601	18	155	.....	509	2,265
	1940	92	8,154	205	2,791	50	4,892	15,888
	1941 <sup>a</sup>	86	9,846	479	3,509	8	6,874	20,238
	1942 <sup>a</sup>	229	17,062	1,167	10,387	1.7	11,242	38,693
	1943 <sup>a</sup>	773	63,102	1,370	18,811	0.40	34,106	116,019
1944 <sup>a</sup>	757	80,003	485	7,285	30	32,432	119,780	
Belgium	1934	1	6	.....	.....	.3	31	38
	1935	1	5	.....	.....	.....	34	39
	1936	.....	.....	.....	.....	.....	32	32
	1937	1	8	10	109	.....	47	164
	1938	.....	.....	5	44	.....	59	103
	1939	.....	.....	8	86	63	131	280
	1940	18	995	13	82	50	23	1,150
	1941 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
1944 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....	
Canada	1934	5	27	6	11	.....	151	189
	1935	8	105	46	54	.2	240	399
	1936	50	345	48	101	4	344	794
	1937	62	658	107	395	10	794	1,857
	1938	52	1,304	204	601	4	1,603	3,511
	1939	68	2,149	83	195	7	924	3,275
	1940	539	18,320	1,042	5,340	397	9,938	33,994
	1941 <sup>a</sup>	1,447	50,866	3,507	18,172	468	25,940	95,445
	1942 <sup>a</sup>	810	28,025	6,747	45,758	47	66,984	140,814
	1943 <sup>a</sup>	489	44,909	7,923	58,153	30	113,248	216,340
1944 <sup>a</sup>	517	56,811	6,603	81,394	141	110,973	249,319	
China	1934	132	3,237	16	79	.6	509	3,826
	1935	81	1,645	80	265	3	610	2,523
	1936	114	3,760	203	1,597	24	1,805	7,186
	1937	41	2,318	96	720	.3	923	3,962
	1938	142	4,683	84	777	.....	932	6,392
	1939	6	153	55	567	.....	352	1,072
	1940	110	4,423	254	2,991	.....	3,673	11,087
	1941 <sup>a</sup>	140	7,098	62	1,001	.....	1,415	9,514
	1942 <sup>a</sup>	448	28,234	163	1,163	.....	7,530	36,927
	1943 <sup>a</sup>	308	23,635	198	2,281	.....	8,912	34,828
1944 <sup>a</sup>	342	28,187	122	1,270	.....	6,121	35,578	
Czechoslovakia	1934	2	3	8	47	.....	6	56
	1935	.....	.....	2	17	.....	9	26
	1936	4	273	2	19	.....	6	299
	1937	2	164	1	7	.....	9	181

TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
Czechoslovakia	1938	1	113	3	31	.....	29	173
	1939	1	116	2	13	.....	7	136
	1940	.....	.....	.....	.....	.....	.....	.....
	1941 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1944 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
Egypt	1934	1	4	1	2	.....	.1	5
	1935	1	6	8	35	.....	7	47
	1936	.....	.....	.....	.....	.....	.1	.1
	1937	2	10	1	.9	.....	.1	11
	1938	.....	.....	.....	.....	.....	8	8
	1939	1	2	.....	.....	.....	.3	2
	1940	1	17	9	16	.....	317	351
	1941 <sup>a</sup>	886	59,305	359	5,537	14	13,519	78,375
	1942 <sup>a</sup>	861	79,375	530	7,332	.02	32,373	119,080
	1943 <sup>a</sup>	1,260	157,325	544	7,420	0.1	68,844	233,589
	1944 <sup>a</sup>	1,287	219,870	688	9,819	13	52,554	282,256
France	1934	3	103	2	11	.....	83	197
	1935	1	30	1	7	.....	118	155
	1936	22	455	1	1	.....	65	521
	1937	.....	.....	3	40	.04	161	201
	1938	12	480	12	167	.....	232	879
	1939	444	29,371	563	5,735	.....	7,380	42,485
	1940	750	53,401	1,136	11,919	.7	10,143	75,464
	1941 <sup>a</sup>	.....	.....	.....	.....	.....	.2	.2
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1944 <sup>a</sup>	6	369	.....	.....	.....	.....	369
Germany	1934	8	337	213	1,167	.....	258	1,762
	1935	1	72	7	55	.....	68	195
	1936	2	16	56	305	.....	92	412
	1937	2	18	89	697	.....	312	1,027
	1938	1	20	41	381	.....	179	580
	1939	.....	.....	5	18	.....	73	91
	1940	.....	.....	.....	.....	.....	.....	.....
	1941 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1944 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
Hong Kong	1934	12	41	.....	.....	\$ 4	19	64
	1935	4	17	5	25	6	21	68
	1936	1	35	5	18	3	140	196
	1937	3	184	.....	.....	.....	298	483
	1938	5	214	59	255	1	743	1,213
	1939	1	120	.....	.....	.....	284	404
	1940	6	306	5	43	.....	170	518
	1941 <sup>a</sup>	2	150	3	28	.....	124	302

TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
Hong Kong	1942 <sup>a</sup>							
	1943 <sup>a</sup>							
	1944 <sup>a</sup>							
Italy	1934	1	\$ 3	12	68		35	107
	1935	3	15	63	549		226	790
	1936	1	20	54	457		154	631
	1937	1	11	17	198		262	470
	1938			4	57		130	187
	1939			1	14		67	81
	1940						7	7
	1941 <sup>a</sup>							
	1942 <sup>a</sup>							
	1943 <sup>a</sup>							
	1944 <sup>a</sup>	25	1,600	129	2,014	.05	3,877	7,521
Japan	1934	6	160	5	36		124	321
	1935	4	242	25	141	3	564	950
	1936	11	450	20	120	.1	419	989
	1937	12	966	56	367		1,151	2,484
	1938	66	5,515	56	466	26	5,055	11,062
	1939	2	757				2,549	3,306
	1940						933	933
	1941 <sup>a</sup>						40	40
	1942 <sup>a</sup>							
	1943 <sup>a</sup>							
	1944 <sup>a</sup>							
Netherlands	1934	2	67	34	213	\$ 1	205	486
	1935	26	1,382	22	131		309	1,822
	1936	5	427	57	393		288	1,108
	1937	25	1,915	69	367		673	2,954
	1938	8	844	170	1,302		1,134	3,279
	1939	26	1,919	161	1,214	5	1,215	4,353
	1940			34	256	89	379	724
	1941 <sup>a</sup>							
	1942 <sup>a</sup>							
	1943 <sup>a</sup>							
	1944 <sup>a</sup>							
Netherland Indies	1934					7	12	19
	1935	1	\$ 1	6	31	3	340	376
	1936	11	776	9	53	7	228	1,064
	1937	3	148	13	108	24	266	547
	1938	70	6,334	43	352	120	1,690	8,495
	1939	66	4,753	28	262	55	1,178	6,249
	1940	101	3,928	43	345	142	1,713	6,129
	1941 <sup>a</sup>	216	13,265	18	206	165	2,454	16,089
	1942 <sup>a</sup>							
	1943 <sup>a</sup>							
	1944 <sup>a</sup>							

TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
New Zealand	1934	1	3	1	\$ .3		.6	4
	1935						.7	.7
	1936	2	15	2	7		.9	23
	1937	6	169	2	13		28	210
	1938	5	127	1	6		28	161
	1939	3	5	2	19		55	79
	1940			2	17		18	34
	1941 <sup>a</sup>	141	7,064	31	274		1,095	8,433
	1942 <sup>a</sup>	108	7,737	57	362		3,044	11,143
	1943 <sup>a</sup>	266	18,028	32	311		4,574	22,913
1944 <sup>a</sup>	105	9,556	18	113	0.02	2,334	12,003	
Norway	1934	3	\$ 11	2	\$ 2		10	23
	1935	1	2				6	8
	1936	8	191	7	28	\$ 37	39	295
	1937	11	46	3	4		46	95
	1938	3	10			.5	18	29
	1939			9	18		25	56
	1940	24	1,299	10	52	26	92	1,469
	1941 <sup>a</sup>							
	1942 <sup>a</sup>							
	1943 <sup>a</sup>							
1944 <sup>a</sup>								
Portugal	1934	6	38			15	4	57
	1935			1	1	4	6	12
	1936	3	7			4	3	15
	1937	3	60	2	7		13	81
	1938	10	15	4	6		28	49
	1939	6	9	2	14		52	76
	1940	13	816	5	33	24	89	962
	1941 <sup>a</sup>			6	36		41	77
	1942 <sup>a</sup>			1	3		44	47
	1943 <sup>a</sup>			1	4		23	27
1944 <sup>a</sup>			8	22	0.01	34	56	
Philippine Islands	1934	5	25	1	3		19	47
	1935	3	16	1	4	\$ .1	49	68
	1936	13	252	8	23		114	389
	1937	16	338	21	111	1	172	622
	1938	14	282	6	50	5	128	465
	1939	23	407	3	19	1	115	542
	1940	1	56	5	23	6	81	166
	1941 <sup>a</sup>	17	852	16	116	4	197	1,168
	1942 <sup>a</sup>						.1	.1
	1943 <sup>a</sup>							
1944 <sup>a</sup>								
Poland and Danzig	1934			24	104		69	173
	1935	3	\$ 194	4	30	\$ .5	93	317
	1936	3	162				87	249
	1937	6	347	5	49		148	544

TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
Poland and Danzig	1938	7	469	5	44	.....	241	753
	1939	4	366	.....	.....	.....	62	428
	1940	.....	.....	.....	.....	.....	.....	.....
	1941 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1944 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
Spain	1934	4	6	5	5	.....	3	14
	1935	3	160	5	24	\$ 9	18	211
	1936	1	80	2	20	15	5	119
	1937	8	325	1	5	104	10	443
	1938	.....	.....	.....	.....	.....	.....	.....
	1939	.....	.....	.....	.....	59	.....	59
	1940	.....	.....	.....	.....	.....	1	1
	1941 <sup>a</sup>	.....	.....	.....	.....	.....	.4	.4
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....
1944 <sup>a</sup>	.....	.....	.....	.....	.....	0.01	0.01	
Sweden	1934	2	\$ 71	21	135	\$ .2	57	263
	1935	.....	.....	11	79	.....	75	154
	1936	2	2	7	44	.1	93	139
	1937	9	381	9	80	.....	170	631
	1938	7	217	70	308	.4	479	1,004
	1939	2	6	14	32	27	412	477
	1940	67	3,668	32	251	115	1,197	5,231
	1941 <sup>a</sup>	.....	.....	.....	.....	7	251	257
	1942 <sup>a</sup>	.....	.....	10	135	.....	151	286
	1943 <sup>a</sup>	.....	.....	.....	.....	.....	35	35
	1944 <sup>a</sup>	.....	.....	10	150	.....	58	208
	Thailand (Siam)	1934	24	\$ 499	3	22	.....	2
1935		12	319	.....	.....	\$ 3	133	455
1936		12	326	12	82	.....	82	489
1937		4	355	62	484	.....	315	1,155
1938		20	570	23	144	25	105	843
1939		1	6	47	346	.1	273	625
1940		21	535	30	193	.1	116	844
1941 <sup>a</sup>		.....	.....	1	1	.1	23	24
1942 <sup>a</sup>		.....	.....	.....	.....	.....	.....	.....
1943 <sup>a</sup>		.....	.....	.....	.....	.....	.....	.....
1944 <sup>a</sup>	.....	.....	.....	.....	.....	.....	.....	
Turkey	1934	18	93	8	46	28	160	327
	1935	1	43	3	10	10	49	113
	1936	.....	.....	1	2	2	93	97
	1937	22	1,800	16	199	7	444	2,450
	1938	48	2,646	7	67	67	380	3,160
	1939	7	168	.....	.....	192	817	1,177
	1940	49	1,234	12	70	44	1,110	2,459
	1941 <sup>a</sup>	.....	.....	2	10	.....	86	96



TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
Argentina	1934	9	134	32	219	4	162	520
	1935	13	87	27	125	18	171	402
	1936	64	1,505	85	329	73	363	2,270
	1937	82	3,224	104	527	23	633	4,407
	1938	93	4,648	25	171	80	1,288	6,187
	1939	16	600	31	332	75	1,179	2,187
	1940	14	50	37	291	40	799	1,180
	1941 <sup>a</sup>	26	148	13	21	.9	560	730
	1942 <sup>a</sup>	35	65	77	142	16	336	559
	1943 <sup>a</sup>	1	12	2	7	.....	58	77
1944 <sup>a</sup>	.....	.....	5	38	.....	66	104	
Bolivia	1934	9	180	5	37	2	84	304
	1935	.....	.....	1	.9	.....	22	23
	1936	.....	.....	6	44	.....	62	105
	1937	.....	.....	2	10	.....	16	26
	1938	9	352	.....	.....	.....	110	462
	1939	2	10	4	27	.1	31	68
	1940	2	19	7	51	.....	51	121
	1941 <sup>a</sup>	3	204	2	25	.....	41	270
	1942 <sup>a</sup>	6	133	1	12	6	147	298
	1943 <sup>a</sup>	20	738	1	7	.....	283	1,028
1944 <sup>a</sup>	1	65	.....	.....	.....	153	218	
Brazil	1934	28	193	42	191	24	120	529
	1935	77	539	42	150	.....	243	931
	1936	14	204	45	127	20	200	551
	1937	46	1,009	54	162	16	488	1,675
	1938	45	1,580	43	63	.5	304	1,947
	1939	92	1,270	76	192	37	426	1,925
	1940	80	1,943	90	327	26	717	3,014
	1941 <sup>a</sup>	173	2,358	225	423	11	744	3,537
	1942 <sup>a</sup>	456	11,709	99	255	6	788	12,758
	1943 <sup>a</sup>	440	13,170	318	1,160	72	7,470	21,872
1944 <sup>a</sup>	219	15,468	731	2,080	20	13,072	30,640	
Chile	1934	1	2	1	6	.....	37	45
	1935	8	166	2	8	.....	72	246
	1936	3	6	2	10	\$ 3	21	41
	1937	.....	.....	1	9	.....	26	35
	1938	1	2	14	37	.....	25	64
	1939	2	5	2	12	.....	9	26
	1940	2	8	17	61	.....	50	119
	1941 <sup>a</sup>	47	1,152	10	50	.5	76	1,278
	1942 <sup>a</sup>	34	1,375	13	28	57	246	1,706
	1943 <sup>a</sup>	87	1,598	.....	.....	.....	888	2,486
1944 <sup>a</sup>	107	2,690	15	73	3	897	3,663	
Colombia	1934	78	1,065	18	103	7	441	1,616
	1935	4	81	8	30	.....	186	297
	1936	8	210	7	29	7	150	396
	1937	9	185	13	55	2	142	384

TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands	
		Number	Value, thousands	Number	Value, thousands				
Colombia	1938	10	301	24	138	.1	246	685	
	1939	8	258	28	89	.....	235	582	
	1940	5	27	15	36	.9	258	321	
	1941 <sup>a</sup>	2	36	7	40	.9	173	250	
	1942 <sup>a</sup>	16	382	4	12	3	147	544	
	1943 <sup>a</sup>	38	948	.....	.....	3	379	1,330	
	1944 <sup>a</sup>	53	1,653	7	30	1	496	2,180	
Costa Rica	1934	2	8	3	4	.....	2	14	
	1935	4	13	3	3	.....	3	20	
	1936	1	7	15	22	.....	1	30	
	1937	3	13	13	16	.....	6	34	
	1938	12	95	19	18	.....	9	123	
	1939	4	38	34	26	.....	19	84	
	1940	2	80	17	25	.....	114	219	
	1941 <sup>a</sup>	1	22	3	8	.....	189	220	
	1942 <sup>a</sup>	1	2	5	13	.....	52	67	
	1943 <sup>a</sup>	.....	.....	4	10	.....	115	125	
	1944 <sup>a</sup>	3	58	4	12	0.6	183	253	
	Cuba	1934	.....	.....	2	3	.....	11	14
1935		2	\$ 80	2	4	2	28	113	
1936		1	4	9	21	.01	35	59	
1937		.....	.....	7	14	7	46	67	
1938		1	5	7	13	.....	16	34	
1939		.....	.....	1	1	.....	27	28	
1940		2	6	2	2	.1	42	50	
1941 <sup>a</sup>		6	20	.....	.....	.2	24	44	
1942 <sup>a</sup>		40	1,204	13	26	.....	150	1,380	
1943 <sup>a</sup>		28	542	1	2	4	171	719	
1944 <sup>a</sup>		13	58	4	5	.....	105	168	
Dominican Republic		1934	1	11	.....	.....	.....	3	14
		1935	.....	.....	.....	.....	.....	3	3
	1936	2	3	1	1	.5	3	7	
	1937	1	26	2	7	.5	8	41	
	1938	.....	.....	1	2	.8	1	4	
	1939	.....	.....	2	11	.....	12	23	
	1940	.....	.....	.....	.....	.....	3	3	
	1941 <sup>a</sup>	4	6	.....	.....	.....	9	15	
	1942 <sup>a</sup>	.....	.....	.....	.....	.....	6	6	
	1943 <sup>a</sup>	15	310	1	7	.....	32	349	
	1944 <sup>a</sup>	10	108	5	5	.....	54	167	
	Ecuador	1934	.....	.....	.....	.....	.....	.....	.....
1935		5	43	.....	.....	.....	3	46	
1936		9	149	.....	.....	2	6	157	
1937		1	1	1	\$ 3	.....	49	53	
1938		1	6	1	1	.....	4	11	
1939		1	16	1	2	.....	23	41	
1940		.....	.....	.....	.....	.....	7	7	
1941 <sup>a</sup>		.....	.....	6	28	.....	17	45	







TABLE 8-6. UNITED STATES EXPORTS OF AERONAUTIC PRODUCTS, 1932-1944.—  
(Continued)

Country of destination	Year	Airplanes, seaplanes, amphibians		Engines		Parachutes and parts, thousands	Aircraft parts, instruments, and accessories (except tires), thousands	Total value, thousands
		Number	Value, thousands	Number	Value, thousands			
Salvador	1938	1	3				7	9
	1938			1	8		4	5
	1940	3	20			.01	5	25
	1941 <sup>a</sup>	3	6	2	4	1	23	34
	1942 <sup>a</sup>	4	89			1	2	92
	1943 <sup>a</sup>							
Trinidad and Tobago	1934			11	22		6	27
	1935			24	64		12	76
	1936	2	6	15	53		14	73
	1937	1	1	14	33	\$.02	35	70
	1938			7	35		15	50
	1939			8	12	.2	9	21
	1940			4	6		21	27
	1941 <sup>a</sup>			7	54		30	84
	1942 <sup>a</sup>			23	126	3	344	473
	1943 <sup>a</sup>	58	1,975	24	100	0.4	1,042	3,117
	1944 <sup>a</sup>	40	912	15	48	0.4	408	1,368
	Uruguay	1934	2	16	1	6		1
1935							.09	.09
1936		2	20	1	1		4	25
1937		3	6				4	10
1938		6	110				5	115
1939							2	2
1940		13	58	1	.4		.9	59
1941 <sup>a</sup>		35	81	1	.3	\$.1	17	98
1942 <sup>a</sup>		40	1,020	2	15	16	90	1,141
1943 <sup>a</sup>		14	257			6	177	440
1944 <sup>a</sup>		9	118	4	2	1	148	269
Venezuela		1934			4	12		2
	1935			2	4	.3	4	9
	1936	1	13	2	7	1	16	38
	1937	8	302	14	61		49	412
	1938	10	351	20	86		79	517
	1939	7	272	19	80	4	90	446
	1940	15	258	23	100		147	505
	1941 <sup>a</sup>	19	277	37	137		110	523
	1942 <sup>a</sup>	6	219	46	146		108	473
	1943 <sup>a</sup>	14	496	11	64	8	191	759
	1944 <sup>a</sup>	23	441	21	114		601	1,156

<sup>a</sup> Figures include lend-lease shipments but do not include products sent to Army or Navy.

