UNITED STATES DEPARTMENT OF LABOR
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Wartime Development of the Aircraft Industry

Prepared by
DIVISION OF CONSTRUCTION AND PUBLIC EMPLOYMENT
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Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR,
BUREAU OF LABOR STATISTICS,
Washington, D. C., November 20, 1944.

The SECRETARY OF LABOR:

I have the honor to transmit herewith a report of the wartime development of the aircraft industry. This report was prepared by Leonard G. Levenson in the Bureau's Division of Construction and Public Employment.

A. F. HINRICHS,
Acting Commissioner.

Hon. FRANCES PERKINS,
Secretary of Labor.

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Wartime Development of the Aircraft Industry

Summary

Total employment in the aircraft industry did not exceed 100,000 workers in January 1940; but in the latter part of 1943, when the peak was attained, about 2,100,000 were at work. Since then employment has been steadily declining and in August 1944 was slightly more than 1,800,000.

Increasing productivity has been of sufficient magnitude to permit schedule attainment despite this 14-percent decline in employment. The average airframe weight accepted per employee increased from 21 pounds in January 1941 to 96 pounds in May 1944. Along with this, the number of completed airplanes accepted rose from 1,000 per month early in 1941 to between 8 and 9 thousand per month thus far in 1944. Whereas about 4 million pounds (including weight of spare parts) were accepted monthly in the beginning of 1941, approximately 100 million pounds per month were being accepted in 1944.

Prime contracting airframe, engine, and propeller plants are the most important subdivisions of the industry, accounting for approximately two-thirds of total employment. Airframe prime contractors alone employ from 45 to 50 percent of the total. This group, with about 59,000 workers in January 1940, reached an employment peak of 936,000 in November 1943 and declined 18 percent to 769,000 in August 1944. The number at work in engine plants increased 21 times from 16,000 at the beginning of 1940 to a peak of 340,000 by February 1944 but decreased 7 percent to 317,000 by August. Propeller employment advanced from only 3,000 in January 1940 to 57,000 by the end of 1943. The August 1944 figure was 53,000 or 6 percent less.

The important role played by women workers in the aircraft program is measured by the ultimate employment of almost 500,000 women engaged in the production of airframes, engines, and propellers as compared with 23,000 in January 1942. Women represented 40 percent of the labor force in airframe plants and approximately 30 percent in engine and propeller plants in August 1944, whereas in January 1942 they had accounted for only about 5 percent.

Because of the possibility of enemy attack, the coastal location of aircraft plants was a source of grave concern. In 1940, about 95 percent of total airframe employment was in plants on both coasts, but by 1943 this was reduced to 61 percent. More important, in view of the threat from Japanese aircraft carriers, was the fact that the pro-

portion on the West Coast was reduced from 60 to 33 percent. Engine and propeller plants, formerly concentrated on the East Coast, had approximately 40 percent of their employment in Ohio and Michigan by 1943.

Separation rates have been higher in airframe plants than in engine and propeller plants, but have been consistently lower than the average for manufacturing as a whole.

Engine and propeller workers reported higher earnings than did airframe workers, but employees in all three branches of the industry showed an increase in income.

Description of the Industry

Prior to World War II the aircraft industry was a relatively unimportant segment of transportation-equipment manufacturing. Within 4 years it has become one of the Nation's major industries in terms of employment and output. This report traces the industry's meteoric rise as measured by employment and related factors.

The aircraft industry is composed of eight subdivisions. These are airframes, gliders, special-purpose aircraft, engines, propellers, subcontractors, parts suppliers, and modification centers.

The airframe plants are by far the most important in terms of both employment and function. Plants so designated assemble the fuselage, wings, and tail fabricated on their own premises and those of their subcontractors and, in addition, install the engines, propellers, instruments, and accessories necessary to complete the airplane for delivery. The airframe plant, often called the airplane plant, is truly a plant of final assembly, for it represents that stage at which a long series of assemblies culminates in the finished product.

Glider and special-purpose aircraft are part of the airplane family. The glider is simply an unpowered airplane. Special-purpose aircraft are primarily targets which are small, powered, pilotless airplanes controlled by radio and used in training aerial gunners. Both types of craft are simple to build. The quantities needed, however, have been relatively small in comparison with total requirements.