Source: Department of Commerce, "Foreign Commerce and Navigation of the United States," annually; "Foreign Commerce and Navigation of the United States, Calendar Year 1942, Table No. 4," preliminary copy, pp. 196-199. (Brought up to date by data from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, Machinery and Motive Products Unit.)

TABLE 8-7. AIRCRAFT IN THE LEND-LEASE PROGRAM, 1941-1944  
(Millions of dollars)

Year	Total lend-lease aid <sup>a</sup>	Total lend-lease exports	Lend-lease exports of aircraft and parts	Aircraft and parts as per cent of lend-lease exports, per cent
1941 <sup>b</sup>	\$ 1,244	\$ 741	\$ 26	3.5
1942	7,009	4,894	885	18.1
1943	11,733	10,107	1,979	19.5
1944	15,397	11,284	2,709	24.0
Total.....	\$35,383	\$27,026	\$5,599	20.7

<sup>a</sup> "Total lend-lease aid" includes the following data not included in "Total lend-lease exports":

1. Goods transferred and awaiting export.
2. Goods transferred for use in this country.
3. Lend-lease services.
4. Ships leased for the duration.
5. Supplies purchased outside the United States.

<sup>b</sup> March-December only.

Source: Foreign Economic Administration, Division of Statistics, letter of Mar. 3, 1945, revised Apr. 25, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 8-8 LEND-LEASE OF AIRCRAFT, BY DESTINATION, FROM MARCH, 1941

United Kingdom (through March, 1945).....	9,500
French (to Dec. 31, 1944).....	1,100
U.S.S.R. (through March, 1945).....	13,300
Africa, Middle East, Mediterranean (to Dec. 1, 1944).....	5,000
Pacific and Far East (to Dec. 1, 1944).....	6,500
Canada (trainer planes) (to Dec. 1, 1944).....	950
Latin America.....	N.A.
Total (to Sept. 30, 1944).....	34,500

Sources: Office of War Mobilization and Reconversion, 1st Report, Jan. 1, 1945, p. 33.

Foreign Economic Administration, Eighteenth Report to Congress on Lend-lease Operations, Feb. 20, 1945, pp. 16, 17, 19, 21, 23, and 24.

Nineteenth Report to Congress on Lend-lease Operations, Mar. 31, 1945, pp. 13 and 15.

TABLE 8-9. AIRCRAFT PRODUCED AND LEND-LEASED, 1941-1944

Year	Aircraft and parts		
	U.S. production, millions (Aug. 1943 unit costs)	Lend-lease exports, million	Per cent of United States production lend-leased
1941	\$ 1,765	\$ 26	1.5
1942	6,071	885	12.9
1943	12,979	1,979	15.2
1944	16,745	2,709	16.2
Total.....	\$37,560	\$5,599 <sup>a</sup>	14.9

<sup>a</sup> Does not include transfers by direct purchase amounting to more than 700 million dollars.

Sources: War Production Board, Bureau of Program and Statistics, Military Division, Aircraft Branch, letter of Mar. 27, 1945.

Foreign Economics Administration, Division of Statistics, letter of Mar. 3, 1945, revised Apr. 25, 1945.

Percentage computed by Aircraft Industries Associations, Research and Statistics Service.

TABLE 8-10. PERCENTAGE OF AIRCRAFT AND PARTS OF TOTAL LEND-LEASE EXPORTS TO SELECTED COUNTRIES AND AREAS, 1941-1944

Year	Total lend-lease exports, thousands	Lend-lease exports of aircraft and parts, thousands	Aircraft and parts as per cent of total
To United Kingdom			
1941 <sup>a</sup>	\$ 572,620	\$ 13,330	2.3
1942	2,005,250	275,750	13.7
1943	4,074,260	655,060	16.1
1944	5,097,960	1,076,784	21.1
To U.S.S.R.			
1941 <sup>a</sup>	550	.....	.....
1942	1,351,790	303,390	22.4
1943	2,926,910	547,120	18.6
1944	3,429,362	557,869	16.3
To Africa, Middle East, and Mediterranean			
1941 <sup>a</sup>	95,910	2,020	2.1
1942	692,110	114,590	16.5
1943	1,606,820	314,350	18.9
1944	1,194,432	396,112	33.2
To Australia and New Zealand			
1941 <sup>a</sup>	14,480	7,000	48.3
1942	273,840	44,130	16.1
1943	525,640	133,110	25.3
1944	366,456	130,822	35.7
To India and China			
1941 <sup>a</sup>	37,740	1,000	26.4
1942	367,260	53,010	14.4
1943	587,870	135,300	23.0
1944	831,930	333,597	40.1
To Latin America			
1941 <sup>a</sup>	360	360	100.0
1942	34,670	17,800	51.3
1943	97,840	38,100	38.9
1944	81,784	40,329	49.3
To All Other Destinations			
1941 <sup>a</sup>	19,240	2,600	13.5
1942	169,500	76,000	44.8
1943	287,300	156,090	54.3
1944	281,696	173,041	61.4
To All Destinations			
1941 <sup>a</sup>	740,900	26,310	3.5
1942	4,894,420	884,670	17.7
1943	10,106,640	1,979,130	19.5
1944	11,283,620	2,708,554	24.0

<sup>a</sup> March-December only.

Source: Foreign Economic Administration, Division of Statistics, letter of Mar. 3, 1945, revised Apr. 25, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

## CHAPTER 9

### SURPLUS DISPOSAL AND CONTRACT TERMINATION

#### SURPLUS DISPOSAL

**Aircraft, Engines, etc. *First World War.*** After the First World War the Army and Navy were confronted with thousands of surplus aircraft and engines. Disposal plans had hardly reached the discussion stage at the time of the Armistice, and disposal tended to be on a trial-and-error basis. Many planes were burned in France after engines and instruments had been removed. Most of the de Havilland observation planes were retained by the Army, while about half the "Jennies" and practically all the Standards were sold by the Army in 1919 in two negotiated sales.

Liberty engines sold very slowly. In 1926, the Army still had most of them on hand. The Curtiss OX-5's sold better; nearly half were sold back to Curtiss in 1919. The rest were sold at very low prices between 1923 and 1925.

The Navy, which had a smaller surplus of aircraft, sold only a little. Export sales were unimportant.

The retention by the services of large numbers of war-produced aircraft and engines caused small purchases of new aircraft. Manufacturers who survived—and only few did survive—had a very precarious existence. The competition of cheap surplus items caused commercial demand for planes to be very poor. Civilian engine production was negligible until 1926. Development of commercial models of planes and engines lagged.

***Second World War.*** In the Second World War a Surplus War Property Administration was set up by Executive Order of the President (Feb. 19, 1944) to coordinate the activities of existing agencies in the disposal of surplus property without creating a new selling agency. Later (Oct. 3, 1944) Congress, in the Surplus Property Act of 1944, established a three-man Surplus Property Board to carry on this work. The Surplus Property Board is responsible for the formulation of policy for surplus aircraft disposal and has established an Aviation Division. The actual disposal of surplus aircraft located in the United States, Hawaii, Alaska, Puerto Rico, and the Virgin Islands has been assigned to the Surplus War Aircraft Division of the Reconstruction Finance Corporation.

Surplus aircraft and components located elsewhere are being disposed of by the Army-Navy Liquidation Commission.

Aircraft, aircraft parts, and aeronautical equipment constitute the largest single surplus property group, judged by original cost. Before V-J day aircraft surpluses were primarily

1. War-weary combat planes.
2. Obsolete type.
3. Trainers.

With the ending of the war surplus also includes many new or used planes and airframes and engines in different stages of production.

Aeronautical surplus material is segregated into the following classes:

Class A. Tactical aircraft including intermediate and advanced trainers. These are, to a large extent, unsalable.

Class B. Transport airplanes.

Class C. Personal aircraft including primary trainers, liaison types, and small utility transports.

Class D. Aircraft equipment, components and parts.

Class E. Unabsorbed surplus—for educational, experimental, and memorial purposes, for nonaviation purposes, and for special flight uses.

Items that cannot be disposed of in classes A to D will be transferred to class E.

**Facilities.** In the First World War the government left the financing of war-plant facilities to private capital. Therefore it faced no problem of plant disposal after the war.

In the Second World War, private capital did not provide enough facilities. It expanded the country's manufacturing capacity by about 7.9 billion dollars; additional government expenditures of about 15 billion dollars were necessary to fill production requirements.

In the aircraft industry private financing (July, 1940–December, 1944) provided only about 8 per cent of the total facilities expansion. More than 90 per cent (more than 3.4 billion dollars) was provided by the government.

Up to Feb. 28, 1945, federally financed aircraft facilities amounting to 3.7 billion dollars had been approved and, largely, put in place (see also Chap. 1).

### CONTRACT TERMINATION

War requirements changed constantly. As a result, contracts had to be terminated even while production requirements went up. For several years the primary function of contract settlement was to clear the way for further war production. At the same time, preparations were made to handle the problems of settlement when war production would diminish or stop.

The first agency to deal with contract termination was the Joint Contract Termination Board formed on Nov. 12, 1943, in the Office of War Mobilization. On July 21, 1944, the Contract Settlement Act of 1944 became effective, and on October 3 of the same year the Office of Contract Settlement was made a part of the Office of War Mobilization and Reconversion. The undelivered value of outstanding contracts at the end of the war was estimated at about 50 billion dollars. The full impact of the termination and settlement of contracts involving such amounts is being realized only now. Up to the end of the war in Europe, contractors were frequently willing to settle terminated contracts, without any claims or without insisting on the costs or profits to which the act would entitle them.

TABLE 9-1. THE SURPLUS SITUATION, BY AGENCIES, FEBRUARY, 1945  
(Cost in thousands of dollars)

Agency	Declarations <sup>a</sup>	Disposal	Per cent disposed of	On hand Feb. 28, 1945
Treasury.....	\$ 213,014	\$103,211	48.5	\$ 109,803
Reconstruction Finance Corporation.....	1,278,486	113,949	8.9	1,164,537
Maritime Commission.....	30,596	7,521	24.6	23,075
War Food Administration.....	350	267	76.3	83
Federal Economic Administration.....	1,681	2	<sup>b,c</sup>	1,679
National Housing Agency.....	166	3	1.8 <sup>c</sup>	163
Total.....	\$1,524,293	\$224,953	14.8 <sup>c</sup>	\$1,299,340

<sup>a</sup> Includes declarations plus inventory on hand June 1, 1944.

<sup>b</sup> Less than .01 per cent.

<sup>c</sup> Percentage computed by Aircraft Industries Association, Research and Statistics Service.

Source: Surplus Property Board, "Monthly Progress Report, February, 1945," Mar. 30, 1945, pp. 19, 24-26.

TABLE 9-2. THE SURPLUS SITUATION, BY TYPE OF SURPLUS, FEB. 28, 1945  
(Cost<sup>a</sup> in thousands of dollars)

Description	Inventory and declarations	Disposals, June, 1944-Feb., 1945	Inventory end of period
Aircraft and related equipment.....	\$ 924,706	\$ 31,879	\$ 892,827
Other capital and producer goods <sup>b</sup> .....	353,780	82,070	271,710
Consumer goods.....	213,014	103,211	109,803
Ships and maritime property.....	30,596	7,521	23,075
Food <sup>c</sup> .....	350	267	83
Housing.....	166	3	163
Foreign surpluses.....	1,681	2	1,679
Total.....	\$1,524,293	\$224,953	\$1,299,340

<sup>a</sup> Cost reported by owning agencies; consumer goods partly on the basis of appraised value.

<sup>b</sup> Does not include property reported by Aircraft Scheduling Unit to Metals Reserve Company under Aircraft Material Redistribution Program.

<sup>c</sup> Excludes WFA-owned stocks.

Source: Surplus Property Board, "Monthly Progress Report, February, 1945," Mar. 30, 1945, p. 19.



TABLE 9-3. ESTIMATED NUMBER OF PLANES AND ENGINES ON HAND IN MAY, 1919  
Planes:

De Havilland 4.....	3,250
Standard J-1.....	1,550
Curtiss JN4, -A-B	3,200
Curtiss JN4-D, JN4-Canadian }	
Curtiss JN4-H, JN6-H.....	1,650
Thomas-Morse S-4.....	500
Penguin.....	296
Spad.....	450
Other foreign.....	750
Miscellaneous and experimental.....	600
Total.....	12,250
Engines:	
Liberty 12.....	11,800
Curtiss OX-5.....	9,000
Hispano-Suiza (all models).....	4,800
LeRhone (all models).....	3,700
Hall-Scott A7A.....	2,100
Lawrance.....	441
Gnome.....	1,400
Fiat.....	750
Salmson.....	400
Miscellaneous and experimental.....	1,100
Total.....	35,500

Source: "Disposal of Surplus Aircraft and Major Components Thereof," Report of War Contracts Subcommittee to the Committee on Military Affairs, June 26, 1944, p. 74.

TABLE 9-4. ESTIMATED SURPLUS DISPOSAL OF THE AIR SERVICE, DEC. 1, 1918-  
APR. 15, 1923

	Cost, millions	Sales price, millions	Per cent of cost recovered
Air service:			
All sales:			
Cost known.....	\$84.5	\$24.2	28
Cost unknown.....	N.A.	5.6	N.A.
All gratis transfers:			
Surplus transferred before Apr. 15, 1923..	20.1	.....	..
Surplus on hand Apr. 1, 1923.....	22.0	.....	..
Surplus to be declared after Apr. 1, 1923..	.6	.....	..
Total, air service.....	N.A.	\$29.8	N.A.
Airplanes and equipment sales only:			
Cost known.....	\$49.9	6.7	13
Cost unknown.....	N.A.	.2	N.A.
Total, airplanes and equipment.....	N.A.	\$ 6.9	N.A.

N.A. Not available.

Source: "Disposal of Surplus War Materials Policies and Procedures, 1918-1926," Reports of the War Contracts Subcommittee to the Committee on Military Affairs, Sept. 25, 1944, pp. 114-116.

TABLE 9-5. SURPLUS AIRCRAFT, ENGINES, AND PARTS, FEB. 28, 1945  
(Cost and price in thousands of dollars)

Description	Cumulative through Feb. 28, 1945			On hand Feb. 28, 1945, cost
	Acquisitions cost	Sales		
		Cost	Price	
Airplanes <sup>a</sup> .....	\$212,982.5	\$35,407.2	\$12,327.4	\$177,575.3
(Number) <sup>a</sup> .....	(17,945)	(8,696)		(9,249)
Engines.....	17,433.9	18.6	7.8	17,415.2
Engine parts and accessories..	410.8	.....	.....	410.8
Aircraft parts and equipment <sup>b</sup>	3,422.9	3.8	2.6	3,419.1
Total aircraft and related equipment <sup>c</sup> .....	\$239,707.5	\$36,111.3	\$12,487.5	\$203,596.2
Nonsalable inventory of (13, 709) airplanes.....	\$689,231.0	.....	.....	\$689,231.0
Total.....	\$928,938.5	\$36,111.3	\$12,487.5	\$892,827.2

<sup>a</sup> Excludes nonsalable inventory of 13,709 nonflyable planes, combat planes, etc.

<sup>b</sup> Includes propellers and aircraft armament equipment and flight equipment (personnel).

<sup>c</sup> Includes other items not listed above.

Source: Federal Loan Agency, Reconstruction Finance Corporation, Press Release ST-100, Mar. 15, 1945.

TABLE 9-6. SALABLE AND NONSALABLE<sup>a</sup> SURPLUS AIRCRAFT ACQUIRED BY RECONSTRUCTION FINANCE CORPORATION AS OF FEB. 28, 1945

Type	Acquired	Sold	Balance
Liaison planes.....	2,756	2,040	716
Primary trainers.....	7,764	1,161	6,603
Cargo and transport planes.....	2,043	119	1,924
Basic and advanced trainers.....	3	3	.....
Fighters and bombers.....	2	2	.....
Subtotal.....	12,568	3,325	9,243
War Training Service Planes owned by RFC.....	5,377	5,371	6
Total.....	17,945	8,696	9,249
Nonsalable aircraft <sup>a</sup> .....	13,709	.....	13,709
Gliders.....	1,066	194	872

<sup>a</sup> Nonsalable aircraft consists exclusively of nonflyable planes and combat planes for which no market exists except for their value as salvage or scrap materials.

Source: Federal Loan Agency, Reconstruction Finance Corporation, Press Release ST-100, Mar. 15, 1945.

TABLE 9-7. CONTRACT TERMINATIONS, CUMULATIVE THROUGH DEC. 31, 1944,  
ARMY AIR FORCES AND NAVY BUREAU OF AERONAUTICS  
ARMY AIR FORCES

Number of Contracts Terminated						
Type of contract	Settled		Pending		Total	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Fixed price.....	5,738	89	726	11	6,464	100
Cost plus fee.....	234	63	136	37	370	100
Total.....	5,972	87	862	13	6,834	100

Commitments Canceled (Millions of Dollars)						
Type of contract	Settled		Pending		Total	
	Amount	Per cent	Amount	Per cent	Amount	Per cent
Fixed price.....	\$3,264	62	\$1,960	38	\$5,224	100
Cost plus fee.....	960	27	2,586	73	3,546	100
Total.....	\$4,224	48	\$4,546	52	\$8,770	100

NAVY BUREAU OF AERONAUTICS

Number of Contracts Terminated						
Type of contract	Settled		Pending		Total	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Fixed price.....	474	56	378	44	852	100
Cost plus fee.....	3	6	47	94	50	100
Total.....	477	53	425	47	902	100

Commitments Canceled (Millions of Dollars)						
Type of contract	Settled		Pending		Total	
	Amount	Per cent	Amount	Per cent	Amount	Per cent
Fixed price.....	\$322	53	\$283	47	\$ 605	100
Cost plus fee.....	217	30	515	70	732	100
Total.....	\$539	40	\$798	60	\$1,337	100

Source: Office of Contract Settlement, "Status of Contract Settlement, December, 1944," Feb. 8, 1945, Tables 2 and 3.

TABLE 9-8. CONTRACT TERMINATIONS AND SETTLEMENTS—ALL CONTRACTS CUMULATIVE THROUGH FEB. 28, 1945

Number of Contracts Terminated			
	Settled	Pending	Total
Fixed price.....	125,119	8,455	133,574
Cost plus fee.....	481	275	756
Total.....	125,600	8,730	134,330

  

Commitments Canceled (Millions of Dollars)			
	Settled	Pending	Total
Fixed price.....	\$13,831	\$4,966	\$18,797
Cost plus fee.....	2,849	4,812	7,661
Total.....	\$16,680	\$9,778	\$26,458

Source: Office of Contract Settlement, "Monthly Report of War Contract Terminations and Settlements, February, 1945," Mar. 31, 1945, p. 8.

TABLE 9-9. TIME ELAPSED<sup>a</sup> FOR FIXED PRICE SETTLEMENTS WITH CLAIMS, MARCH 1945

War Department (Average time to settle a termination 3.4 months)		
Months	Per cent of terminations	Per cent of canceled commitments
3 or less.....	59	15
4-6.....	33	21
7-12.....	7	64
Over 12.....	1	<sup>b</sup>

  

Navy Department (Average time to settle a termination 5.9 months)		
Months	Per cent of terminations	Per cent of canceled commitments
3 or less.....	17	1
4-6.....	51	25
7-12.....	21	33
Over 12.....	11	41

<sup>a</sup> Time from effective date of termination to settlement date.

<sup>b</sup> Less than .05 per cent.

Source: Office of Contract Settlement, "Monthly Report of War Contract Terminations and Settlements, March, 1945," Apr. 30, 1945, p. 18.

TABLE 9-10. FIXED PRICE PRIME CONTRACTS: AMOUNTS OF TERMINATIONS, CLAIMS,  
AND SETTLEMENTS, 1945  
(Millions of dollars)

WAR DEPARTMENT

Period covered	Total commitments		Termination claims settled	
	Canceled	Settled	Claimed	Settled for
January, 1945.....	222.0	569.5	54.1	49.2
February, 1945.....	206.5	501.2	37.6	34.6
March, 1945.....	253.5	669.5	40.1	36.9
Cumulative to Mar. 31, 1945.....	14,404.2	11,882.3	685.9	589.7

NAVY DEPARTMENT

Period covered	Total commitments		Termination claims settled	
	Canceled	Settled	Claimed	Settled for
January, 1945.....	86.2	465.5	13.2	11.8
February, 1945.....	67.2	302.0	7.8	7.0
March, 1945.....	569.8	191.7	8.8	8.2
Cumulative to Mar. 31, 1945.....	4,350.2	2,125.0	74.5	65.7

Sources: Office of Contract Settlement, "Monthly Report of War Contract Terminations and Settlements," January, 1945 (Mar. 3, 1945), pp. 11, 13; February, 1945 (Mar. 31, 1945), pp. 11, 13; March, 1945 (Apr. 30, 1945), pp. 9, 11.

## CHAPTER 10

### SERVICE FACILITIES

The growth of both commercial air transport and personal flying depends on the development of service facilities—airports, aids to air navigation such as beacons, weather service, radio-range stations, airway traffic control, filling stations, and repair service.

Airports are the responsibility of the Airports Service of the Civil Aeronautics Administration. This service provides technical aid to communities and individuals interested in airport construction. It has also prepared a National Airport Plan (78th Congress, 2d Session, House Document 807, Nov. 28, 1944) proposing the construction of 3,050 new airports and the improvement of 1,625 existing ones.

The Federal Airways Service of the CAA is responsible for the establishment, maintenance, and operation of the 34,000 miles of lighted airways in the United States.

Aviation gasoline and lubricants must be produced, refined, and transported before airport servicing. The War Mobilization Director indicates that toward the end of the war about 10 per cent of our crude petroleum production was converted into aviation gasoline. The Defense Plant Corporation has committed 245 million dollars for 38 aviation gasoline facilities since 1940.

TABLE 10-1. COMMUNITIES AND AIRPORTS, BY SIZE OF COMMUNITY, APR. 1, 1944

Community size	Number of places	Places with airports	Number of airports
Over 500,000.....	14	14	39
100,000-500,000.....	78	70	217
50,000-100,000.....	107	72	139
25,000-50,000.....	213	135	206
5,000-25,000.....	1,630	748	972
Under 5,000 <sup>a</sup> .....	14,710	1,546	1,682
Total.....	16,752	2,585	3,255
Usable.....	.....	.....	2,942

<sup>a</sup> Includes incorporated rural territory.

Source: "National Airport Plan," House Document 807, Nov. 28, 1944, pp. 7, 27 (p. 19 for date).

TABLE 10-2. CLASSIFICATION OF AIRPORTS  
(Civil Aeronautics Administration—Airports Service)

Class	Use	Capacity
1	Suitable for private-owner small-type aircraft	2- to 5-place aircraft—adequate for aircraft up to 4,000 lb gross weight; adapted to needs of small communities and auxiliary airports in metropolitan areas; landing strips 1,800 to 2,700 ft in length
2	Suitable for larger type private owner aircraft and smaller transport aircraft	Up to 20 place; adequate for aircraft to 15,000 lb gross weight; for communities of 5,000 to 25,000 population; runways 2,500 to 3,500 ft in length
3	Suitable for present-day twin-engine transport aircraft	Up to 30 place; adequate for aircraft up to 50,000 lb gross weight; cities of 25,000 to 250,000 population; runways 3,500 to 4,500 ft in length
4 and 5	Suitable for largest aircraft now in use and those planned for the immediate future	30 place and larger; adequate for aircraft of more than 50,000 lb gross weight; major metropolitan centers and air terminals; Class 4 runways 4,500 to 5,500 ft in length; Class 5 runways 5,500 ft in length and over

Sources: Civil Aeronautics Administration, *Civil Aeronautics Journal*, Aug. 15, 1944, p. 100.  
"National Airport Plan," House Document 807, Nov. 28, 1944, pp. 4, 5.

TABLE 10-3. EXISTING CIVIL AIRPORTS BY CLASS AND REGION, JANUARY, 1939

Division	Total	Per cent of United States total	Inter-mediate fields	Sub-class I	Class I	Class II	Class III	Class IV
New England.....	111	5.1	2	7	89	13	0	0
Middle Atlantic.....	217	10.0	12	15	164	22	4	0
East North Central..	389	17.9	26	1	323	33	6	0
West North Central.	241	11.1	33	5	177	23	3	0
South Atlantic.....	323	14.9	28	8	256	29	2	0
East South Central..	107	4.9	24	2	70	6	5	0
West South Central.	220	10.1	38	12	148	16	6	0
Mountain.....	313	14.4	70	10	219	9	5	0
Pacific.....	253	11.6	34	3	184	27	5	0
Total United States.	2,174	100.0	267	63	1,630	178	36	0

Source: Interstate Commerce Commission, "Some Aspects of Postwar Air and Surface Transportation," Jan., 1945, p. 63.

TABLE 10-4. AIRPORTS, BY CLASSIFICATION, 1939-1945

Date	Classification					Total
	1	2	3	4	5	
Jan. 1, 1939.....	1,693	424	57	...	...	2,174
Apr. 1, 1944.....	981	810	443	403	305	2,942 <sup>a</sup>
July 1, 1944.....	1,023	834	464	765		3,086 <sup>b</sup>
Jan. 1, 1945.....	1,215	936	464	812		3,427 <sup>c</sup>

<sup>a</sup> Does not include 313 airports not usable.

<sup>b</sup> Includes 256 airports that exist but do not come up to Class 1 standards.

<sup>c</sup> Includes 330 airports that exist but do not come up to Class 1 standards.

Sources: "National Airport Plan," House Document 807, Nov. 28, 1944, pp. 19, 27.

Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 17.  
(Brought up to date by Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 10-5. ESTIMATED INVESTMENT IN PUBLIC AND PRIVATE CIVIL AIRPORTS,  
1926-1945  
(Millions of dollars)

Jan. 1	All airports	Publicly owned airports used by scheduled carriers
1926	\$ 42	\$ 16
1927	51	24
1928	60	27
1929	68	34
1930	99	41
1931	115	52
1932	135	53
1933	141	54
1934	157	65
1935	163	78
1936	168	98
1937	232	142 <sup>a</sup>
1938	271	164 <sup>a</sup>
1939	326	212 <sup>a</sup>
1940	N.A.	N.A.
1941	419	N.A.
1942	N.A.	N.A.
1943	N.A.	N.A.
1944	N.A.	N.A.
1945	1,027	N.A.

N.A. Not available.

<sup>a</sup> Corrected by Civil Aeronautics Administration, Airports Services from data published in House Document 245, 76th Congress, p. 40, Table 10 and p. 41, Table 11.

Source: American Petroleum Institute, "Aviation—A Survey of Developments and Trends," December, 1943, p. 64, revised by material from the files of Civil Aeronautics Administration, Airports Service, Feb. 22, 1945.



TABLE 10-6. CLASSES OF AIRPORTS, BY STATES, JAN. 1, 1945

State	Class					Total
	Sub-1 <sup>a</sup>	1	2	3	4 and over	
Ala.....	2	9	17	16	19	63
Ariz.....	3	12	28	12	25	80
Ark.....	6	11	10	7	16	50
Calif.....	25	63	62	31	96	277
Colo.....	2	14	20	4	10	50
Conn.....	4	8	...	4	5	21
Del.....	...	5	1	1	3	10
D. C.....	...	...	...	1	2	3
Fla.....	1	28	35	55	72	191
Ga.....	8	7	16	14	33	78
Idaho.....	13	14	13	5	7	52
Ill.....	11	31	44	11	8	105
Ind.....	6	17	36	7	13	79
Iowa.....	7	15	20	4	5	51
Kans.....	5	44	15	14	22	100
Ky.....	2	5	7	3	6	23
La.....	5	13	17	3	17	55
Maine.....	7	3	6	10	9	35
Md.....	...	9	6	4	8	27
Mass.....	15	15	10	8	9	57
Mich.....	11	59	45	15	15	145
Minn.....	3	20	16	3	5	47
Miss.....	4	7	14	12	16	53
Mo.....	3	18	26	11	12	70
Mont.....	10	24	30	8	12	84
Neb.....	4	19	14	2	18	57
Nev.....	2	8	8	6	18	42
N. H.....	1	5	2	4	3	15
N. J.....	7	13	13	4	7	44
N. M.....	5	17	20	5	24	71
N. Y.....	24	49	27	20	18	138
N. C.....	14	15	10	15	20	74
N. D.....	...	12	15	3	5	35
Ohio.....	12	32	44	12	8	108
Okla.....	13	38	30	10	23	114
Ore.....	2	10	8	13	16	49
Pa.....	31	58	28	10	9	136
R. I.....	2	...	...	2	2	6
S. C.....	3	10	10	4	22	49
S. D.....	2	6	9	2	8	27
Tenn.....	2	3	15	4	11	35
Tex.....	26	62	99	46	88	321
Utah.....	1	7	9	5	10	32
Vt.....	1	6	1	4	...	12
Va.....	6	25	13	7	15	66
Wash.....	9	9	14	8	32	72
W. Va.....	5	7	11	3	1	27
Wis.....	5	14	28	6	2	55
Wyo.....	...	9	14	6	7	36
Total.....	330	885	936	464	812	3,427

<sup>a</sup> Indicates airports that exist but do not come up to Class 1 standards.

Source: Obtained from the files of the Civil Aeronautics Administration, Information and Statistics Service, Feb. 22, 1945.

TABLE 10-7. AIRPORTS AND LANDING FIELDS, 1927-1944

Year	Commercial	Municipal	All other	Total	Lighted
1927	263	240	533	1,036	...
1928	365	368	631	1,364	...
1929	495	453	602	1,550	...
1930	564	550	668	1,782	640
1931	829	780	484	2,093	680
1932	869	777	471	2,117	701
1933	938	827	423	2,188	626
1934	872	980	445	2,297	664
1935	822	1,041	505	2,368	698
1936	774	1,037	531	2,342	705
1937	727	1,053	519	2,299	720
1938	760	1,092	522	2,374	719
1939	801	963	516	2,280	735
1940	860	1,031	440	2,331	776
1941	930	1,086	468	2,484	662
1942	1,069	1,129	611	2,809	700
1943	801	914	1,054	2,769	859
1944	1,027	1,067	1,333	3,427	964

Source: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 16. (Brought up to date by Civil Aeronautics Administration, Information and Statistics Service. Column 3 computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 10-8. CAPITAL EXPENDITURES ON CIVIL AIRPORTS, AS OF JAN. 1, 1945

Source of funds	Expenditures, thousands	Per cent
Federal.....	\$ 740.7	72.1
State and municipal.....	203.1	19.8
Private and commercial.....	83.3	8.1
Total.....	\$1,027.1	100.0

Source: Civil Aeronautics Administration, Airports Service, obtained from the files of the CAA, Information and Statistics Service, Feb. 22, 1945.

TABLE 10-9. ESTIMATED MILITARY AND NAVAL AIRPORT CONSTRUCTION, 1940-1944

	Army	Navy	Total
Number:			
Owned.....	315	276	591
Occupied.....	301	94	395
Total.....	616	370	986
Cost (millions):			
Airports.....	\$1,036.9	\$ 76.0	\$1,112.9
Buildings and utilities.....	1,973.7	152.0	2,125.7
Total.....	\$3,010.6	\$228.0	\$3,238.6

Source: John B. Bayard, Jr., Civil Aeronautics Administration at Hearings before Senate Commerce Aviation Subcommittee, Mar. 13, 1945. Quoted in *American Aviation Daily*, Mar. 14, 1945, p. 70.

TABLE 10-10. TYPES OF AIRPORTS AND LANDING FIELDS, BY STATES,<sup>a</sup> JAN. 1, 1945

State	Municipal	Commercial	Miscellaneous government	Private	Intermediate	Total	Lighted
Ala.....	13	8	..	..	3	24	18
Ariz.....	23	17	4	2	10	56	29
Ark.....	13	19	..	2	3	37	10
Calif.....	66	60	3	6	12	147	86
Colo.....	25	12	..	1	3	41	12
Conn.....	6	10	..	1	1	18	6
Del.....	2	4	..	..	..	6	2
D. C.....	.....	.....	1	..	..	1	3
Fla.....	32	17	1	1	4	55	54
Ga.....	14	11	..	1	9	35	37
Idaho.....	31	6	6	1	5	49	14
Ill.....	16	58	..	5	6	85	22
Ind.....	16	29	..	1	5	51	20
Iowa.....	19	24	..	1	4	48	14
Kans.....	35	20	..	2	5	62	19
Ky.....	8	8	..	..	3	19	10
La.....	13	17	..	1	4	35	21
Maine.....	16	9	..	..	..	25	18
Md.....	2	15	..	..	..	17	5
Mass.....	10	32	..	1	1	44	12
Mich.....	90	33	2	4	2	131	21
Minn.....	26	15	..	2	2	45	8
Miss.....	19	9	..	..	6	34	17
Mo.....	15	26	..	1	9	51	18
Mont.....	47	4	12	2	14	79	25
Neb.....	24	10	..	5	5	44	15
Nev.....	13	10	1	..	9	33	17
N. H.....	10	4	..	..	..	14	5
N. J.....	5	28	..	1	..	34	11
N. M.....	23	11	2	8	10	54	23
N. Y.....	42	75	..	3	2	122	34
N. C.....	16	28	..	..	1	45	14
N. D.....	24	3	..	..	8	35	11
Ohio.....	30	61	..	3	8	102	27
Okla.....	31	34	..	2	4	71	22
Ore.....	17	11	..	..	4	32	24
Pa.....	35	88	..	2	3	128	28
R. I.....	.....	2	..	..	..	2	2
S. C.....	14	8	..	1	2	25	15
S. D.....	14	7	..	..	1	22	7
Tenn.....	12	9	..	..	7	28	18
Tex.....	77	95	..	9	25	206	94
Utah.....	18	2	..	1	7	28	18
Vt.....	9	3	..	..	..	12	3
Va.....	15	26	..	1	5	47	19
Wash.....	29	8	2	1	3	43	27
W. Va.....	9	15	..	..	2	26	4
Wis.....	24	25	1	1	3	54	10
Wyo.....	19	1	4	2	9	35	15
Total.....	1,067	1,027	39	75	229	2,437	964
Army and Navy.....						990	
Total.....						3,427	

<sup>a</sup> Included in the total of 990 Army and Navy airports are some civil airports taken over by the Services and which will be returned after the war.

Source: Obtained from the files of the Civil Aeronautics Administration, Information and Statistics Service, Feb. 22, 1945.

TABLE 10-11. ESTIMATED PRODUCTION OF AVIATION GASOLINE  
(Millions of barrels of 42 gal)

1940	5
1941	15
1942	30
1943	65
1944	140

<sup>a</sup> No figures available before October, 1939.

Source: Office of War Mobilization and Reconversion, "First Report," Jan. 1, 1945, p. 10 (based on chart).

TABLE 10-12. UNITED STATES MOTOR-FUEL CONSUMPTION BY AIRCRAFT, 1932-1944  
(Millions of gallons)

Year	Domestic and foreign air lines	Personal flying	Government aircraft	Total consumption
1932	23.7	10.3	20.1	54.1
1933	26.3	8.9	21.8	57.0
1934	25.1	9.6	23.7	58.4
1935	33.3	11.1	29.3	73.7
1936	37.2	10.4	31.8	79.4
1937	41.4	10.6	36.2	88.2
1938	45.3	10.2	44.9	100.4
1939	55.9	16.4	N.A.	N.A.
1940	74.5	22.4	N.A.	225.5 <sup>a</sup>
1941	93.0	N.A.	N.A.	N.A.
1942	85.7	N.A.	N.A.	N.A.
1943	63.9 <sup>b</sup>	N.A.	N.A.	N.A.
1944	88.1 <sup>b,c</sup>	N.A.	N.A.	N.A.

N.A. Not available.

<sup>a</sup> Indicated consumption.

<sup>b</sup> Domestic only.

<sup>c</sup> Preliminary.

Sources: American Petroleum Institute, "Petroleum Facts and Figures, 1941," p. 32.

Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, pp. 29, 61. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, letter of May 4, 1945.)

Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, *Civil Aeronautics Journal*, Jan. 15, 1944, p. 11.

TABLE 10-13. CONSUMPTION OF AVIATION GASOLINE BY ARMY, NAVY, AND COAST GUARD, 1935-1940  
(Thousands of barrels of 42 gal)

Fiscal year	Army	Navy	Coast Guard
1935	371	225	N.A.
1936	426	264	N.A.
1937	484	347	39
1938	576	426	40
1939	N.A.	468	11
1940	N.A.	N.A.	20

N.A. Not available.

Source: American Petroleum Institute, "Petroleum Facts and Figures, 1941," p. 31.

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TABLE 10-14. SALES OF AVIATION GASOLINE IN THE UNITED STATES, 1939-1941  
(Thousands of gallons)

	1939	1940	1941
Alabama.....	1,597	3,248	9,529
Arizona.....	1,228	1,594	6,508
Arkansas.....	374	549	1,013
California.....	22,223	34,020	97,542
Colorado.....	787	1,279	2,375
Connecticut.....	3,835	7,282	13,119
Delaware.....	91	117	178
District of Columbia.....	1,749	1,734	2,291
Florida.....	8,160	13,420	35,568
Georgia.....	2,000	3,740	11,954
Idaho.....	390	542	1,574
Illinois.....	7,104	9,941	10,788
Indiana.....	1,058	2,957	12,227
Iowa.....	476	609	958
Kansas.....	872	1,389	2,076
Kentucky.....	636	801	1,602
Louisiana.....	2,670	3,385	6,203
Maine.....	208	309	939
Maryland.....	969	913	1,925
Massachusetts.....	1,476	2,116	3,579
Michigan.....	3,259	4,402	8,958
Minnesota.....	1,084	1,618	2,015
Mississippi.....	597	1,096	3,131
Missouri.....	3,252	5,155	6,684
Montana.....	1,147	1,406	1,638
Nebraska.....	1,145	1,846	2,049
Nevada.....	846	1,159	1,765
New Hampshire.....	102	109	401
New Jersey.....	10,715	9,494	19,396
New Mexico.....	1,090	1,510	3,007
New York.....	5,710	15,934	20,126
North Carolina.....	925	1,171	3,852
North Dakota.....	472	565	622
Ohio.....	7,454	12,575	14,101
Oklahoma.....	602	1,030	7,280
Oregon.....	1,388	1,868	4,570
Pennsylvania.....	3,687	7,781	8,027
Rhode Island.....	240	518	1,548
South Carolina.....	657	1,252	2,880
South Dakota.....	318	424	517
Tennessee.....	1,727	2,615	4,220
Texas.....	15,679	22,430	78,788
Utah.....	1,565	2,524	2,969
Vermont.....	224	155	161
Virginia.....	7,443	11,067	16,731
Washington.....	3,325	5,152	10,458
West Virginia.....	116	173	359
Wisconsin.....	178	411	674
Wyoming.....	1,142	1,205	1,625
Total.....	133,992	206,590	450,230

Source: Division of Research, Petroleum Administration for War, quoted from American Petroleum Institute, "Aviation—Survey of Developments and Trends," December, 1943, Table 38.