Production of aircraft engines calls for facilities specializing in the machining and assembling of an item requiring extremely close tolerances. This is reflected in the high proportion of skilled workers employed. However, immediate adoption of mass-production techniques was made possible by the size of the unit, the great numbers of engines required, and the relative stability of design. The experience of the automobile industry in this type of production was used to good advantage. The manufacturing process is completely different from that of airframes, with the result that engine plants (which are virtually giant machine shops) cannot perform the operations of airframe plants which are enclosed assembly areas with high ceilings and wide bays.

The propeller branch of the industry also is highly specialized. Although a propeller may at first sight appear to be simple, it is actually extremely complicated. A large proportion of skilled workers is required in its production. The machined parts going into the hub of a propeller require the closest tolerances. The blades must be perfectly balanced. Furthermore, as changes are made, to improve the effectiveness of propellers in connection with existing engines or im-

proved engines, they become more complex and continue to rely on highly skilled workmanship. Like engine plants, propeller plants are one-purpose establishments.

The producers discussed thus far are classified as prime contractors. They enter into a contractual obligation directly with the Government to deliver a finished product within a specified time. The accepted item must meet specifications, but how the job is to be done remains the responsibility of the prime contractor. The war brought with it pressure for unprecedented production in the shortest possible time. The aircraft industry met the challenge by subcontracting much of the work formerly done within the plant. Naturally, the ability to maintain the close tolerances of the aircraft industry was a major criterion in the selection of subcontractors. Many automobile plants took on the job of making items such as wing sections, fuselage sections, or tail assemblies, while plants in other industries did what they could to assist in aircraft production. As the program progressed and some of the prime contractors completed their jobs, they in turn took on subcontract work. It is estimated that a fifth of total airframe production, a third of engine, and a fourth of propeller production has been accomplished by subcontractors.

Parts suppliers are relied upon to furnish many of the items that go into the finished airplane. This branch of the industry is composed of specialists in their respective fields, devoting their attention to such products as instruments, turbo-superchargers, generators, and the like. The war naturally resulted in expansion in this segment of the industry, and new specialists entered the field. In order to maintain standardization and simplify procurement of items common to several airplane models, the Government has followed the policy of contracting for equipment which is then turned over to manufacturers for installation. Allocation of scarce items is made in accordance with the relative need for different types of airplanes.

Modification centers are a war innovation. When the airplane shortage was particularly acute, the latest changes in aeronautical design were incorporated into completed planes by modification centers until such changes could be introduced in the production line. In addition, these plants installed special equipment on combat planes, to prepare them for flying conditions in different theaters of operation. Improved production techniques and the current supply of aircraft are now such that in many cases the function of modification centers can conveniently be taken over by the airframe plants themselves.

Coverage.—The basic data for this report were secured from the Aeronautical Monthly Progress Reports developed by the Army Air Forces, and from the Bureau's reports on labor turnover and on hours and earnings. Arrangements have been made whereby all prime contractors of airframes, engines, propellers, gliders, special-purpose aircraft, and modification centers submit detailed data monthly on these schedules. Prime contractors now account for about 65 percent of the industry's total employment. Subcontractors and parts suppliers are not direct reporters under this program for the aircraft industry as such, but the data submitted by prime contractors include the basis for estimating off-site man-hours spent, permitting an estimate of the level of employment for these branches of the industry. Within the reporting group, glider, special-purpose, and

modification-center employment is relatively unimportant, representing less than 5 percent of the total. Consequently, in the present article major emphasis is placed on the prime contracting airframe, engine, and propeller plants in tracing the industry's progress.

Employment Trends

In January 1940 total employment in the entire aeronautical industry probably did not exceed 100,000 workers. When peak employment was attained in the latter part of 1943, about 2,100,000 were at work—20 times the number 4 years earlier. In August 1944 employment was approximately 1,800,000, or 14 percent below the peak (table 1).

From not quite 80,000 workers employed in prime contracting airframe, engine, and propeller plants at the beginning of 1940, the figure rose to over 1,300,000 by the end of 1943, or to 16 times the previous figure (table 2). The greater part of the expansion took place within a 2-year span. This is one of the most striking accomplishments of the war and resulted in the creation, in record time, of the world's most powerful air force.

Airframe plants now employ about two-thirds of the workers in prime contracting establishments, engine plants a little over a fourth, and propeller plants only about 5 percent.

TABLE 1.—*Total Employment in the Aircraft Industry, by Type of Contractor, January 1942–August 1944* [1]

[In thousands]

Month	1942			1943			1944		
	Total	Prime contractors [2]	Subcontractors and parts suppliers [3]	Total	Prime contractors [2]	Subcontractors and parts suppliers [3]	Total	Prime contractors [2]	Subcontractors and parts suppliers [3]
January	618.4	460.4	158.0	1,609.3	1,064.3	545.0	2,079.9	1,368.9	711.0
February	682.8	501.8	181.0	1,681.2	1,111.2	570.0	2,062.7	1,356.7	706.0
March	735.1	538.1	197.0	1,739.4	1,148.4	591.0	2,018.1	1,327.1	691.0
April	792.6	572.6	220.0	1,789.9	1,180.9	609.0	1,986.9	1,305.9	681.0
May	848.2	611.2	237.0	1,836.6	1,211.6	625.0	1,956.5	1,285.5	671.0
June	930.0	664.0	266.0	1,895.3	1,252.3	643.0	1,909.6	1,254.6	655.0
July	1,000.3	710.3	290.0	1,941.5	1,281.5	660.0	1,883.4	1,235.4	648.0
August	1,099.4	772.4	327.0	1,980.7	1,304.7	676.0	1,811.0	1,186.0	625.0
September	1,179.8	819.8	360.0	2,032.3	1,338.3	694.0			
October	1,280.3	879.3	401.0	2,073.9	1,364.9	709.0			
November	1,384.3	939.3	445.0	2,101.6	1,382.6	719.0			
December	1,496.5	1,003.5	493.0	2,079.1	1,369.1	710.0			

[1] All data are as of end of month.
[2] Includes actual employment of airframe, engine, propeller, glider, and special-purpose aircraft plants, and modification centers.
[3] 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.

Airframe prime contractors had an estimated 59,000 persons at work in 21 facilities [1] in January 1940. During the course of the year, employment more than doubled, reaching 134,000. The monthly net increase averaged 7,000 workers. The net increase in 1941 was 180,000, an average of 15,000 per month, and when Pearl Harbor was

[1] The term facility as used in this report represents a single plant fabricating a complete airframe, engine, or propeller, or different plants working under the same corporate management and together as a unit fabricating the complete airframe, engine, or propeller.

attacked, employment had exceeded 300,000. Immediately afterward, expansion was greatly accelerated largely because of the completion of new plants. The first half of 1942 witnessed an average monthly increase of 26,000 workers, but the average monthly gain for the last half of 1942 jumped to 43,000. The greatest increase in any one month occurred in December 1942, when 49,500 workers were added. Not only were existing plants expanded, but new plants were put into operation. There were 54 facilities at that time as compared with 21 in 1940. Thus, by December 1942, employment stood at 730,000, a net increase of 417,000 workers over the end of 1941.

TABLE 2.—*Total Employment in Prime Contracting Airframe, Engine, and Propeller Plants, January 1940–August 1944* [1]