TABLE 10-15. FEDERAL AIRWAYS, 1926-1944

Cal- endar year	Lighted mileage	Airway light beacons	Radio-range stations	Weather- reporting stations	Airway traffic- control centers
1926	2,041	612	...	...	..
1927	4,468	760	...	...	..
1928	6,988	1,188	...	...	..
1929	12,448	1,311	9	58	..
1930	15,258	1,652	33	143	..
1931	17,512	1,836	47	234	..
1932	19,500	1,988	68	234	..
1933	18,655	1,796	94	205	..
1934	19,081	1,520	112	206	..
1935	22,012	1,868	137	203	..
1936	22,245	1,918	146	213	5
1937	22,319	1,969	180	271	8
1938	23,723	1,967	215	314	9
1939	27,074	2,089	244	298	12
1940	30,480	2,261	281	376	14
1941	32,679	2,274	312	453	15
1942	33,407	2,221	280	442	23
1943	33,403	2,178	291	365	23
1944	34,424	2,160	297	535	24

Source: Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, pp. 6, 7. (Brought up to date by Civil Aeronautics Administration, Information and Statistics Service.)

## CHAPTER 11

### TRAINING

On Jan. 1, 1938, there were 31 flying schools granted approved certificates by the Department of Commerce. During that year, 15,556 student pilot certificates were issued but the number of certificated airplane pilots increased only by about 5,000 between 1937 and 1938. At that time (1938), the Army Air Forces trained about 500 flying officers a year at Kelly and Randolph Fields. Something drastic had to be done to provide the pilots needed for defense.

On Jan. 12, 1939, the President asked Congress for an appropriation that provided for primary flight training for 20,000 men. A month later the Civil Aeronautics Authority awarded test contracts to 13 educational institutions for the training of 330 students. The results of the tests were satisfactory. In August, 1939, Congress passed the Civilian Pilot Training Act. The CAA Pilot Training Service trained 400,000 trainees in the fiscal years 1940-1944 through contracts with colleges and accredited commercial flying schools.

The training program of the CAA constituted a valuable pool from which personnel could be drawn for the armed services. While until 1942, training had been mostly extracurricular, it later became necessary for students to concentrate wholly on becoming pilots. Students were put on active duty, and Congress provided pay for them. In 1942, the name of the program was changed to War Training Service. In 1944, the War Training Service of CAA was terminated.

The Army Air Forces Training Command is charged with the responsibility of training all AAF personnel, including pilots, bombardiers, navigators, gunners, and scores of other categories of technicians. It conducted several hundred training schools during the period of peak training needs.

The corresponding activities in the Navy are under the Aviation Training Division of the Deputy Chief of Naval Operations (Air).

Increased attention is being given to Aviation Education in schools and colleges. The Aviation Education Service of CAA provides books, sponsors teachers courses, etc. Several thousand high schools offer courses in aviation.

A program is now under way to distribute surplus planes to schools for educational use.

TABLE 11-1. ESTIMATED NUMBER OF PILOTS AT END OF WAR<sup>a</sup>  
 Army and Navy..... 350,000  
 Civilian<sup>b</sup>..... 150,000

<sup>a</sup> This estimate may be somewhat optimistic if training data, casualties, and duplication between armed services and civilians are taken in account.

<sup>b</sup> Including students.

Source: National Airport Plan, 78th Congress, 2d Session, House Document 807, Nov. 28, 1944, p. 3

TABLE 11-2. CIVIL STUDENT PILOTS AND CERTIFICATED AIRPLANE PILOTS, 1927-1944

Year	Student pilot certificates issued during the year	Certificated airplane pilots
1927	545	1,572
1928	9,717	4,887
1929	20,400	10,287
1930	18,398	15,280
1931	16,061	17,739
1932	11,325	18,594
1933	12,752	13,960
1934	11,994	13,949
1935	14,572	14,805
1936	17,675	15,952
1937	21,770	17,681
1938	15,556	22,983
1939	29,839	31,264
1940	110,938	63,113
1941	93,366	100,787
1942 <sup>a</sup>	93,777	110,510
1943 <sup>a</sup>	36,802	122,884
1944 <sup>a</sup>	51,618	132,432

<sup>a</sup> The count of certificated pilots for 1942 and 1943 is not directly comparable with the previous years as the Civil Aeronautics Regulations were amended to permit pilot certificates currently effective on Apr. 1, 1942, to continue in effect indefinitely.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 75. (Brought up to date by data from the files of Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 11-3. COLLEGES GIVING COURSES IN AVIATION AND RELATED FIELDS, 1943-1945

Colleges asked.....	1,500
Replies received.....	1,243
Colleges offering academic work in aviation.....	399
Colleges not offering aviation courses.....	844

Source: American Council on Education, "A Survey of Collegiate Courses in Aviation and Related Fields," Oct. 15, 1944.



TABLE 11-4. CIVIL FLYING SCHOOLS HOLDING CERTIFICATES OF APPROVAL, 1940, 1941, 1943, 1945

Total Sept. 5, 1940 <sup>a</sup> .....	106
Total July 3, 1941.....	1,231 <sup>a</sup>
Total Oct. 30, 1943.....	645 <sup>a</sup>
Total Jan. 1, 1945.....	470

Source: Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, unpublished data.

<sup>a</sup> Includes schools approved for civilian pilot training. The number of these schools was reduced and the sizes increased at the request of the Army.

TABLE 11-5.—CIVIL AERONAUTICS AUTHORITY CERTIFIED CIVIL FLYING SCHOOLS, JAN. 1, 1945, BY STATES

State	Approved Flying Schools	State	Approved Flying Schools
Alabama.....	7	Nebraska.....	9
Arizona.....	10	Nevada.....	2
Arkansas.....	10	New Hampshire.....	7
California.....	16	New Jersey.....	1
Colorado.....	11	New Mexico.....	4
Connecticut.....	3	New York.....	33
Florida.....	13	North Carolina.....	7
Georgia.....	12	North Dakota.....	5
Idaho.....	3	Ohio.....	32
Illinois.....	31	Oklahoma.....	11
Indiana.....	9	Oregon.....	2
Iowa.....	18	Pennsylvania.....	25
Kansas.....	15	South Carolina.....	7
Kentucky.....	4	South Dakota.....	3
Louisiana.....	4	Tennessee.....	11
Maine.....	3	Texas.....	29
Maryland.....	1	Utah.....	7
Massachusetts.....	5	Vermont.....	3
Michigan.....	21	Virginia.....	8
Minnesota.....	9	Washington.....	7
Mississippi.....	10	West Virginia.....	7
Missouri.....	16	Wisconsin.....	14
Montana.....	3	Wyoming.....	2

Source: Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, unpublished data.

TABLE 11-6. MILITARY TRAINING PLANES PRODUCED, 1940-1944

Year	Total production	Accepted by Navy
1940	1,808 <sup>a</sup>	N.A.
1941	9,355	1,898
1942	17,632	3,718
1943	19,942	5,627
1944	7,578	1,782

<sup>a</sup> Six months.

Sources: Aircraft Resources Control Office, *Report 15*. Navy Department, Press Release Dec. 29, 1944.

TABLE 11-7. TRAINING OF TECHNICIANS, ARMY AIR FORCES, 1939-1944

	1939	1940	1941	1942	1943	1944
Graduates of:						
Officers courses.....			1,441	30,133	39,450	30,800
Factory courses.....				41,229	74,549	55,823
Advanced courses....	270	943	2,815	11,343	49,717	56,118
Basic:						
Airplane mechanics...	419	7,402	21,688	99,560	164,991	49,155
Radio operator mechanics.....	292	2,048	5,770	35,012	75,198	46,476
Armorsers.....	177	1,299	3,509	19,798	53,653	26,916
Clerks.....	45	916	1,860	9,172	38,422	1,854
Miscellaneous.....	406	1,906	5,002	31,712	83,796	26,771
Total basic.....	1,339	13,571	37,829	195,254	416,060	151,172
Grand total <sup>a</sup> .....	1,609	14,514	42,085	277,959	579,776	293,913

<sup>a</sup> Some duplication exists between those shown in Table 11-8 under heading Aerial Gunners and those shown in one or more of the graduates of the above technical courses due to completion of both courses.

Source: Army Air Forces, Headquarters Army Air Forces Training Command, Public Relations Office, Press Release, Apr. 9, 1945, pp. 8, 9.

TABLE 11-8. TRAINING OF AIR CREW MEMBERS, ARMY AIR FORCES, 1939-1944

Year	Pilots	Navigators	Bombardiers	Aerial gunners <sup>a</sup>	Miscellaneous <sup>b</sup>
1939	696	.....	.....	.....	.....
1940	1,786	44	18	.....	.....
1941	7,244	601	310	.....	198
1942	28,782	4,477	5,760	25,820	2,325
1943	63,399	15,972	16,101	92,059	21,170
1944	82,487	22,180	19,214	146,724	54,832

<sup>a</sup> Some individuals represented in these figures have taken one or more technical courses, or the bombardier course.

<sup>b</sup> A large proportion of these courses are "pilot transition" training in tactical type aircraft, taken by graduates of the pilot courses. Also includes graduates of schools for observation and for glider, women, and liaison pilots. There is some duplication in Pilots and Miscellaneous.

Source: Army Air Forces, Headquarters Army Air Forces Training Command, Public Relations Office, Press Release, Apr. 9, 1945, p. 8.

TABLE 11-9. CIVIL AERONAUTICS ADMINISTRATION PILOT TRAINING SERVICE, 1940-1944

	1940	1941	1942	1943	1944	Total
Hours flown.....	371,000	2,168,725	1,857,860	3,648,950	3,818,434	11,864,969
Number of trainees.....	10,281	57,972	40,096	111,140	178,323	397,812
Courses, total.....	10,281	65,991	49,490	142,193 <sup>a</sup>	235,111 <sup>b</sup>	503,066
Elementary....	10,197	47,276	26,845	46,626	29,232	160,176
Secondary.....	84	8,019	9,394	15,765	2,337	35,599
Cross country..	.....	.....	7,288	6,501	3,079	16,868
Link instrument.....	.....	.....	.....	2,335	3,108	5,443
Instructor.....	.....	7,131	5,963	5,447	2,582	21,123
Flight officer... ..	.....	.....	.....	1,815	104	1,919
Army Air crew indoctrination.....	.....	.....	.....	49,491	168,631	218,122
Navy intermediate.....	.....	.....	.....	5,703	26,038	31,741
All others.....	.....	3,565	.....	8,510	.....	12,075

<sup>a</sup> Includes 93,825 Army, 47,917 Navy, and 451 Marine courses.

<sup>b</sup> Includes 179,645 Army and 55,466 Navy courses.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 9.

TABLE 11-10. INTER-AMERICAN AVIATION TRAINING PROGRAM OF CIVIL AERONAUTICS ADMINISTRATION, JANUARY, 1942-DECEMBER, 1944

Pilots trained.....	234
Mechanics.....	306
Engineers.....	11
Airway technicians.....	45
Total.....	596

Source: Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service, Press Release, Dec. 31, 1944.

## CHAPTER 12

### ACCIDENTS

The Safety Regulation Service of the Civil Aeronautics Administration determines the airworthiness of civil aircraft and competency of airmen.

Civil aircraft accident data are based on reports and investigations by the Civil Aeronautics Board.

In the Army Air Forces the Office of Flying Safety endeavors to hold down the accident rate.

Safety in flying is measured on several different bases—accidents, fatal accidents, and fatalities in relation to hours or miles flown.

Flying accidents are limited almost entirely to passengers and pilots, whereas motor vehicles and railroads cause numerous fatalities to non-travelers. While trains and busses are therefore still safer for passengers than scheduled airliners, airliners cause fewer fatalities per passenger-mile than railroads and passenger automobiles and taxis.

#### Insurance.

*Airplane Insurance.* The personal flier has the following means of insurance protection:

1. Insurance against damage to his own plane (hull insurance).
2. Insurance against damage to property of others.
3. Passenger liability insurance.
4. Public liability insurance.

High insurance rates (largely due to high accident rates) contribute much to the high operating cost of personal planes.

*Life Insurance.* Life insurance generally is now issued without restrictions on scheduled airline travel.

Personal flying is excluded from the normal policy in many companies. Some companies limit their liability to the reserve on the policy; some refuse to accept personal fliers; some others accept them with extra premium and limited amounts.

TABLE 12-1. AIR FORCES TRAINING ACCIDENTS: AIRCRAFT HOURS PER FATALITY

First World War.....	1,146
1939.....	16,000
1943 (hours of primary flight per fatal accident).....	63,230

Source: Aeronautical Training Society, Press Release, Febr. 15, 1945.

TABLE 12-2. AIR FORCES FATAL ACCIDENTS PER 1,000 FLYING HOURS, 1921-1945

Fiscal Year	Rate
1921	.582
1922	.368
1923	.502
1924	.235
1925	.200
1926	.170
1927	.199
1928	.137
1929	.163
1930	.114
1931	.053
1932	.086
1933	.065
1934	.094
1935	.073
1936	.081
1937	.052
1938	.063
1939	.044
1940	.047
1941 <sup>a</sup>	.052
1942 <sup>a</sup>	.077
1943 <sup>a</sup>	.082
1944 <sup>a</sup>	.06 <sup>c</sup>
1945 <sup>a,b</sup>	.05 <sup>c</sup>

<sup>a</sup> 1941 and after, continental USAAF only.

<sup>b</sup> First 9 months.

<sup>c</sup> Based on 100,000 flying hours.

Source: Army Air Forces, Office of Flying Safety, Research and Statistics Division quoted in Office of War Information, Press Release NB-1967, Jan. 16, 1944, p. 14. (Brought up to date by Army Air Forces, Office of Flying Safety, Research and Statistics Division.)

TABLE 12-3. NAVY: AIRCRAFT HOURS PER FATALITY, 1922-1938

1922	2,843
1923	2,191
1924	3,681
1925	1,993
1926	4,380
1927	3,977
1928	3,922
1929	6,773
1930	14,710
1931	10,091
1932	11,261
1933	9,923
1934	11,201
1935	11,806
1936	12,897
1937	13,513
1938	7,217

Source: Hearings on Regular Navy Appropriations Bill for 1940, HR 6144, 76th Congress, p. 610.

TABLE 12-4. DOMESTIC AIRLINE ACCIDENTS, 1927-1944

Year	Fatal accidents	Fatalities	Plane-miles flown per fatal accident	Fatalities per million plane-miles flown
1927	4	5	1,444,966	.87
1928	11	23	945,476	2.21
1929	21	36	1,065,715	1.61
1930	9	33	3,554,737	1.03
1931	13	38	3,288,878	.89
1932	16	36	2,850,397	.79
1933	9	28 <sup>a</sup>	5,419,061	.57
1934	8	29	5,119,424	.71
1935	8	29	6,922,544	.52
1936	8	61	7,972,153	.96
1937	5	52	13,214,301	.79
1938	5	35	13,933,765	.50
1939	2	12	41,285,762	.15
1940	3	45	36,266,812	.41
1941	4	44	33,255,679	.33
1942	5	71	22,020,572	.64
1943	2	30 <sup>b</sup>	51,800,722	.29
1944	5 <sup>c</sup>	58	28,446,967	.41

<sup>a</sup> Includes 11 ground-crew and third-party fatalities.

<sup>b</sup> Includes 1 "deadhead" pilot not carried elsewhere.

<sup>c</sup> Includes 2 nonpassenger single-engine flights that carried mail and cargo only.

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 49. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service.)

TABLE 12-5. TYPES OF CIVIL FLYING ACCIDENTS, 1939-1943  
(Per cent)

Type	Domestic airlines	Personal flying
Landing.....	47	44
Take off.....	22	24
Collision.....	12	5
Forced landing.....	6	17
Spin or stall.....	1	5
Other.....	12	5
Total.....	100	100

Source: National Safety Council, "Accident Facts," 1944 ed., p. 43.

TABLE 12-6. PERSONAL FLYING ACCIDENTS, 1926-1944

Year	Fatal accidents	Fatalities	Plane-miles flown per fatal accident	Fatalities per million plane-miles flown
1926	...	...	.....	...
1927	95	146	315,789	4.8
1928	215	362	279,070	6.0
1929	287	457	383,275	4.1
1930	301	507	359,700	4.6
1931	253	400	372,898	4.2
1932	208	321	375,859	4.1
1933	182	310	391,334	4.3
1934	186	325	406,463	4.2
1935	164	262	516,803	3.0
1936	159	272	586,921	2.9
1937	185	283	557,818	2.7
1938	172	275	752,088	2.1
1939	194	314	916,846	1.7
1940	208	330	1,269,231	1.2
1941	217	325	1,595,868	.9
1942	141	218	2,082,217	.7
1943	165	255	.....	...
1944	...	169	.....	...

Sources: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 62.

Column 4 computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 12-7. CAUSE OF CIVIL FLYING ACCIDENTS, 1939-1943  
(Per cent)

Cause	Domestic airlines	Personal flying
Pilot error.....	38	68
Other personal error.....	8	1
Structural failures, etc.....	13	6
Power plant.....	6	14
Weather.....	10	4
Airport, terrain, water.....	13	5
Miscellaneous.....	12	2
Total.....	100	100

Source: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, pp. 50 and 71.

TABLE 12-8. PERSONAL PLANES DESTROYED AND DAMAGED BY ACCIDENTS, AVERAGE 1930-1938

Per cent of registered planes destroyed per year.....	4.8
Per cent requiring major overhaul due to accidents.....	4.4
Per cent requiring major assembly due to accidents.....	9.5
Average life (including destruction), years.....	7.4

Source: J. H. Geisse, "Suggestions for Furthering Private Flying," *Aeronautical Engineering Review*, August, 1944, p. 49.

TABLE 12-9. TRANSPORTATION ACCIDENT DEATH RATES, 1943  
(Per 100,000,000 passenger-miles)

	Passenger deaths	All deaths <sup>a</sup>
Scheduled air transport <sup>b</sup> .....	1.4	1.8
Railroad passenger trains.....	.31	2.6
Busses.....	.22	1.7
Passenger automobiles and taxis <sup>b</sup> .....	2.7	4.4

<sup>a</sup> Includes pedestrians, employes (except pilots and drivers), trespassers, etc.

<sup>b</sup> Drivers and pilots considered as passengers.

Source: National Safety Council, "Accident Facts," 1944 ed., p. 87.