Year and month	Total employment in—				Year and month	Total employment in—			
	All plants	Airframe plants	Engine plants	Propeller plants		All plants	Airframe plants	Engine plants	Propeller plants
1940					*1942*—Con.				
January [2]	77,500	59,000	16,000	2,500	May	611,272	439,188	148,738	23,346
February	82,416	62,125	17,433	2,858	June	653,033	470,765	156,964	25,304
March	87,742	65,518	19,106	3,118	July	695,359	505,274	162,893	27,192
April	95,182	71,116	20,671	3,395	August	753,425	553,240	170,680	29,505
May	104,066	77,246	23,176	3,644	September	796,954	589,503	176,597	30,854
June	114,698	85,744	24,825	4,129	October	852,862	635,056	185,387	32,419
July	126,214	93,799	28,042	4,373	November	910,932	680,535	195,869	34,528
August	135,293	101,030	29,738	4,525	December	970,359	729,995	204,177	36,187
September	146,054	108,710	32,392	4,952	*1943*				
October	156,353	117,637	33,290	5,426					
November	167,294	125,501	36,129	5,664	January	1,027,914	770,471	219,084	38,359
December	178,489	133,654	38,848	5,987	February	1,072,573	800,055	232,186	40,332
1941					March	1,106,664	819,848	244,434	42,382
					April	1,139,018	839,349	255,547	44,122
January	194,135	146,197	41,329	6,609	May	1,166,555	856,244	263,684	46,627
February	204,962	153,554	44,143	7,265	June	1,203,479	881,139	273,798	48,542
March	216,156	161,231	47,205	7,720	July	1,233,385	900,584	282,944	49,857
April	231,102	172,240	50,461	8,401	August	1,257,427	907,098	297,329	53,000
May	246,006	183,134	53,960	8,912	September	1,290,181	924,872	310,573	54,736
June	269,059	200,260	59,381	9,418	October	1,311,765	931,109	325,916	54,740
July	293,661	218,925	64,813	9,923	November	[3]1,326,345	936,466	336,128	[3] 53,751
August	319,125	238,549	70,213	10,363	December	[3]1,310,799	922,859	333,303	[3] 54,637
September	341,450	255,796	74,710	10,944	*1944*				
October	371,247	276,810	82,907	11,530					
November	391,453	291,574	87,544	12,335	January	[3]1,307,953	913,091	337,698	[3] 57,164
December	423,027	313,297	96,746	12,984	February	1,295,791	898,865	339,833	57,093
1942					March	1,267,657	875,423	335,614	56,620
					April	1,247,182	856,325	334,458	56,399
January	460,356	341,603	104,156	14,597	May	1,227,724	840,351	332,149	55,224
February	501,753	368,669	116,804	16,280	June	1,197,974	811,623	331,667	54,684
March	538,060	390,278	129,387	18,395	July	1,180,866	796,976	329,620	54,270
April	572,616	412,927	138,974	20,715	August	1,139,919	769,282	317,346	53,291

[1] All data are as of end of month.
[2] Estimated.
[3] A change in propeller coverage occurred in December 1943 and January 1944, adding 1,500 workers in December and 2,500 more in January. If November and December data were placed on a comparable basis with those for January and subsequent months, propeller employment would be 57,400 and 57,100, respectively, and the corresponding figures for total employment would be 1,330,000 and 1,313,300. Revised figures are not being published for months prior to November or for November and December since the percent of difference would be insignificant in most months, and the revised series would differ from the official series used by the Army Air Forces and the Aircraft Resources Control Office.

Employment continued upward in prime contracting airframe plants during the first 11 months of 1943, though at a slower pace. The monthly average increase for the period was down to 19,000, reflecting the general tightening of the labor market and the completion of the program of staffing needed at the levels of efficiency that had been attained. In November 1943 peak employment of 936,000 was reached, or more than 15 times the 59,000 so employed at the beginning of 1940.

Since November the employment level has been receding steadily. The average monthly decrease for the 9-month period—November 1943 to August 1944—was close to 19,000 workers. By the end of August, airframe employment had dropped to 769,000, a decline of 167,000 or 18 percent from the peak. It is significant, however, that output has continued to increase despite the employment decline as a result of increasing productivity.[2]

The need for multiple-engine airplanes resulted in extremely high engine requirements. The automobile industry provided valuable assistance on this problem and consequently is well represented in the engine phase of aeronautical production. Pratt & Whitney engines are being manufactured by Buick, Chevrolet, Ford, and Nash; Wright engines by Chrysler and Studebaker; and Rolls-Royce Merlin engines by Packard. By the time the engine industry reached peak employment, 50 percent of the workers employed in engine manufacture were under automobile management.

At the beginning of 1940 there were only about 16,000 at work in engine plants and nearly 90 percent were employed by two firms—Pratt & Whitney and the Wright Aeronautical Corporation. The engine branch of the industry more than doubled its employment during 1940 as a result of the impetus given by the European war, ending the year with almost 39,000 workers. By the end of 1941 employment was in the vicinity of 97,000, nearly 2½ times the number at the end of 1940. Engine plants were able to recruit and train employees in sufficient numbers to add an average of 9,000 per month in 1942, and an average of 11,000 per month in 1943. This continued expansion raised employment to 204,000 in December 1942 and to 333,000 in December 1943. The peak was not reached until February 1944 when 340,000 were at work in 19 facilities. Since then employment has declined each month, although horsepower produced has remained about the same. The number at work dropped to 317,000 by the end of August 1944—a decline from peak of 22,500 or 7 percent.

The rapid expansion experienced by the propeller branch of the industry paralleled that of engines. There were fewer than 3,000 workers engaged on propeller production in 1940, representing the total employment of the only two producers in the field, Hamilton Standard and Curtiss Propeller Division. These two doubled their employment by the end of the year. Three more facilities entered the industry in the following year, so that employment more than doubled, reaching 13,000 by December 1941. By the end of 1942 there were 9 propeller facilities in operation and employment had made an almost threefold expansion over 1941. The peak of 57,000 was attained toward the end of 1943.[3] However, by August 1944 the figure dropped to 53,000, or 6 percent, following closely the decrease in engine employment.

The effective use of the glider as a tactical weapon was disclosed in the German invasion of Crete in May 1941. In June 1942 there were about 2,000 persons at work in this phase of the aircraft program. Thereafter expansion was very rapid, as evidenced by the

[2] See section on production trends, p. 21.

[3] A change in propeller coverage occurred in December 1943 and January 1944, adding 1,500 workers in December and 2,500 more in January. If November and December data were placed on a comparable basis with those for January and subsequent months, propeller employment would be 57,400 and 57,100, respectively.

December 1942 employment figure of 12,000. The peak came toward the end of 1943 when 16,000 were employed, but the figure was again down to 12,000 by June 1944 and remained without change thereafter.

The modification centers came into existence in the middle of 1942 and by the end of the year employed 20,000 workers. This figure more than doubled during 1943, and during the first 6 months of 1944 employment rose to about 43,000. It remained fairly constant up to July but declined to 33,000 by the end of August.

Roughly, 1 worker is employed by subcontractors and parts suppliers for every 2 workers engaged in plants of final assembly. Toward the end of 1943 and the beginning of 1944, subcontracting plants employed about 700,000 workers (table 1). It is reasonable to expect an employment decline in these facilities commensurate with that of final assembly plants, since they are so closely affiliated. Accordingly, employment among subcontractors is estimated to have been about 650,000 by mid-1944 and 625,000 in August.

TRENDS IN EMPLOYMENT OF WOMEN

Competition of other war industries and the armed services for manpower made it plain that production schedules could be met in the aircraft industry only by extensive employment of women workers. There was at first reluctance to hire women for jobs customarily filled by men, but by 1942 the industry had recognized the need for making the adjustments necessary for the mass hiring and utilization of this new and inexperienced labor force. The significant role eventually played by women in aircraft production may be measured by the fact that whereas these plants had practically no women workers before the war, toward the end of 1943 prime contracting airframe, engine, and propeller plants employed almost 500,000—37 percent of the entire work force (table 3).

The airframe branch of the industry had numbers of jobs that could be broken down and thus performed, after only nominal training, by inexperienced women workers. At the beginning of 1942, the 18,700 women employed in prime contracting airframe plants constituted only 5.5 percent of total employment. Within that year alone, female employment showed a more than twelvefold increase, and finally in December comprised exactly one-third of the entire labor force. Although expansion did not continue at this rapid pace, some increase occurred in each succeeding month until in November 1943, when the peak female employment of 370,300 was attained, women represented practically two-fifths of the work force. Thereafter the number of women workers declined, along with the drop in total employment, but their proportion of the total remained about the same. It is beyond the scope of this report to examine the volume of female employment in individual airframe plants. It is, nevertheless, interesting to note that at peak employment, three major plants had more women than men on their pay rolls.

The total number of employees required by engine plants was a great deal smaller than that needed by airframes. This branch of the industry, therefore, delayed large-scale hiring of women. Early in 1942 there was a female work force of nearly 4 percent of the total employment, which expanded to 17 percent by the end of the year as compared with the 33 percent for airframes. Nevertheless, this

represented more than a sevenfold increase, from 3,900 in January to 34,100 by December. The engine plants apparently felt their manpower squeeze in 1943, for by November, when peak female employment was attained, they had 103,100 women workers who made up 31 percent of the labor force. There has been some decrease since then, especially between July and August 1944, but the number has remained at about 100,000 and the proportion at about 30 percent.