TABLE 12-10. EXPERIENCE ON PERSONAL PLANE INSURANCE, 1938-1942

Type of insurance	Net premiums, thousands	Losses, thousands	1938-1942 loss ratio, per cent
Hull.....	\$1,942	\$1,067	54.9
Passenger liability.....	201	20	10.0
Public liability.....	252	11	4.3
Property damage.....	199	15	7.7
Total.....	\$2,594	\$1,113	43.0

Source: John H. Geisse and Samuel C. Williams, "Postwar outlook for Private Flying," Sept. 30, 1943, p. 124.

TABLE 12-11. INSURANCE RATES  
(Personal plane, 65-75 hp, \$2,000 cost)

Hull.....	\$310
Passenger liability.....	68
Public liability.....	35
Property damage.....	45
	<u>\$458</u>

Source: John H. Geisse, "Suggestions for Furthering Private Flying," *Aeronautical Engineering Review*, August, 1944, p. 51.



## CHAPTER 13

### AVIATION AND OTHER MEANS OF TRANSPORTATION

New facilities for travel create travel. Railroads and automobiles added greatly to the total per capita mileage traveled per year. The airlines and private flying will create substantially more travel—both domestic and overseas—than has existed hitherto.

Public action has been an important force in transportation. Land grants helped build our railroads. Public aid has produced our highways, revived our waterways, improved harbors, and created airports and airways. In a normal year, the government invests about a billion dollars in transportation—an investment that pays interest not only through economic advancement of the country, but through transportation and gasoline taxes, special rates for the government on railroads, airmail revenue, etc.

The history of American transportation may be summarized as follows.

In the early years of colonial development, transportation depended largely upon the ocean and inland waterways.

It was only after the Revolution that stage lines began operations. Turnpikes were originally constructed by private capital, but later on state and local governments provided subsidies. By 1806 the Federal government entered the field with the Cumberland Road project.

The first important canal, the Erie Canal, was completed in 1825 from Troy, N.Y., to Buffalo on Lake Erie.

Railroads, first dependent on horsepower, then on steampower, followed only a few years later. The period of 1830–1850 was one of experimentation in American railroading. After 1850, through rail routes began to develop. By 1869, the first transcontinental line was completed. Railroads caused the decline of turnpikes and canals, though inland waterways have kept some of their traffic.

The automobile appeared in the early 1900's. By 1916 it provided serious competition to the street railways. After the First World War, private automobile ownership increased rapidly. The multiplication of motor vehicles necessitated the rapid extension of good roads. In a single year, nearly 10 billion dollars were spent on private passenger transport, five times as much as had ever been spent annually on all other types of passenger transport in one year. The growth of the automobile created a vast amount of new travel. It made inroads on

steam railroad passenger service, caused the decline of the interurban electric railway, and seriously affected urban transport.

Truck and bus operations were well under way by 1926. Busses offered more frequent schedules at lower rates than the railroads.

Aviation owes its commercial success to developments following the stimulus of the First World War. In 1918, the Post Office opened an airmail route between Washington and New York. Two years later air service reached from coast to coast. The world's first regular night service was inaugurated between Chicago and Cheyenne, Wyo., on July 1, 1924. When, after 1926, encouragement was given to private operators, scheduled air transportation began to expand considerably.

The principal spheres of operation of commercial intercity transportation may be outlined as follows:

*Railways:* Carriage of goods. Medium-distance passenger traffic.

*Waterways:* Bulk movements, especially on Great Lakes and in coastal trade.

*Motortrucks:* Short-haul business, terminal services, long-haul where faster than railroads; less-than-carload business.

*Busses:* Short-distance traffic, cross-country traffic between major channels of movement, low-cost traffic for medium distance.

*Pipelines:* For petroleum and products.

*Airways:* Fast medium- and long-distance passenger traffic. Feeder service on shorter distances. Air freight for perishables or high value products. First class mail where faster than railroads, some second class mail.

TABLE 13-1. ESTIMATED TOTAL INTERCITY PASSENGER-MILES TRAVELED, 1916-1944<sup>a</sup>

Year	Passenger-miles billions	Population, millions	Passenger-miles per capita
1916	42.9	102.0	421
1929 <sup>b</sup>	232.2	121.8	1,919
1939	271.7	130.0	2,076
1941	311.7	133.1	2,342
1944	235.9	137.0	1,722

<sup>a</sup> Railways, inland waterways, highways, airways.

<sup>b</sup> Excludes inland waterways.

Sources: National Resources Planning Board, Transportation and National Policy, May, 1942, p. 33.

Pullman Inc., *Annual Report*, 1943, p. 24.

Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1943, p. 3.

Interstate Commerce Commission, *57th Annual Report*, Nov. 1, 1943, p. 15.

Office of Defense Transportation, Highway Transport Department, Inventory and Statistics Section, letter of May 28, 1945.

"Investigation of the National Defense Program," 78th Congress, 2d Session, *Senate Report* 10, Part 16, Mar. 4, 1944, p. 411.

TABLE 13-2. AUTOMOBILE PRODUCTION AND REGISTRATION, 1900-1944  
 (Thousands of vehicles)

Year	Passenger cars		Motor trucks		Total motor vehicles	
	Production	Registration	Production	Registration	Production	Registration
1900	4.2	8.0	.....	.....	4.2	8.0
1901	7.0	14.8	.....	.....	7.0	14.8
1902	9.0	23.0	.....	.....	9.0	23.0
1903	11.2	32.9	.....	.....	11.2	32.9
1904	22.1	54.6	.7	.7	22.8	55.3
1905	24.3	77.4	.8	1.4	25.0	78.8
1906	33.2	105.9	.8	2.2	34.0	108.1
1907	43.0	140.3	1.0	2.9	44.0	143.2
1908	63.5	194.4	1.5	4.0	65.0	198.4
1909	124.0	306.0	3.3	6.1	127.3	312.0
1910	181.0	458.5	6.0	10.0	187.0	468.5
1911	199.3	619.5	10.7	20.0	210.0	639.5
1912	356.0	902.6	22.0	41.4	378.0	944.0
1913	461.5	1,194.3	23.5	63.8	485.0	1,258.1
1914	548.1	1,625.7	24.9	85.6	573.0	1,711.3
1915	895.9	2,309.7	74.0	136.0	969.9	2,445.7
1916	1,525.6	3,298.0	92.1	215.0	1,617.7	3,513.0
1917	1,745.8	4,657.3	128.2	326.0	1,873.9	4,983.3
1918	943.4	5,621.6	227.3	525.0	1,170.7	6,146.6
1919	1,651.6	6,771.1	224.7	794.4	1,876.4	7,565.4
1920	1,905.6	8,225.9	321.8	1,006.1	2,227.3	9,231.9
1921	1,468.1	9,346.2	148.1	1,117.1	1,616.1	10,463.3
1922	2,274.2	10,862.7	270.0	1,375.7	2,544.2	12,238.4
1923	3,624.7	13,479.6	409.3	1,612.6	4,034.0	15,092.2
1924	3,185.9	15,460.6	416.7	2,134.7	3,602.5	17,595.4
1925	3,735.2	17,496.4	530.7	2,440.9	4,265.8	19,937.3
1926	3,784.0	19,237.2	516.9	2,764.2	4,300.9	22,001.4
1927	2,936.5	20,219.2	464.8	2,914.0	3,401.3	23,133.2
1928	3,815.4	21,379.1	543.3	3,114.0	4,358.8	24,493.1
1929	4,587.4	23,121.6	771.0	3,379.9	5,358.4	26,501.4
1930	2,784.7	23,059.3	571.2	3,486.0	3,356.0	26,545.3
1931	1,973.1	22,366.3	416.6	3,466.6	2,389.7	25,832.9
1932	1,135.5	20,885.8	235.2	3,229.3	1,370.7	24,115.1
1933	1,573.5	20,643.6	346.5	3,230.7	1,920.1	23,874.2
1934	2,177.9	21,532.4	575.2	3,419.3	2,753.1	24,951.7
1935	3,252.2	22,562.8	694.7	3,664.4	3,946.9	26,227.3
1936	3,669.5	24,178.2	784.6	3,987.3	4,454.1	28,165.6
1937	3,915.9	25,449.9	893.1	4,255.3	4,809.0	29,705.2
1938	2,001.0	25,261.6	488.1	4,224.0	2,489.1	29,485.7
1939	2,866.8	26,201.4	710.5	4,413.7	3,577.3	30,615.1
1940	3,692.3	27,435.0	777.0	4,590.4	4,469.4	32,025.4
1941	3,744.3	29,507.1	1,094.3	4,876.1	4,838.6	34,383.2
1942	220.8	27,974.2	805.3	4,608.1	1,026.1	32,582.2
1943	.....	26,019.4	677.1	4,480.2	677.1	30,499.6
1944	.....	25,608.4 <sup>a</sup>	749.5	4,528.1 <sup>a</sup>	749.5	30,136.5 <sup>a</sup>

<sup>a</sup> Estimated.

Source: Automobile Manufacturers Association, Automobile Facts and Figures, 1944 and 1945, pp. 42, 50.

TABLE 13-3. ESTIMATED INTERCITY PASSENGER TRAFFIC

Year	Airways	Inland waterways	Highways	Railways	Total
Millions of Passenger-miles					
1916	<sup>a</sup>	864	<sup>a</sup>	42,045	42,909
1939	678	1,486	245,891	23,669	271,724
1941	1,370	1,821	277,962	30,583	311,736
1942	1,418	1,860	221,150	55,073	279,501
1943	1,632	1,927	177,810	89,865	271,234
1944	2,200	1,930	134,070	97,700	235,900
Per Cent					
1916	<sup>a</sup>	2.0	<sup>a</sup>	98.0	100.0
1939	.2	.6	90.5	8.7	100.0
1941	.4	.6	89.2	9.8	100.0
1942	.5	.7	79.1	19.7	100.0
1943	.6	.7	65.6	33.1	100.0
1944	.9	.8	56.9	41.4	100.0

<sup>a</sup> Negligible.

Sources: National Resources Planning Board, Transportation and National Policy, May, 1942, p. 33. Investigation of the National Defense Program, 78th Congress, 2d Session, *Senate Report* 10, Part 16, Mar. 4, 1944, p. 411.

Interstate Commerce Commission, *57th Annual Report*, Nov. 1, 1943, p. 15, *58th Annual Report*, Nov. 1, 1944, p. 6.

Office of Defense Transportation, Highway Transport Department, Inventory and Statistics Section, letter of May 28, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 13-4. AIR VS. PULLMAN TRAVEL, 1937-1944

Year	Million passenger-miles		Air as per cent of Pullman
	Airlines	Pullman	
1937	477	9,170	5.2
1938	558	8,270	6.7
1939	750	8,455	8.8
1940	1,147	8,214	13.9
1941	1,492	10,070	14.8
1942	1,482	19,072	7.7
1943	1,643	25,891	6.3
1944 <sup>a</sup>	2,265	28,267	8.0

<sup>a</sup> Preliminary.

Sources: Department of Commerce, Civil Aeronautics Administration, "Statistical Handbook of Civil Aviation," Oct. 15, 1944, p. 31. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service.)

Interstate Commerce Commission, Statistics of Railways in the United States, 1942, p. 210; 1943, p. 200.

Monthly Comment on Transportation Statistics, Apr. 6, 1945, p. 12.

TABLE 13-5. AMERICA'S TRANSPORTATION SYSTEM, 1940

	In Thousands of Miles
Surfaced rural roads.....	1,328
Unsurfaced rural roads.....	1,637
City and village streets.....	304
Railroads.....	233
Petroleum pipe lines.....	126
Inland waterways and Great Lakes <sup>a</sup> .....	11
Airways (domestic).....	41

<sup>a</sup> Channel 9 ft or more in depth.

Source: National Resources Planning Board, *Transportation and National Policy*, May, 1942, pp. 44, 50.

Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1943*, pp. 450, 479.

American Petroleum Institute, "Petroleum Facts and Figures," 7th ed., 1941, p. 124.

 TABLE 13-6. AVERAGE REVENUE PER PASSENGER-MILE, 1926-1944  
(Cents)

Year	Domestic air- lines	Railroads <sup>a</sup>	Pullman	Intercity busses
1926	12.0	3.35	6.16	2.96
1927	10.6	3.34	6.17	2.94
1928	11.0	3.31	6.19	2.99
1929	12.0	3.29	6.21	2.84
1930	8.3	3.25	6.21	2.78
1931	6.7	3.06	6.19	2.72
1932	6.1	2.70	6.19	2.8
1933	6.1	2.35	6.06	2.4
1934	5.9	2.17	6.29	2.32
1935	5.7	2.18	6.36	2.54
1936	5.7	2.02	6.30	2.40
1937	5.6	1.95	6.25	1.73
1938	5.7	2.07	6.35	1.71
1939	5.1	2.02	6.49	1.64
1940	5.06	1.90	6.40	1.6
1941	5.03	1.87	6.04	1.55
1942	5.27	2.00	5.45	1.67
1943	5.35	1.93	5.50	1.72
1944	5.14	1.92	5.57	1.74

<sup>a</sup> Class I railways—excluding commutation.

Sources: Department of Commerce, Civil Aeronautics Administration, "Progress of Civil Aeronautics in United States," p. 3. (Brought up to date by Department of Commerce, Civil Aeronautics Administration, Information and Statistics Service.)

Carl W. Stocks, editor of *Bus Transportation*, letter of Sept. 12, 1944.

Interstate Commerce Commission, Annual Reports on the "Statistics of Railways in the United States," 1942, pp. 83 and 210 (revised).

"Monthly Comment on Transportation Statistics," Apr. 6, 1945, p. 6.

TABLE 13-7. RATIO OF PASSENGERS TRAVELING BY AIR BETWEEN MAJOR CITIES,<sup>a</sup> 1940

Routes	Airline distance, miles	Intercity railroad passengers	Intercity airline passengers	Per cent of total passengers by air
New York-San Francisco.....	2,588	51,139	7,680	13.1
New York-Los Angeles.....	2,509	44,959	13,750	23.4
New York-Seattle.....	2,475	7,051	2,150	23.4
Kansas City-Los Angeles.....	1,392	11,616	1,325	10.2
New York-New Orleans.....	1,175	15,665	4,250	21.3
New York-St. Louis.....	888	46,705	8,520	15.4
San Francisco-Seattle.....	693	20,250	7,470	26.9
St. Louis-New Orleans.....	606	7,456	996	11.8
New York-Detroit.....	486	122,979	33,600	21.5
Los Angeles-San Francisco.....	327	263,779	43,500	14.2
New York-Washington.....	214	964,140	125,000	11.5
New York-Boston.....	184	909,221	111,200	10.9
New York-Philadelphia.....	95	2,513,351	20,680	.8

<sup>a</sup> Transient traffic not included.

Source: Edward P. Warner, "Postwar Transport Aircraft," *Aeronautical Engineering Review*, October, 1943, p. 3.

TABLE 13-8. COST AND SPEED OF PASSENGER TRANSPORTATION<sup>a</sup>  
(Scheduled trips—Los Angeles to New York,<sup>b</sup> September, 1945)

Means of transportation	Total mileage	Total fare	Speed, m.p.h.	Cost, cents per mile
<b>Airline:</b>				
Regular fare.....	2,596	\$119.10	150	4.6
Extra fare.....	2,501	134.10	170	5.4
<b>Railroad:<sup>c</sup></b>				
Regular fare.....	3,202	128.36	40	4.0
Extra fare <sup>d</sup> .....	3,188	143.36	52	4.5
Bus, regular fare.....	2,987	45.25	27	1.5

<sup>a</sup> Based on fastest schedules. Federal tax not included. Train fares include lower berth but no meals. Plane fares include meals.

<sup>b</sup> Eastbound airline schedules are somewhat faster than westbound ones.

<sup>c</sup> Time allowed in Chicago between trains: Regular fare, 15 minutes; extra fare, 50 minutes.

<sup>d</sup> Extra fare Los Angeles to Chicago only.

Source: Airline, railroad, bus timetables and passenger agents.

TABLE 13-9. ANNUAL MILEAGE PER UNIT OF TRANSPORTATION, 1942

	Average Miles
Motor trucks (intercity, class I).....	47,600
Passenger busses (intercity, class I).....	75,600
Railway freight cars (class I).....	17,600
Pullman cars (class I).....	145,000
Coaches, etc. (class I).....	70,800
Airliners (domestic).....	464,000

Source: Condensed from J. Parker Van Zandt, "Civil Aviation and Peace," p. 119.

TABLE 13-10. ESTIMATED INTERCITY FREIGHT TRAFFIC

Year	Airways	Inland waterways	Highways	Railways	Pipe lines	Total
Millions of Ton-miles						
1916	a	87,833	a	367,257	21,000	476,090
1939	11	96,249	43,000	336,100	63,107	538,467
1941	16	140,454	57,123	481,748	77,818	757,159
1942	33	148,565	50,207	645,262	74,730	918,797
1943	52	141,652	48,199	734,715	96,257	1,020,875
1944	64	145,000	48,200	746,250	133,000	1,072,514
Per Cent						
1916	a	18.5	a	77.1	4.4	100.0
1939	a	17.9	8.0	62.4	11.7	100.0
1941	a	18.6	7.5	63.6	10.3	100.0
1943	a	13.9	4.7	72.0	9.4	100.0
1944	a	13.5	4.5	69.6	12.4	100.0

a Negligible; airways freight includes air mail and express.

Sources: National Resources Planning Board, Transportation and National Policy, May, 1942, p. 33.

Investigation of the National Defense Program, 78th Congress, 2d Session, *Senate Report* 10, Part 16, Mar. 4, 1944, p. 410.

Interstate Commerce Commission, *57th Annual Report*, Nov. 1, 1943, p. 15, *58th Annual Report*, Nov. 1, 1944, p. 6.

Office of Defense Transportation, Highway Transport Department, Inventory and Statistics Section, letter of May 28, 1945.

Percentage computed by Aircraft Industries Association, Research and Statistics Service.

TABLE 13-11. EMPLOYES IN TRANSPORTATION, JULY, 1944, ESTIMATE

Railroads.....	1,570,000
Intercity bus.....	52,000
For-hire trucking.....	550,000
Great Lake carriers.....	27,500
Inland water carriers.....	37,200
Pipelines.....	22,500
Local transit.....	251,000
Public warehousing.....	70,000
Not elsewhere classified.....	175,000
Airlines.....	31,000 <sup>a</sup>
Total.....	2,786,200

<sup>a</sup> Estimated by Aircraft Industries Association.

Source: Investigation of the National Defense Program, 78th Congress 2d Session, *Senate Report* 10, Part 16, Mar. 4, 1944, p. 450.

TABLE 13-12. A SUMMARY OF ESTIMATED INVESTMENT IN TRANSPORTATION  
(Billions of dollars)

Railroads, 1942:	
Class I:	
Road.....	\$18.0
Equipment.....	6.3
General.....	.4
Classes II and III.....	1.1
Total.....	\$25.8 <sup>a</sup>
Waterways, 1940 (coastwise, intercoastal, inland):	
Waterway improvements.....	\$ 3.2
Terminal facilities.....	3.5
Total.....	\$ 6.7
Highways, 1940: <sup>b</sup>	
Roads and streets.....	\$20.0
Vehicles.....	11.8
Total.....	\$31.8
Airways:	
Civil airports, 1945.....	\$ 1.0
Airways and civil airplanes, 1940.....	.1
Total.....	\$ 1.1
Pipelines, 1939.....	\$ .8

<sup>a</sup> Value of securities in hands of public: 17.3 billion dollars (Dec. 31, 1942).

<sup>b</sup> Depreciated investment.