TABLE 3.—*Total Female Employment in Prime Contracting Airframe, Engine, and Propeller Plants, January 1942–August 1944* [1]

Year and month	Number of women in—				Percent of total employment			
	All plants	Airframe plants	Engine plants	Propeller plants	All plants	Airframe plants	Engine plants	Propeller plants
1942								
January	23,137	18,656	3,920	561	5.0	5.5	3.8	3.8
February	30,218	24,226	5,352	640	6.0	6.6	4.6	3.9
March	38,455	30,448	7,040	967	7.1	7.8	5.4	5.3
April	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
August	119,967	100,966	15,913	3,088	15.9	18.2	9.3	10.5
September	153,301	131,351	18,480	3,470	19.2	22.3	10.5	11.2
October	196,665	168,993	23,517	4,155	23.1	26.6	12.7	12.8
November	237,002	202,542	29,394	5,066	26.0	29.8	15.0	14.7
December	280,497	240,595	34,090	5,812	28.9	33.0	16.7	16.1
1943								
January	321,788	274,248	41,247	6,293	31.3	35.6	18.8	16.4
February	351,752	295,743	47,889	8,120	32.8	37.0	20.5	20.1
March	370,635	309,129	52,779	8,727	33.5	37.7	21.6	20.5
April	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
August	449,938	353,656	83,694	12,588	35.7	39.0	28.1	24.2
September	468,169	363,952	91,353	12,864	36.2	39.3	29.4	23.5
October	479,923	367,701	99,199	13,023	36.5	39.5	30.4	23.8
November	[2] 486,073	370,262	103,112	[2] 12,699	36.7	39.5	30.7	23.6
December	[2] 472,519	358,823	100,657	[2] 13,039	36.0	38.9	30.2	23.9
1944								
January	[2] 466,292	351,509	100,743	[2] 14,040	35.7	38.5	29.8	24.6
February	461,074	346,028	100,732	14,314	35.6	38.5	29.6	25.1
March	454,412	339,296	100,450	14,666	35.8	38.8	29.9	25.9
April	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
August	419,216	307,699	96,417	15,100	36.8	40.0	30.4	28.3

[1] All data are as of end of month. Data are not available prior to 1942.

[2] A change in propeller coverage occurred in December 1943 and January 1944, adding 450 women workers in December and 450 more in January. If November and December data were placed on a comparable basis with those for January and subsequent months, employment of women in propeller plants would be 13,600 and 13,500, respectively, and the corresponding figures for total female employment would be 486,900 and 473,000. Revised figures are not being published for months prior to November or for November and December, since the percent of difference would be insignificant in most months, and the revised series would differ from the official series used by the Army Air Forces and the Aircraft Resources Control Office.

Total labor requirements in propeller plants were considerably lower even than for engine plants, and many jobs were not adaptable to women workers. In January 1942 there were fewer than 600 women propeller workers—nearly 4 percent of total employment. By the end of the year 5,800 women were at work. As these represented 16 percent of the total, this branch of the industry kept pace with the engine branch which ended 1942 with a woman work force of 17 percent. Addition of female workers in propeller plants continued steadily throughout 1943. By the end of that year the approximately 13,000 employed were nearly a fourth of the labor force. Female

employment in propeller plants did not reach peak until July 1944, when 15,300 workers, or 28 percent of total employment, were women. This was not quite the proportion (31 percent) attained in engine plants.

Employment Distribution

LABOR-MARKET AREAS

An indication of the recruitment task which confronted aircraft management and assisting governmental agencies may be gauged by an examination of the industry's employment, as shown by War Manpower Commission labor-market-area classifications.[4] During each month of 1943 and of 1944 through August, more than half of the total workers in prime contracting airframe, engine, and propeller plants were in Group I areas, i. e., areas of existing labor shortage (table 4). If plants in areas of labor stringency are included (Group II), about 85 percent of total employment is accounted for during 1943 and approximately 80 percent through August 1944. Airframe plants throughout the period had far more employment in Group I areas than did engine and propeller plants. Propeller plants had least employment in areas of labor shortage. The proportion of both airframe and propeller Group I employment decreased during the period January 1943–August 1944, while engine employment tended to increase. The recruitment problem should, of course, be considered on a case basis, for conditions vary from locality to locality and in many instances the plants themselves, because of their size, created the labor-market conditions that existed. Nevertheless, the critical manpower situation in general is readily apparent from consideration of these data.

The location of airframe plants was such as to place 70 percent of employment in areas of existing labor shortage (Group I) in January 1943. In February, the airframe proportion dropped to 66 percent, and labor-market conditions continued to keep about two-thirds of total employment in Group I until peak employment was reached in November 1943. By December, 60 percent was in Group I, but in March 1944 the ratio declined to 55 percent where it remained through June. Though the proportion in Group I advanced to 58 percent in July and August, evidence of improved labor-market conditions was apparent. Employment in Groups III and IV approximated 14 percent throughout 1943, as compared with 23 percent for the period April through August 1944.

Engine plants have never had as much Group I employment as airframe plants, but the volume in this classification increased rather than decreased as time went on. Roughly, a third of engine employment was in Group I areas from January through August 1943. For the remainder of the year, the proportion approximated 45 percent. Except for January, 47 percent of employment was in areas of labor shortage during the first 7 months of 1944. In August the proportion dropped to 40 percent. About 50 percent of the employment was in areas of labor stringency (Group II) at the beginning of 1943, but the ratio declined to nearly half of this by July 1944, rising in the following

[4] 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; and Group IV—areas in which substantial labor reserves will remain after 6 months. Throughout this discussion the labor-market classifications are current as issued monthly by the War Manpower Commission. For example, an increase in percentage of employment in Group I areas may be caused either by an increase in the number of areas classified as Group I or by an increase in actual employment.

month, however, to 40 percent. Whereas, during most of 1943, approximately 15 percent of total engine employment was in areas experiencing neither shortage nor stringency, this rose to almost 25 percent during 1944.

TABLE 4.—*Percentage Distribution of Airframe, Engine, and Propeller Employment by WMC Labor-Area Classification, January 1943–August 1944* [1]

Type of plants and WMC labor-area classification [2]	1943									
	January	February	March	April	May	June	July	August	September	October
All plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	61.3	57.6	56.4	58.6	57.7	57.1	56.9	56.0	61.0	58.0
Group II	22.7	29.0	30.3	26.4	27.0	27.6	28.1	29.0	24.5	26.2
Group III	10.3	7.8	7.8	8.5	8.9	9.0	9.3	9.3	8.9	10.3
Group IV	5.7	5.6	5.5	6.5	6.4	6.3	5.7	5.7	5.6	5.5
Airframe plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	70.4	65.7	64.6	68.1	66.7	66.2	67.0	65.8	68.6	64.7
Group II	15.8	21.8	23.0	17.9	19.0	19.6	19.1	20.3	18.2	20.0
Group III	6.6	5.4	5.4	5.7	6.0	6.1	6.6	6.4	6.0	8.2
Group IV	7.2	7.1	7.0	8.3	8.3	8.1	7.3	7.5	7.2	7.1
Engine plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	35.2	35.0	34.2	32.7	33.5	33.1	32.8	34.1	45.4	45.1
Group II	42.9	51.0	51.8	51.3	50.2	50.9	51.5	50.6	39.5	39.9
Group III	20.2	12.6	12.5	14.6	14.9	14.6	14.4	14.1	12.9	12.8
Group IV	1.7	1.4	1.5	1.4	1.4	1.4	1.3	1.2	2.2	2.2
Propeller plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	27.5	26.4	27.5	26.6	26.0	26.3	11.4	10.7	20.8	20.0
Group II	44.9	45.7	45.8	46.0	44.5	43.1	57.3	55.5	45.0	47.7
Group III	27.6	27.9	26.1	26.7	28.5	29.2	29.8	32.2	34.2	32.3
Group IV	-------	-------	.6	.7	1.0	1.4	1.5	1.6	-------	-------