Sources: Department of Commerce, Civil Aeronautics Administration, Airports Service.

National Resources Planning Board, *Transportation and National Policy*, May, 1942, pp. 44, 47, 337.

Association of American Railroads, *Railroads in This Century*, March, 1944, p. 10.

American Petroleum Institute, "Petroleum Facts and Figures," 7th ed., 1941, p. 127.

TABLE 13-13. TRANSPORTATION'S SHARE OF CONSUMPTION EXPENDITURES  
1929-1943  
(Billions of dollars)

Year	Total consumption expenditures	For transportation	Per cent for transportation
1929	\$78.4	\$8.0	10.2
1930	71.1	6.5	9.1
1931	61.4	5.2	8.5
1932	49.7	4.1	8.3
1933	46.6	4.1	8.8
1934	52.0	4.7	9.0
1935	56.4	5.4	9.6
1936	62.3	6.3	10.1
1937	66.2	6.7	10.1
1938	63.3	5.8	9.2
1939	66.5	6.5	9.8
1940	70.8	7.2	10.2
1941	80.6	8.5	10.5
1942	88.7	5.6	6.3
1943 <sup>a</sup>	97.8	5.7	5.8

<sup>a</sup> Preliminary.

Source: Condensed from Department of Commerce, *Survey of Current Business*, June 1944, pp. 6, 10, 11. Percentage computed by Aircraft Industries Association, Research and Statistics Service.



TABLE 13-14. CONSUMPTION EXPENDITURES FOR TRANSPORTATION  
(Millions of dollars)

	1929	1932	1939	1942
1. User-operated transportation.....	\$6,013.8	\$2,902.6	\$5,097.5	\$3,331.6
a. New cars <sup>a</sup> (c).....	2,562.9	612.1	1,626.3	143.3
b. Net purchases of used cars (s).....	89.4	26.3	101.6	74.8
c. Tires and tubes (c).....	418.9	198.0	232.7	22.8
d. Parts and accessories (c).....	422.9	169.7	305.6	362.1
e. Automobile repair, greasing, washing, parking, storage, and rental (s).....	571.9	296.1	462.0	457.4
f. Gasoline and oil (c).....	1,813.5	1,475.7	2,181.4	2,093.9
g. Bridge, tunnel, ferry, and road tolls (s) ..	40.3	42.9	46.2	40.9
h. Automobile insurance—net payments <sup>b</sup> (s).....	94.0	81.8	141.7	136.4
2. Purchased local transportation.....	1,190.0	824.9	926.4	1,361.9
a. Street and electric railway and local bus (s).....	819.7	624.5	684.0	972.6
b. Taxicab—fares and tips (s).....	280.0	139.0	195.0	331.0
c. Steam railways—commutation (s).....	76.6	53.3	40.8	50.6
d. Ferries—foot passengers (s).....	13.7	8.1	6.6	7.7
3. Purchased intercity transportation (s).....	731.5	342.4	446.9	793.5
a. Steam railway (excluding commutation) (s).....	550.8	220.3	254.4	439.6
b. Sleeping and parlor car—fares and tips (s).....	56.5	25.6	33.5	45.4
c. Intercity bus (s).....	68.8	63.2	121.2	255.3
d. Airline (s).....	2.8	2.7	11.4	19.2
e. Coastal and inland waterway (s).....	40.9	25.6	22.0	24.1
f. Baggage transfer, carriage, storage, and excess charges (s).....	11.7	5.0	4.4	9.9
4. Luggage (c).....	96.5	40.9	51.9	89.3
Total.....	\$8,031.8	\$4,110.8	\$6,522.7	\$5,576.3

<sup>a</sup> New cars are valued at the full retail price before trade-in allowances.

<sup>b</sup> Net payments are premiums minus claims paid.

(c) Commodity expenditures.

(s) Service expenditures.

Source: Condensed from Department of Commerce, *Survey of Current Business*, June, 1944, pp. 10 and 11.

TABLE 13-15. TRANSPORTATION'S SHARE OF NATIONAL INCOME PRODUCED,  
1929-1943  
(Billions of dollars)

Year	Total national income	Income produced by transportation	Per cent produced by transportation
1929	\$ 83.3	\$7.0	8.4
1932	40.0	3.6	9.0
1940	77.6	5.4	7.0
1941	96.6	6.4	6.6
1942	121.6	8.1	6.6
1943	147.9	9.5	6.3

Source: National Industrial Conference Board, "The Economic Almanac, 1944-45," 1944, p. 75.

TABLE 13-16. AVERAGE TRANSPORTATION EXPENDITURES OF AMERICAN FAMILIES, 1935-1936

Income level	Average expenditure per family for—								
	All transportation	Automobile							Other transportation
		Total	Purchase	Operation					
				Total	Gasoline	Oil	In-surance	Other items	
Under \$500.....	\$ 18	\$ 15	\$ 6	\$ 9	\$ 5	\$ 1	<sup>a</sup>	\$ 3	\$ 3
\$500-\$750.....	33	28	12	16	9	1	\$ 1	5	5
\$750-\$1,000.....	53	44	18	26	15	2	1	8	9
\$1,000-\$1,250....	81	70	28	42	25	3	2	12	11
\$1,250-\$1,500....	107	93	38	55	32	4	3	16	14
\$1,500-\$1,750....	139	123	54	69	39	5	5	20	16
\$1,750-\$2,000....	172	154	69	85	48	6	7	24	18
\$2,000-\$2,500....	222	200	95	105	59	7	10	29	22
\$2,500-\$3,000....	266	242	115	127	72	8	13	34	24
\$3,000-\$4,000....	320	289	137	152	86	11	16	39	31
\$4,000-\$5,000....	417	382	190	192	107	12	24	49	35
\$5,000-\$10,000....	570	522	271	251	129	16	34	72	48
\$10,000 and over..	1,358	1,085	679	406	186	26	79	115	273
All levels.....	\$ 130	\$ 114	\$ 54	\$ 60	\$ 34	\$ 4	\$ 5	\$ 17	\$ 16

<sup>a</sup> Less than \$0.50.

Source: Condensed from National Resources Planning Board, Family Expenditures in the United States, 1941, p. 4.

TABLE 13-17. AVERAGE EXPENDITURE FOR TRANSPORTATION PER FAMILY,<sup>a</sup> 1941

Net money income class	Automobile		Other transportation	
	Dollars	Percentage of money income	Dollars	Percentage of money income
\$0-\$500.....	\$ 21	7.3	\$ 5	1.7
\$500-\$1,000.....	58	7.9	11	1.5
\$1,000-\$1,500.....	101	8.1	19	1.5
\$1,500-\$2,000.....	165	9.5	28	1.6
\$2,000-\$3,000.....	237	9.7	41	1.7
\$3,000-\$5,000.....	364	9.8	59	1.6
\$5,000 and over.....	781	6.7	239	2.1

<sup>a</sup> Includes families of two or more persons and single consumers.

Source: Department of Labor, Bureau of Labor Statistics, "Spending and Saving of the Nation's Families in Wartime," 1942, *Bulletin* 723, pp. 18-20.

TABLE 13-18. AVERAGE EXPENDITURES OF FAMILIES OPERATING AND PURCHASING CARS, AND AVERAGE NUMBER AND GROSS PRICE OF NEW AND USED CARS PURCHASED, BY INCOME LEVEL, 1935-1936

Income level	Proportion of all families		Average expenditure for		Cars purchased per 1,000 families			Average gross price per car purchased	
	Purchasing cars, per cent	Operating cars, per cent	Purchase by families purchasing <sup>a</sup>	Operation by families operating	Total number <sup>b</sup>	Per cent		New	Used
						New	Used		
Under \$500.....	3.6	21.0	\$164	\$ 43	36	15.0	85.0	\$752	\$140
\$500-\$750.....	7.1	31.7	167	51	72	12.8	87.2	687	165
\$750-\$1,000.....	9.6	41.9	182	62	98	12.4	87.6	707	190
\$1,000-\$1,250.....	12.4	53.0	229	80	124	19.1	80.9	702	230
\$1,250-\$1,500.....	14.4	58.5	264	94	146	26.5	73.5	712	258
\$1,500-\$1,750.....	17.1	65.2	317	105	174	35.5	64.5	732	302
\$1,750-\$2,000.....	19.8	70.0	349	120	200	46.6	53.4	782	325
\$2,000-\$2,500.....	24.0	74.9	397	140	244	56.0	44.0	761	388
\$2,500-\$3,000.....	27.3	81.0	421	157	276	63.8	36.2	789	440
\$3,000-\$4,000.....	29.3	83.9	465	181	302	73.5	26.5	820	490
\$4,000-\$5,000.....	37.4	88.8	508	217	385	80.0	20.0	910	548
\$5,000-\$10,000 <sup>c</sup> .....	45.9	94.7	592	265	490	76.7	23.3	983	655

<sup>a</sup> It should be noted that the average expenditures for purchase of cars is a net figure, covering gross price minus trade-in allowance or discount, and, in cases where car is used in part for business purposes, minus the amount properly chargeable to business. It should also be noted that the estimates represent average expenditures per family, not per car.

<sup>b</sup> At most income levels, these estimates are a little higher than those in the first column showing proportion of families purchasing cars, since some families bought more than one car during the year.

<sup>c</sup> Estimates for the \$10,000 and over income level have been omitted from this table, since they are highly tentative and could not be checked against other estimates presented in this study.

Source: Condensed from National Resources Planning Board, Family Expenditures in the United States, 1941, p. 4.

 TABLE 13-19. AVERAGE YEARLY EXPENDITURE PER FAMILY<sup>a</sup> FOR AUTOMOBILE PURCHASE, OPERATION, AND MAINTENANCE BY MONEY-INCOME CLASSES

Net money income class	1935-1936	1941	1942 <sup>b</sup>
\$500-\$1,000.....	\$ 39	\$ 58	\$ 48
\$1,500-\$2,000.....	138	165	104
\$3,000-\$5,000.....	307	364	240

<sup>a</sup> Includes families of two or more persons and single consumers.

<sup>b</sup> Annual rate for 1942 based on first quarter.

Source: Department of Labor, Bureau of Labor Statistics, "Spending and Saving of the Nation's Families in Wartime," 1942, *Bulletin* 723, p. 8.

## CHAPTER 14

### RESEARCH AND DEVELOPMENT

Before the war, research expenditures in all fields of science, both public and private, totaled an estimated \$250,000,000 a year. A large part of this was spent by industry and educational institutions. Only about \$50,000,000 was spent by agencies of the Federal Government—mostly on agricultural and aviation research.

During the war several billion dollars were spent by the Federal Government in its own laboratories or through contracts with private industrial organizations and educational institutions. No precise information is available as to the extent of privately financed research and development.

Aviation research and development, which takes only a small part of this amount, is carried on both by industry and by the government. A survey made by the Aircraft Industries Association on industry research early in 1945 disclosed that 19 companies spent more than \$744,000,000 on research and development for all their aircraft models active in 1944.

The *National Aircraft Standards Committee* of the Aircraft Industries Association promotes standardization of airplane parts, specifications, design methods, and fabrication practices.

The *Airplane and Engine Technical Committees* of the Aircraft Industries Association study design, construction and other problems and advise government research laboratories of research needs.

The *Institute of Aeronautical Sciences* stimulates research efforts through meetings and publications.

The *Society of Automotive Engineers* has had a strong influence on the development of airplane engines.

University laboratories and independent workers also contribute to aeronautical research.

The following government agencies conduct research in aeronautics.

The *National Advisory Committee for Aeronautics* was created in 1915 and charged with the duty of supervising, directing, and conducting fundamental scientific research and experiment in aeronautics.

On Jan. 26, 1945, the NACA presented an *Aeronautical Research Policy*.

According to this policy, fundamental research in the aeronautical sciences is the principal objective of the NACA.

Research programs of the NACA are formulated in close collaboration with technical personnel from government and industry.

The research facilities of the NACA may be used to assist private individuals and corporations.

Application of the results of fundamental research to the design of improved aircraft, both civil and military, is the function of the aircraft industry.

Evaluation of military aircraft and equipment is the function of the Army and Navy, while evaluation of civil aircraft and equipment is the function of the Civil Aeronautics Administration.

The NACA consists of 15 members appointed by the President. It operates three laboratories with a total plant investment of \$70,000,000. It employs 7,135 employes—about 2,500 of them professional engineers, pilots, physicists, etc.

Applied research and engineering development for the Army Air Forces is conducted by the Engineering Division Laboratories of the *Air Technical Service Command* at Wright Field, Dayton, Ohio. On Apr. 1, 1944, about 6,000 persons were employed in the development program in the engineering division, including 1,700 directors or supervisors and professional research workers.

The *Bureau of Aeronautics (Navy)* sponsors development of naval aircraft, engines, equipment, and materials.

In the main, the bureau confines its efforts to experimentation and development, leaving research to such agencies as the NACA. However, a small amount of basic research is carried on.

Two laboratories are operated directly by the bureau.

The *Civil Aeronautics Administration* directs its efforts toward eliminating hazards and toward improving the efficiency of aircraft. These efforts are conducted (or supervised) by the Technical Development Division.

The CAA operates one laboratory largely engaged in air navigation problems, in which about \$100,000 have been invested. There is a staff of about 75 employes.

Several other government agencies conduct research activities that may bear on aviation—the Weather Bureau, the National Bureau of Standards, the Library of Congress, etc.

The *Office of Scientific Research and Development* was set up by Executive order of the President of June 28, 1941, for the purpose of assuring adequate provision for research on scientific and medical problems relating to the national defense. During 1940 to 1944 the office spent almost 348 million dollars. As a temporary agency it is scheduled to be liquidated at the end of the war.

On Feb. 12, 1945, there was established a *Research Board for National Security* under the National Academy of Science. The objective of the Board will be to continue the close cooperation between civilian scientists

and the Armed Services in all fields of science applicable to war which has proved to be such a vital element in the prosecution of the war.

The new board will consist of up to 20 civilians and up to 10 officers each from the Army and the Navy. The Executive Committee will consist of three civilians (one of whom is Chairman of the Board and of the Executive Committee), one Army and one Navy officer. As this board will not establish its own laboratories and will include the Chairman of the NACA as a member, aeronautical problems will continue to be investigated and reported on by the NACA.

TABLE 14-1. NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS APPROPRIATIONS

Fiscal Years	Appropriations <sup>a</sup>
1915	\$ 5,000
1916	5,000
1917	87,515
1918	112,000
1919	205,000
1920	175,000
1921	200,000
1922	200,000
1923	225,600
1924	307,000
1925	470,000
1926	534,000
1927	513,000
1928	550,000
1929	628,770
1930	1,508,000
1931	1,321,000
1932	1,051,070
1933	915,000
1934	957,194
1935	1,244,830
1936	1,177,550
1937	2,544,550
1938	1,733,850
1939	3,869,434
1940	4,374,546
1941	11,200,000
1942	19,865,910
1943	25,428,736
1944	38,392,215
1945	45,442,330
1946 <sup>b</sup>	26,014,393

<sup>a</sup> Includes construction of research facilities.

<sup>b</sup> Estimate.

Sources: National Advisory Committee for Aeronautics, letter Sept. 29, 1944.  
Independent Offices Appropriation Bill for 1946, Hearings, p. 70.

National Resources Planning Board, "Research—A National Resource, Vol. II, Industrial Research," December, 1940, p. 134.

TABLE 14-2. FEDERAL AERONAUTICAL RESEARCH AND DEVELOPMENT APPROPRIATIONS  
(Thousands of dollars)

Fiscal year	Army Air Forces	Navy Bureau of Aeronautics	National Advisory Committee for Aeronautics	Civil Aeronautics Administration
1940	10,000	9,500	4,375	557
1941	102,231	10,004	11,200	557
1942	98,199	27,087	19,866	744
1943	113,343	46,840	25,429	950
1944	121,648	79,967	38,392	612

Source: "The Government's Wartime Research and Development, 1940-1944," *Senate Subcommittee Report 5*, Part 1, Jan. 23, 1945, pp. 284, 302, 305, and 314.

## CHAPTER 15

### PUBLIC OPINION ON AVIATION

A public opinion survey on aviation was conducted by Benson & Benson, Inc., Princeton, N. J., in February, 1945.

**Sample.** The survey is based on data obtained from 2,600 interviews throughout the nation. Interviews were distributed in proportion to the United States adult population (*i.e.*, twenty-one and over), by size of town, by geographic section (grouping of states), and by individual states, except that only about one-fourth of the total proportion of the Negroes in the Southern states was included.

In all, 2,900 interviews were completed in the course of the survey. In order to provide the most accurate picture of public opinion on the various phases of aviation covered in the survey, the sample was balanced so far as distribution among the various education levels was concerned, and the tabulations were made on the 2,600 cases which represented the balanced sample.

The interviewing was done by the same staff of interviewers who do the interviewing for the Gallup poll.

Because of the ban on interviewing members of the armed forces, none are included in the survey. Therefore, something over 11,000,000 men, most of them under thirty, are not represented.

Because of a tendency of the interviewers to select persons interested in aviation, it should be recognized that the sample selected is slightly more favorable toward the aviation industry than the whole public is. In our opinion, this factor is of negligible importance on the great majority of questions in the survey, but on the remaining questions Benson & Benson is of the opinion that a survey of the whole public would show sentiment about 3 to 6 percentage points less favorable to the aviation industry than is reported here. These questions specifically are:

What kind of job did the industry do in making war planes for our Army and Navy?

Are war profits of airplane manufacturers reasonable?

*Probable Error.* Results for the total sample are subject to an error factor as a result of the size of the sample, which probably does not exceed 2 per cent.



TABLE 15-1. SHOULD THE UNITED STATES MAINTAIN A STRONG POSTWAR AIR FORCE?

*Question:* Do you think the United States should maintain a strong air force after the war?

If yes or no opinion, ask:

Would you be willing to pay a tax equal to a week's earnings every year to cover the cost of maintaining a strong air force?

Cases.....	1,300
	Per Cent
Favor strong air force:	
And willing to pay tax.....	67
But unwilling to pay tax.....	20
But undecided about tax.....	4
	<u>91</u>
Opposed to strong air force.....	7
No opinion on strong air force.....	2
	<u>100</u>

TABLE 15-2. SHOULD THE UNITED STATES DEVELOP NEW MILITARY PLANES AFTER THE WAR?

*Question:* After the war should the government spend money to develop new types of military planes, or have we good enough planes now so that the government should not spend money to develop new types of planes for 4 or 5 years?

Cases.....	1,300
	Per Cent
Develop new planes.....	72
Not develop new planes.....	22
No opinion.....	6
	<u>100</u>

TABLE 15-3. WILL THE ARMY AND NAVY HAVE A SURPLUS OF PLANES AFTER THE WAR?

*Question:* After the war is over, do you expect that the Army and Navy will have very many airplanes that they will not need?

Cases.....	1,300
	Per Cent
Yes.....	74
No.....	19
No opinion.....	7
	<u>100</u>

TABLE 15-4. DO WE NEED MORE AIRPORTS?

*Question:* In your opinion, do we have enough airports and airfields now to take care of our needs for the next 5 years, or will more have to be built?

Cases.....	2,600
	Per Cent
Have enough.....	26
Need more built.....	66
No opinion.....	8
	<u>100</u>

TABLE 15-5. HAS AIRPLANE MANUFACTURING INDUSTRY DONE A GOOD JOB IN THE WAR?

*Question:* In making planes for the Army and Navy during the war, would you say the airplane manufacturing industry has done a good job, just a fair job, or a poor job?

Cases.....	1,300
	Per Cent
Good job.....	92
Fair job.....	6
Poor job.....	*
No opinion.....	2
	<u>100</u>

\* Less than 1 per cent.

TABLE 15-6. ARE WAR PROFITS OF AIRPLANE MANUFACTURERS REASONABLE?

*Question:* Do you think airplane manufacturing companies are making more money than they should out of the war, or do you think their profits are reasonable?

Cases.....	2,600
	Per Cent
Profits reasonable.....	46
More than should.....	25
No opinion.....	29
	<u>100</u>

TABLE 15-7. SHOULD GOVERNMENT TRY TO SELL POSTWAR SURPLUS OF MILITARY PLANES?

*Question:* If the Army and Navy have planes that they do not need after the war, do you think the government should try to sell these planes?

Cases.....	1,300
	Per Cent
Yes.....	69
No.....	25
Qualified answer.....	1
No opinion.....	5
	<u>100</u>

TABLE 15-8. WILL AIRPLANES BE AS WIDELY OWNED AFTER THE WAR AS AUTOMOBILES ARE NOW?

*Question:* Do you think the day will ever come when as many people will own airplanes as now own automobiles?

Cases.....	1,300
	Per Cent
Yes.....	35
No.....	59
Do not know.....	6
	<u>100</u>

TABLE 15-9. IS TRAVEL BY AIR MORE POPULAR THAN TRAVEL BY RAIL?

*Question:* After the war, if you were taking a thousand-mile trip across the country, would you prefer to go by railroad or by airplane?

Cases.....	1,300
	Per Cent
Airplane.....	54
Railroad.....	44
No choice.....	2
	<u>100</u>

TABLE 15-10. ADVANTAGES OF AIR TRAVEL

*Question:* What advantages do you see in traveling by airplane?

Cases.....	1,300
	Per Cent
Speed, saves time.....	91
More comfortable, cleaner, more pleasant.....	1
Scattered advantages.....	2
Has no advantages.....	4
No advantages named.....	2
	<u>100</u>

TABLE 15-11. WHAT COULD BE DONE TO ENCOURAGE POSTWAR AIRLINE TRAVEL?

*Question:* What do you think could be done to get more people to travel on commercial airlines after the war?

Case.....	1,300
	Per Cent
Make rates low.....	43
Attract people by advertising.....	9
Educate people as to safety.....	8
Make them safer, have fewer accidents.....	7
Improve airport locations and facilities and local transportation.....	5
Have more planes, better planes.....	2
Scattered suggestions.....	4
Nothing need be done.....	3
No suggestion made.....	19
	<u>100</u>

TABLE 15-12. WHAT CHANGES WILL MAKE PLANES MORE POPULAR?  
*Question:* What things can you think of that could be done to change air-planes that would make more people want to own and fly them?

Cases.....	2,600
	Per Cent
Lower cost, comparable with cars.....	24
Safer, make them foolproof, absolutely safe, safety mechanisms, safe in all weather conditions.....	17
Easier to operate, simplify them.....	10
Smaller, able to land in smaller space.....	8
Educate the people as to how safe planes are now.....	4
Improve appearance and cut down noise.....	2
Develop helicopters.....	1
Scattered suggestions.....	3
Nothing, they are OK now.....	2
Nothing suggested.....	29
	<u>100</u>

TABLE 15-13. ANTICIPATED PRICE OF POSTWAR TWO-PASSENGER PLANE  
*Question:* About how much do you think an average two-passenger plane will cost after the war?

Cases.....	2,600
	Per Cent
\$500 or less.....	3
\$501-\$999.....	9
\$1,000.....	16
\$1,000-\$1,499.....	8
\$1,500.....	11
\$1,501-\$1,999.....	4
\$2,000.....	13
\$2,001-\$2,999.....	6
\$3,000-\$4,999.....	8
\$5,000.....	3
Over \$5,000.....	2
No price named.....	17
	<u>100</u>
Median price.....	\$1,500

TABLE 15-14. SHOULD AVIATION COURSES BE GIVEN IN HIGH SCHOOLS?  
*Question:* Do you think high schools should give courses in aviation, not including actual flying?

Cases.....	1,300
	Per Cent
Yes.....	79
No.....	14
No opinion.....	7
	<u>100</u>

## CHAPTER 16

### FOREIGN AVIATION DATA

Foreign aviation data are greatly limited. Military figures are almost completely absent, and those available are not reliable.

Personal flying in foreign countries was not significant before the Second World War. Only France, the United Kingdom, and Germany listed more than 1,000 personal planes in 1938.

Commercial airlines, however, were important. In most foreign countries, commercial aviation was an international activity, most countries being too small to provide scope for operations on a domestic scale.

International air transport created new branches of international law. The first international air navigation agreement (between France and Germany) was concluded in 1913. The first general air convention was signed in Paris in 1919 by 26 countries. The 1919 convention was amended from time to time, the last amendments becoming effective in 1933.

The Habana Convention of 1928 was ratified by 11 American countries which were not parties to (or withdrew from) the Paris Convention.

The two conventions related to safety and technical matters. They did not provide for the establishment of commercial air routes.

The Chicago Conference of 1944 produced the following results:

1. A new International Air Navigation Convention, providing for up-to-date safety and technical regulation in international operations, and for the establishment of an International Civil Aviation Organization, with technical and advisory powers in the fields of international air navigation and air transport.

2. The Interim Agreement creating a temporary organization that will function until the International Convention is ratified. (Up to Aug. 24, 1945, 53 nations had accepted the signatures of their delegates to the Interim Agreement with reservations. Twenty six were necessary to bring it into force.)

3. The "Two Freedoms Document" gives aircraft of the signatory nations the right to fly over, and make nontraffic stops (for refueling, repair, etc.), in the territory of other signatory nations. (Accepted by 42 nations up to Aug. 24, 1945.)

4. The "Five Freedoms Document" includes the "Two Freedoms" listed above and the following others:

Third Freedom: The right to carry traffic from the home state to any other state.

Fourth Freedom: The right to pick up traffic anywhere in the world and carry it to the home state.

Fifth Freedom: The right to pick up traffic in one foreign state and carry it to another foreign state. (Accepted with reservations by 28 nations as of Aug. 24, 1945.)

5. The conference also adopted a resolution recommending a Standard Form of Bilateral Air Transport Agreement. Since Dec. 1, 1944, the United States has concluded six bilateral air-transport agreements with other nations, which have followed in general the standard form.

TABLE 16-1. WORLD AIRLINE OPERATIONS, 1938 AND 1942

Country	Route miles (1938)	Route miles (1942)	Plane-miles flown (1938)	Plane-miles flown (1942)
<b>Latin America:</b>				
Mexico.....	9,404	15,180	3,205,327	6,312,360
Brazil.....	23,608	35,157	4,238,312	6,696,676
Argentina.....	1,577	3,438	261,352	785,616
Central America.....	4,575	4,592	1,547,694	1,044,628
All other.....	17,440	18,535	6,209,553	7,181,826
Total.....	56,604	76,902	15,462,238	22,021,106
<b>British Empire:..</b>				
United Kingdom.....	24,395	33,514	12,987,370	11,495,784
Canada.....	11,917	15,518	10,853,405	13,381,814
Australia.....	21,748	24,925	9,654,678	7,829,847
All other.....	24,863	22,101	6,303,451	3,779,012
Total.....	82,923	96,058	39,798,904	36,486,457
<b>Europe:</b>				
Russia.....	65,865	N.A.	40,000,000	N.A.
France.....	40,833	20,548	9,000,727	N.A.
Germany.....	24,974	N.A.	12,230,564	N.A.
Italy.....	23,583	N.A.	8,447,448	2,699,750
All other.....	72,297	31,257	18,155,694	5,460,704
Total.....	229,552	N.A.	88,334,433	N.A.
<b>Near East and Far East:</b>				
Japan.....	8,694	N.A.	3,321,450	N.A.
China.....	4,956	N.A.	1,713,074	N.A.
Egypt.....	2,047	1,173	1,011,104	715,728
Siam.....	420	N.A.	91,300	N.A.
All other.....	2,389	1,355	756,107	270,770
Total.....	18,506	N.A.	6,893,035	N.A.
United States.....	70,718	86,753	78,047,055	137,411,175
Grand total.....	456,303	N.A.	228,535,665	N.A.

N.A. Not available.

Source: Department of Commerce, Office of Air Transport Information, June 28, 1943, p. 4.

TABLE 16-2. DEVELOPMENT OF WORLD AIRLINES, 1919-1938

Year	Approximate route mileage	Approximate plane-miles flown, millions
1919	3,200	1.0
1920	9,700	3.0
1925	34,000	13.0
1930	156,800	69.5
1935	278,200	149.4
1936	305,200	179.2
1937	333,500	198.9
1938	349,100	233.8

Source: H. M. Stationery Office, *The Civil Aviation Statistical and Technical Review*, 1938 (1939), p. 52; the total plane-miles for 1938 correspond closely to the ones given by J. Parker Van Zandt, "Civil Aviation and Peace," 1944, p. 126; figures compiled by the Civil Aeronautics Board's Office of Air Transport Information for the same year differ greatly as to route miles (456,300) and somewhat as to plane-miles (228.5).

TABLE 16-3. ESTIMATED TRAVEL BETWEEN THE UNITED STATES AND OVERSEAS, 1937

	Millions of passenger-miles	Per cent
Transatlantic:		
Continental Europe.....	2,061	42.9
British Isles.....	1,062	22.1
Near East and Africa.....	115	2.4
Total.....	3,238	67.4
Transcaribbean:		
Bermuda and British West Indies.....	171	3.6
Cuba and other West Indies.....	193	4.0
Central America.....	99	2.0
South America.....	135	2.8
Total.....	598	12.4
Transpacific:		
Asia.....	528	11.0
Australia.....	151	3.1
Alaska.....	137	2.9
Hawaii.....	153	3.2
Total.....	969	20.2
Grand total.....	4,805	100.0

Source: Condensed from Civil Aeronautics Board, "Overseas Air Service Patterns, Travel Distribution and Composition, All Areas," Dec. 1944, p. 15.

TABLE 16-4. WORLD REGISTRATION OF CIVIL AIRCRAFT, 1938

Country	Number of registered civil aircraft <sup>a</sup>		
	Scheduled air carriers	Personal aircraft	Total
Greater Europe:			
British Isles.....	173	1,502	1,675
Germany.....	146	1,420	1,566
Italy.....	134	558	692
France.....	159	2,829	2,988
Other continental Europe.....	265	1,098	1,363
Mediterranean Africa.....	18	14	32
Mediterranean Asia.....	12	17	29
Total.....	907	7,438	8,345
North America:			
Canada and Newfoundland.....	112	476	588
United States and Territories <sup>b</sup> .....	345	10,855	11,200
Total.....	457	11,331	11,788
U.S.S.R.....	400	175	575
Asia, excluding Mediterranean:			
Japan.....	55	64	119
China.....	30	15	45
India.....	27	136	163
Others.....	29	100	129
Total.....	141	315	456
Africa, excluding Mediterranean.....	63	270	333
Middle America:			
Mexico.....	83	113	196
Central America.....	52	3	55
West Indies.....	8	6	14
North coast of South America.....	36	11	47
Total.....	179	133	312
South America, excluding north coast:			
Brazil.....	41	52	93
Argentina.....	10	230	240
Others.....	40	93	133
Total.....	91	375	466
Oceania.....	150	304	454
World total.....	2,388	20,341	22,729

<sup>a</sup> All figures, except United States, U.S.S.R., and China, are from British Air Ministry, *The Civil Aviation Statistical and Technical Review*, 1938 (1939), pp. 60-61. For Russia the number of aircraft operated by scheduled air carriers is estimated from total plane-miles flown (see p. 125), assuming 100,000 miles per plane per year; "other" civil aircraft is an arbitrary estimate. For China, planes operated by scheduled carriers are given in "China Handbook 1937-1943," Chinese Ministry of Information (1943), p. 255. "Other" civil aircraft in China is estimated arbitrarily at a nominal figure.

<sup>b</sup> From *Civil Aeronautics Journal*, Jan. 15, 1944, pp. 10-12; and United States Department of Commerce, *Air Commerce Bulletin*, Nov. 15, 1938. "Other" aircraft includes 10,718 in domestic and 137 in territorial nonscheduled operations. Alaska not included.

Source: J. Parker Van Zandt, "Civil Aviation and Peace," 1944, p. 121.



TABLE 16-5. AIRLINE OPERATIONS IN LATIN AMERICA, LOCAL AND NONLOCAL FOR 1943

Country	Route miles Dec. 31	Miles flown, thousands	Ton-miles, thousands			
			Passenger and baggage	Cargo	Mail	Total
Local <sup>a</sup>						
South America:						
Argentina.....	4,551	991	804	127	13	944
Bolivia.....	3,602	778	405	332	18	755
Brazil <sup>b</sup> .....	33,460	8,273	5,999	1,392	318	7,709
Chile.....	1,345	896	613	31	13	657
Colombia.....	6,719	2,755	1,738	885	45	2,668
Ecuador.....	895	228	270	14	2	286
Peru.....	5,947	2,145	884	367	43	1,294
Uruguay.....	156	151	157	3	1	161
Venezuela.....	4,218	1,013	697	218	20	935
Total South America local.....	60,893	17,230	11,567	3,369	473	15,409
Middle America:						
Caribbean Islands.....	12,702	3,141	2,477	352	29	2,858
Central America.....	5,839	2,610	963	1,519	30	2,512
Mexico.....	18,428	8,950	7,807	1,137	149	9,093
Total Middle America local.....	36,969	14,701	11,247	3,008	208	14,463
Total Latin America local	97,862	31,931	22,814	6,377	681	29,872
Nonlocal <sup>c</sup>						
Within Latin America...	.....	.....	8,309	978	522	9,809
With the U.S.A.....	.....	.....	16,126	3,899	2,213	22,238
Total Latin America nonlocal.....	28,848	18,406	24,435	4,877	2,735	32,047
Grand total local and nonlocal.....	113,929 <sup>d</sup>	50,337	47,249	11,254	3,416	61,919

<sup>a</sup> Local includes all domestic traffic with each of the countries of South America and Mexico and all traffic within the Caribbean Islands and Central America. A substantial part of the traffic between Mexico and the United States and a small amount of other international traffic is also included in local. Route miles of international carriers are included under both local and nonlocal wherever appropriate, but this duplication is eliminated in the grand total for Latin America. A portion of the miles flown by international carriers is allocated to local on the basis of the local traffic carrier.

<sup>b</sup> Excludes Correio Aereo Nacional, which is a noncommercial Army mail service.

<sup>c</sup> Excludes military operations.

<sup>d</sup> Duplication eliminated.

Source: Defense Supplies Corporation, American Republics Aviation Division, Release May 8, 1944. pp. 3 and 4, Table 1.

TABLE 16-6. AIRLINE REVENUE IN LATIN AMERICA, LOCAL AND NONLOCAL FOR 1943

Country	Average revenue, U.S. cents	
	Per passenger-mile	Per cargo ton-mile
Local <sup>a</sup>		
South America.....		
Argentina.....	6.6	80.0
Bolivia.....	7.6	108.3
Brazil <sup>b</sup> .....	6.0	59.6
Chile.....	4.4	130.7
Colombia.....	10.8	95.6
Ecuador.....	8.5	110.0
Peru.....	3.8	37.3
Uruguay.....	7.1	310.0
Venezuela.....	16.0	219.2
Total South America local.....	7.2	83.8
Middle America:		
Caribbean Islands.....	10.7	116.9
Central America.....	9.8	80.7
Mexico.....	5.4	70.9
Total middle America local.....	6.9	81.2
Total Latin America local.....	7.1	82.6
Nonlocal <sup>c</sup>		
Within Latin America.....	8.0	85.6
With the U.S.A.....	8.3	87.5
Total Latin America nonlocal.....	8.0	85.6
Grand total local and nonlocal.....	7.6	84.6

<sup>a</sup> Local includes all domestic traffic with each of the countries of South America and Mexico and all traffic within the Caribbean Islands and Central America. A substantial part of the traffic between Mexico and the United States and a small amount of other international traffic is also included in local. Route-miles of international carriers are included under both local and nonlocal wherever appropriate, but this duplication is eliminated in the grand total for Latin America. A portion of the miles flown by international carriers is allocated to local on the basis of the local traffic carrier.

<sup>b</sup> Excludes Correio Aereo Nacional, which is a noncommercial Army mail service.

<sup>c</sup> Excludes military operations.

Source: Defense Supplies Corporation, American Republics Aviation Division, Release, May 8, 1944, pp. 1-4, Table 1.

TABLE 16-7. AIRLINE AIRCRAFT AND PERSONNEL IN LATIN AMERICA, 1942

Country	Aircraft utilization average hours flown per plane per day <sup>a</sup>	Numbers of airline aircraft, Dec. 31						Total number of airline personnel Dec. 31
		Multiengine				Single engine	Total planes	
		U.S. mfr.	German mfr.	Other	Total			
Foreign flag carriers:								
South America:								
Argentina.....	1.0	2	9	3	14	...	14	245
Bolivia.....	1.0	3	2	..	5	1	6	235
Brazil <sup>b</sup> .....	2.2	23	17	3	43	18	61	2,333
Chile.....	2.2	6	..	3	9	...	9	172
Colombia.....	2.1	17	..	..	17	9	26	1,460
Ecuador <sup>c</sup> (1941)....	1.3	...	2	..	2	...	2	71 <sup>d</sup>
Peru.....	2.2	2	..	..	2	16	18	205
Uruguay.....	1.1	2	2	5	9	...	9	122
Venezuela.....	1.5	10	..	..	10	...	10	147
Total South America	1.9	65	30	14	109	44	153	4,919
Middle America:								
Caribbean Islands...	2.9	19	..	2	21	1	22	515
Central America....	1.5	22	..	0	22	18	40	837
Mexico.....	2.2	24	..	1	25	78	103	1,314
Total Middle America.....	2.1	65	..	3	68	97	165	2,666
Total Latin America	2.0	130	30	17	177	141	318	7,585
United States flag carriers, total Latin America.....	5.4	66	..	..	66	9	75	8,224
Grand total, Latin America (foreign and United States flag carriers)....	2.6	196	30	17	243	150	393	15,809

<sup>a</sup> Based on average fleet, excluding trainers and planes used only as sources of spare parts.

<sup>b</sup> Excludes Correio Aereo Nacional.

<sup>c</sup> Panagra local services included with United States flag carriers.

<sup>d</sup> 1940.

Source: Defense Supplies Corporation, American Republics Aviation Division, Release, May 8, 1944, pp. 1-4, Table 2.

TABLE 16-8. MULTIENGINE AIRLINE AIRCRAFT IN LATIN AMERICA, 1940-1943

Country and year, as of Dec. 31	U.S. manu- factured	German manufactured	Other	Total
<b>SOUTH AMERICA</b>				
<b>Argentina:</b>				
1940	2	8	3	13
1941	2	8	3	13
1942	2	9	3	14
1943	1	10	6	17
<b>Bolivia:</b>				
1940	2	4	..	6
1941	4	4	..	8
1942	3	2	..	5
1943	3	1	..	4
<b>Brazil:</b>				
1940	7	18	..	25
1941	18	21	..	39
1942	23	17	3	43
1943	28	16	2	46
<b>Chile:</b>				
1940	...	2	4	6
1941	6	..	3	9
1942	6	..	3	9
1943	10	..	3	13
<b>Columbia:</b>				
1940	16	..	..	16
1941	16	..	..	16
1942	17	..	..	17
1943	17	..	..	17
<b>Ecuador:</b>				
1940	...	2	..	2
1941	...	2	..	2
<b>Peru:</b>				
1940	7	2	..	9
1941	4	..	..	4
1942	2	..	..	2
1943	2	..	..	2
<b>Uruguay:</b>				
1940	...	2	4	6
1941	...	2	6	8
1942	2	2	5	9
1943	2	2	5	9
<b>Venezuela:</b>				
1940	9	..	..	9
1941	11	..	..	11
1942	10	..	..	10
1943	11	..	..	11

TABLE 16-8. MULTIENGINE AIRLINE AIRCRAFT IN LATIN AMERICA.—(Continued)

Country and year, as of Dec. 31	U.S. manu- factured	German manufactured	Other	Total
Total South America:				
1940	43	38	11	92
1941	61	37	12	110
1942	65	30	14	109
1943	74	29	16	119
MIDDLE AMERICA				
Caribbean Islands:				
1940	18	..	..	18
1941	20	..	..	20
1942	19	..	2	21
1943	23	..	2	25
Central America:				
1940	35	..	..	35
1941	30	..	..	30
1942	22	..	..	22
1943	22	..	..	22
Mexico:				
1940	15	..	..	15
1941	16	..	..	16
1942	24	..	1	25
1943	23	..	..	23
Total Middle America:				
1940	68	..	..	68
1941	66	..	..	66
1942	65	..	3	68
1943	68	..	2	70
Total Latin America:				
1940	111	38	11	160
1941	127	37	12	176
1942	130	30	17	177
1943	142	29	18	189
U.S. flag carriers total Latin America:				
1940	47	..	..	47
1941	60	..	..	60
1942	66	..	..	66
1943	57	..	..	57
Grand total, Latin America, foreign and U.S. flag car- riers:				
1940	158	38	11	207
1941	187	37	12	236
1942	196	30	17	243
1943	199	29	18	246

Source: Defense Supplies Corporation, American Republics Aviation Division, Release May 8, 1944, p. 104, Table 2.

TABLE 16-9. UNITED KINGDOM: REGISTERED CIVIL AIRCRAFT, 1920-1938

Dec. 31	Airline	Private	Schools and clubs	All other	Total registered
1920	56	103 <sup>a</sup>	...	166	325
1925	36	16	54	95	201
1930	35	333	166	312	846
1935	122	589	451	373	1,535
1936	116	668	507	391	1,682
1937	117	672	525	346	1,660
1938	120	590	627	329	1,666

<sup>a</sup> Mostly for demonstration purposes.

Source: H. M. Stationery Office, *The Civil Aviation Statistical and Technical Review*, 1938 (1939) p. 34.

TABLE 16-10. UNITED KINGDOM: DELIVERIES OF MILITARY AIRCRAFT, 1939-1944

Year	Heavy bombers	Medium and light bombers	Fighters	Naval	Trainers	General reconnaissance, transport, air-sea rescue and other	Total new aircraft
1939 <sup>a</sup>	.....	1,072	447	165	772	468	2,924
1940	41	3,679	4,283	476	5,125	1,445	15,049
1941	498	4,170	7,063	1,232	6,614	516	20,093
1942	1,976	4,277	9,850	1,082	5,940	546	23,671
1943	4,614	3,113	10,727	1,720	4,825	1,264	26,263
1944 <sup>b</sup>	2,889	1,391	5,655	1,533	2,070	1,071	14,609
1939-1944 <sup>c</sup>	10,018	17,702	38,025	6,208	25,346	5,310	102,609

<sup>a</sup> September-December only. <sup>b</sup> January-June only. <sup>c</sup> Total September, 1939-June, 1944.

Source: H.M. Stationery Office, "Statistics Relating to the War Effort of the United Kingdom," November, 1944, Cmd 6564, p. 14.

TABLE 16-11. UNITED KINGDOM: STRUCTURE WEIGHT OF NEW AIRCRAFT DELIVERED, 1939-1944  
(Millions of pounds)

1939 <sup>a</sup>	11.26
1940	58.84
1941	87.26
1942	133.36
1943	185.23
1944 <sup>b</sup>	111.75
1939-1944 <sup>c</sup>	587.70

<sup>a</sup> September-December only. <sup>b</sup> January-June only. <sup>c</sup> Total September, 1939-June, 1944.

Source: H.M. Stationery Office, "Statistics Relating to the War Effort of the United Kingdom," November, 1944, Cmd 6564, p. 14.

TABLE 16-12. UNITED KINGDOM: DELIVERIES AND REPAIR OF MILITARY AIRCRAFT ENGINES, 1939-1944

Year	Aircraft engines delivered	Engine horse-power of new engines delivered (million hp)	Aircraft engines repaired
1939 <sup>a</sup>	4,532	2.90	.....
1940	24,074	17.40	6,726 <sup>b</sup>
1941	36,551	31.42	20,177
1942	53,916	59.45	27,567
1943	57,985	72.80	35,832
1944 <sup>c</sup>	31,643	41.92	22,703
1940-1944	208,701	225.89	113,005 <sup>d</sup>

<sup>a</sup> September-December only.<sup>b</sup> July-December only.<sup>c</sup> January-June only.<sup>d</sup> Total July, 1940-June, 1944.

Source: H.M. Stationery Office, "Statistics Relating to the War Effort of the United Kingdom," November, 1944, Cmd 6564, p. 14.

TABLE 16-13. UNITED KINGDOM: AERONAUTIC EXPORTS, 1924-1939

Year	Complete aircraft including engines		Engines		Spare parts value <sup>a</sup>	Total value <sup>a</sup>
	Number	Value <sup>a</sup>	Number	Value <sup>a</sup>		
1924	188	\$ 1,936,720	580	\$1,986,061	\$1,387,186	\$ 5,309,967
1925	148	1,669,248	492	2,118,766	1,738,008	5,544,893
1926	150	1,898,634	266	1,437,283	2,154,105	5,425,399
1927	140	996,995	380	1,925,255	2,350,437	5,272,687
1928	358	2,252,760	432	1,697,711	2,569,967	6,369,034
1929	525	3,905,195	1,148	2,447,195	4,138,732	10,491,122
1930	317	2,922,255	552	2,622,169	4,418,192	8,199,684
1931	304	3,534,699	363	1,876,963	3,034,091	7,441,192
1932	300	2,251,412	452	1,640,606	2,221,777	6,113,795
1933	234	2,013,563	409	2,241,915	2,299,076	6,155,163
1934	298	3,762,612	479	2,986,381	2,933,361	9,682,349
1935	453	5,955,837	652	3,408,915	3,970,308	13,335,061
1936	448	6,386,256	625	3,683,719	4,395,231	14,527,996
1937	507	9,450,709	588	2,533,940	5,580,787	18,160,912
1938	506	12,038,803	865	5,630,957	8,869,835	26,504,129
1939	481	11,148,427	769	5,321,562	9,038,068	25,278,255

<sup>a</sup> Value in United States dollars computed by Aircraft Industries Association, Research and Statistics Service.Source: H.M. Stationery Office, *The Civil Aviation Statistical and Technical Review*, 1938 (1939), p. 45. (Brought up to date by data from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, International Trade Unit, from "Annual Statement of the Trade of the United Kingdom," Vol. III, 1939.)

TABLE 16-14. CANADA: VALUE OF EXPORTS<sup>a</sup> OF AIRCRAFT AND PARTS, 1932-1939  
Aircraft and Parts

Year	Value <sup>b</sup>
1932	\$ 17,534
1933	4,238
1934	26,388
1935	195,805
1936	359,713
1937	264,687
1938	2,781,977
1939	332,689

<sup>a</sup> Domestic exports only.

<sup>b</sup> Value in United States dollars computed by Aircraft Industries Association, Research and Statistics Service.

Source: Data secured from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, International Trade Unit, from data published in "Trade of Canada, Calendar Year, 1932, 1934-1936" and "Trade of Canada," Vol. II, 1939.

TABLE 16-15. FRANCE: EXPORTS OF AIRCRAFT, BY WEIGHT AND VALUE, 1932-1939<sup>a</sup>

Year	Airplanes weight, <sup>b</sup> pounds	Value <sup>b</sup>
1932	700,700	\$3,145,233
1933	480,920	3,601,500
1934	1,373,020	5,400,516
1935	2,635,380	9,949,500
1936	1,976,480	7,885,653
1937	1,353,000	4,309,018
1938	1,183,820	3,776,148
1939 <sup>a</sup>	977,680	3,501,000

<sup>a</sup> 1939 January to July.

<sup>b</sup> Value in United States dollars and weight in United States pounds, computed by Aircraft Industries Association, Research and Statistics Service.

Source: Data secured from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, International Trade Unit, from data published in Tableau Général du Commerce Extérieur, République Française, 1932-1938. Statistique Mensuelle du Commerce Extérieur de la France, July, 1939.



TABLE 16-16. NETHERLANDS: EXPORTS OF AIRPLANES AND PARTS AND AIRPLANE ENGINES, BY NUMBER, WEIGHT, AND VALUE, 1932-1939

Year	Airplanes and parts			Airplane engines	
	Number	Weight, <sup>a</sup> pounds	Value <sup>a</sup>	Number	Value <sup>a</sup>
1932	17	240,724	\$ 535,320	15	\$ 30,034
1933	7	131,349	361,703	13	44,798
1934	15	202,145	359,325	17	71,041
1935	14	167,312	658,197	11	80,231
1936	33	543,756	1,339,750	29	134,645
1937	63	540,628	1,721,154	28	125,656
1938	11	129,103	435,247	49	263,904
1939	55	755,242	2,825,414	48	296,048

<sup>a</sup> Weights in United States pounds and value in United States dollars, computed by Aircraft Industries Association, Research and Statistics Service.

Source: Data secured from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, International Trade Unit, from data published in Nederland, Jarrstatistiek, 1932-1939.

TABLE 16-17. SWITZERLAND: EXPORTS OF AIRPLANES AND PARTS BY NUMBER, WEIGHT, AND VALUE, 1932-1939

Year	Number	Airplanes and parts weight <sup>a</sup>	Value <sup>a</sup>
1932	2	72,101	\$ 438,910
1933	1	35,992	222,929
1934	5	123,336	814,713
1935	11	83,739	486,464
1936	3	33,112	271,896
1937	11	64,504	257,775
1938	18	365,765	1,899,763
1939	13	249,201	1,476,758

<sup>a</sup> Weights in United States pounds and values in United States dollars, computed by Aircraft Industries Association, Research and Statistics Service.

Source: Data secured from the Department of Commerce, Bureau of Foreign and Domestic Commerce, International Trade Unit, from data published in Statistique Annuelle du Commerce Extérieur de la Suisse, 1932-1939.

TABLE 16-18. ITALY: EXPORTS OF AIRPLANES AND SPARE PARTS BY NUMBER, WEIGHT, AND VALUE 1932-1939<sup>a</sup>

Year	Number	Airplanes weight, <sup>b</sup> pounds	Value <sup>b</sup>	Airplane spare parts value <sup>b</sup>
1932	10	N.A.	\$ 87,062	\$ 532,144
1933	31	137,940	737,005	570,633
1934	13	57,200	450,038	530,018
1935	61	252,120	1,742,040	1,035,101
1936	32	178,860	902,415	773,119
1937	39	192,280	1,516,904	2,047,462
1938	152	1,260,380	6,143,988	2,597,592
1939 <sup>a</sup>	42	427,460	1,861,704	3,086,408

N.A. Not available.

<sup>a</sup> 1939—January to July.

<sup>b</sup> Weights in United States pounds and value in United States dollars computed by Aircraft Industries Association, Research and Statistics Service.

Source: Data secured from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce, International Trade Unit, from data published in Commercio di Importazione e di Esportazione del Regno d'Italia 1932-1938, July 1939.

TABLE 16-19. ANNUAL AVERAGE RATE OF EXCHANGE BASED ON DAILY BUYING RATES FOR CABLE TRANSFERS, CERTIFIED BY THE FEDERAL RESERVE BANK OF NEW YORK  
(In U.S. dollars)

Year	Italy (lire)	Canada (dollar)	France (franc)	Netherlands (guilder)	Switzerland (franc)	United Kingdom (pound) <sup>a</sup>
1932	\$.0513	\$.8809	\$.0393	\$.4029	\$.1940	\$3.5061
1933	.0671	.9196	.0503	.5172	.2484	4.2368
1934	.0856	1.0101	.0657	.6738	.3237	5.0393
1935	.0825	.9949	.0660	.6771	.3250	4.9018
1936	.0729	.9991	.0611	.6448	.3019	4.9709
1937	.0526	1.0000	.0405	.5504	.2294	4.9440
1938	.0526	.9942	.0288	.5501	.2287	4.8894
1939	.0520	.9602	.0251	.5334	.2252	4.4354

<sup>a</sup> The British Pound was \$4.42 in 1924, varied from \$4.83 to \$4.87 from 1925 to 1930 and averaged \$4.535 in 1931.

Source: Data from the files of the Department of Commerce, Bureau of Foreign and Domestic Commerce.

## DEFINITIONS AND DESCRIPTIONS

**acceptances.** Deliveries of aircraft to the government, usually at the manufacturer's plant, upon verification by military representatives that the aircraft have been completed in accordance with contract specifications. See *production*.

**accident, fatal.** Accident in which one or more fatalities occur. See *fatality*.

**aeronautics.** The science associated with study, design, construction, or operation of aircraft.

**aircraft.** All air-borne vehicles (supported either by buoyancy or by dynamic action).

The International Civil Aviation Conference of 1944 classifies aircraft as lighter-than-air or as heavier-than-air. Lighter-than-air include balloons and airships. Heavier-than-air include gliders, kites, airplanes, gyroplanes, helicopters, and ornithopters.

The Aircraft Resources Control Office includes rotary-wing planes and aerial targets with airplanes. It lists airplanes plus unpowered tactical troop carriers as aircraft. (Lighter-than-air aircraft are not included in ARCO statistics.)

The Bureau of the Census declares: "This industry embraces establishments primarily engaged in the manufacture of complete aircraft, both heavier-than-air and lighter-than-air, including gliders, balloons, and parachutes." (Excludes establishments producing aeronautical instruments and electrical equipment.)

In terms such as "the aircraft industry" or "aircraft supply contracts" the word "aircraft" is usually interpreted very broadly, to include not only aircraft proper but also related equipment.

See also *airframe, airplane, glider*.

**aircraft certificated.** Civil aircraft having a registration and an air worthiness certificate issued by the Civil Aeronautics Administration.

**aircraft, civil.** All aircraft that is not military. Civil aircraft are airliners or personal aircraft. See *aircraft, personal*.

**aircraft, personal** (also called private aircraft). All civil aircraft that are not used for scheduled airline operations. They include aircraft used for training, nonscheduled commercial flying, pleasure, etc. Geisse and Williams define a personal plane as one selling for \$10,000 or less, or as one with a gross weight with single engine of less than 4,000 lb. See *aircraft, civil*.

**aircraft, private.** See *aircraft, personal*.

**aircraft registered.** Civil aircraft having a registration certificate issued by the Civil Aeronautics Administration. (See *aircraft, certificated*.)

**airframe plants** (also called airplane plants). As the term is used by the Bureau of Labor Statistics, these plants assemble the fuselage, the wings and tail are fabricated on the premises and those of the subcontractors, and in addition they install the engines, propellers, instruments, and accessories necessary to complete the airplane for delivery.

**airframe weight.** As used by the Aircraft Resources Control Office, the empty airplane minus the items listed below:

1. Engine
2. Propeller hubs, blades, power control, and governor
3. Wheels, brakes, tires, and tubes
4. Auxiliary power plant
5. Turbo superchargers
6. Radio receivers, transmitters, and removable units, but not installation parts and wiring
7. Starter
8. Battery
9. Generator
10. Turrets and power-operated gun mounts.

**airplane.** A mechanically driven aircraft, heavier-than-air. See *aircraft*.

**appropriation.** Money set aside by Congressional action for a specific use.

**authorized.** See *initiated*.

**civil aircraft.** See *aircraft, civil*.

**civil aviation.** See *aircraft, civil*.

**contingencies.** Special reserves out of current income to cover possible future obligations due to war.

**direct employment.** See *employment, direct*.

**direct floor space.** See *floor space, direct*.

**employment, direct.** Employes actually engaged in fabrication, processing, subassembly, and assembly.

**employment total.** Includes all persons considered as employed whether they work or not.

**facility.** 1. A single plant producing or fabricating a complete aircraft, engine, or propeller. 2. Different plants working under the same corporate management and together as a unit producing or fabricating the complete aircraft, engine, or propeller.

**facilities expansion.** New construction, alterations, and equipment, including major replacements but excluding ordinary maintenance and repair cost.

**fatality.** Death due to accident.

**floor space, direct.** The covered area equipped and available for direct manufacturing operations (fabrication, processing, subassembly, assembly, etc.)

**floor space, indirect.** All covered floor area not classified as direct floor space. It contains the area used by the tool department, storage, service, engineering, administration, etc.

**floor space, total.** The sum of direct and indirect floor space.

**glider.** A heavier-than-air aircraft, without power plant. See *aircraft*.

**indirect floor space.** See *floor space, indirect*.

**initiated** (as used in connection with facilities expansion.) Federally financed projects: funds have been allocated or authorized; privately financed projects: construction started. See *facilities expansion*.

**passenger-mile.** One passenger traveling one mile.

**personal aircraft.** See *aircraft, personal*.

**plane-mile.** One plane traveling one mile.

**prime contractors.** Contractors who enter in direct contractual relation with the government to deliver a finished product. Only prime contractors report directly on aircraft production. See *subcontractors*.

**private aircraft.** See *aircraft, personal*.

**production.**

Military: Military production figures during the war represent acceptances of aircraft and shipments of engines and propellers. Exports (and lend-lease) are included in the totals both before and during the war.

Civil: Production of civil aircraft as reported by the Civil Aeronautics Administration is obtained from aircraft registration certificates and does not include civil aircraft exported.

**put in place** (as used in connection with facilities expansion). Completed construction and value of equipment delivered to projects. See *facilities expansion*.

**shipments.** As used by the War Production Board, these represent the value of products at point of shipment, and therefore include duplication of the value of parts and subassemblies which were received for further fabrication or assembly from other plants and incorporated in the products shipped during the quarter.

As used by Aircraft Resources Control Office, see *production*.

**subcontractors.** Those contractors with whom prime contractors have contracted for work which they are obligated to deliver to the government. See *prime contractors*.

**ton-mile.** One ton traveling one mile.

**total floor space.** See *floor space, total*.

**value at 1943 unit cost.** In order to value physical deliveries the number

of units for aircraft items is multiplied by its unit-cost as reported in August, 1943. Value as reported by the War Production Board may therefore differ from the actual prices paid which are generally lower.

**value added by manufacture.** Value of the product less the cost of materials, supplies, fuel, purchased electric energy, and contract work.

**wage earners.** Time- and pieceworkers employed in the plant. Working foremen are treated as wage earners, and foremen whose duties are primarily supervisory are classed as supervisory employes.

**weight, empty.** Weight of airframe, power plant, and fixed equipment. See *airframe weight* and *weight, gross*.

**weight, gross.** Total weight when fully loaded. See *airframe weight* and *weight, empty*.

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