Type of plants and WMC labor-area classification [2]	1943—Con.		1944							
	November	December	January	February	March	April	May	June	July	August
All plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	58.0	54.5	51.6	55.6	51.3	51.0	50.4	50.7	53.2	50.7
Group II	26.4	29.9	31.2	25.8	28.9	25.9	26.8	26.6	22.2	26.9
Group III	10.4	10.3	10.9	12.0	13.5	17.3	16.9	17.1	19.2	11.3
Group IV	5.2	5.3	6.3	6.6	6.3	5.8	5.9	5.6	5.4	11.1
Airframe plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	65.0	60.3	60.2	61.6	55.4	55.1	54.2	54.8	57.6	57.6
Group II	20.2	25.0	25.3	22.1	26.4	22.1	22.8	22.5	16.9	18.1
Group III	7.9	7.6	5.9	7.7	9.8	14.7	14.8	15.2	18.1	11.4
Group IV	6.9	7.1	8.6	8.6	8.4	8.1	8.2	7.5	7.4	12.9
Engine plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	44.7	44.4	35.4	47.4	47.4	47.6	47.5	47.5	47.9	40.4
Group II	40.4	40.0	41.7	29.3	29.5	29.0	28.2	27.7	27.0	39.5
Group III	13.8	14.4	21.7	20.9	21.2	22.4	23.3	23.4	23.6	11.6
Group IV	1.1	1.2	1.2	2.4	1.9	1.0	1.0	1.4	1.5	8.5
Propeller plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Group I	20.3	19.7	9.5	9.6	9.6	9.6	9.4	9.2	20.5	11.6
Group II	47.6	50.0	64.5	64.3	64.4	65.0	78.5	81.2	70.2	79.2
Group III	32.1	30.3	26.0	26.1	26.0	25.4	10.8	8.3	8.0	7.9
Group IV	-------	-------	-------	-------	-------	-------	1.3	1.3	1.3	1.3

[1] All data are as of end of month.
[2] 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; and Group IV—Areas in which substantial labor reserves will remain after 6 months.

The propeller branch had about half of its employment in Group II areas during 1943. However, beginning with January and continuing through the first 8 months of 1944, Group II employment increased from 65 to 80 percent. Sharp variations in employment in labor-

market area classes indicate the preponderance of a few large plants in the reporting sample causing major shifts which were of less significance than might at first appear.

GEOGRAPHIC DISTRIBUTION

During World War I the sea was considered an adequate barrier against the enemy, completely excluding the necessity of considering, in the location of industrial facilities, the possibility of attack. The product of the industry with which this report is concerned changed all that. Because of the potentialities of the present-day airplane as an offensive weapon, it could no longer be taken for granted that the Atlantic and Pacific Oceans made this continent impregnable. Consequently, the coastal location of the airframe, engine, and propeller plants at the outset of the war was a source of uneasiness. Plans for new plants called for location within the interior of the country. Existing facilities, however, were expanded, despite their questionable location, because of the urgent need for airplanes. The extent of the geographic dispersion of the industry is apparent from the fact that at the time of the United States' entrance into the war, airframe, engine, and propeller plants were situated in 16 States as compared with 25 States by the end of 1943. The shift in geographic distribution can be visualized in more detail from consideration of changes in the proportion of employment in the six Army Air Forces Procurement Districts [5] as the industry grew (table 5).

In 1940, approximately 60 percent of airframe employment was in the Western District and 35 percent in the Eastern District. Thus, 95 percent of the industry was in a vulnerable location. One year later, almost 90 percent of the airframe workers were still on both coasts. It was not until 1943 that the results of inward migration became apparent. By the end of that year, although 28 percent of employment was in the Eastern District, the proportion in the Western District had fallen to 33 percent. Thus, within a 3-year period the 95 percent coastal employment was reduced to 61 percent, but especially important (in view of the threat from Japanese ship-based air power) was the fact that the proportion on the West Coast decreased from 60 to 33 percent. Despite the inland shift, southern California continued to be the most important airframe region. At the beginning of 1940, the State of California had 32,000 airframe workers or more than half of total airframe employment. By the time Pearl Harbor was attacked, this figure exceeded 150,000 and was 48 percent of the total. Peak was reached in July 1943 with 280,000 at work, but the proportion of the total had fallen to 31 percent. New York was the only other State that approached California in airframe employment; the highest level attained in New York was slightly more than 135,000 in September 1943. The move inland is readily apparent from the employment peak in 1943 of 41,000 for Oklahoma and 69,000 each for Kansas and Texas.

Engine employment was found in 7 States in 1940, Connecticut and New Jersey being the principal areas of production. Conse-

[5] States included in Army Air Forces Procurement Districts are as follows: *Eastern.*—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *Southeastern.*—Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. *Central.*—Michigan and Ohio. *Mid-Central.*—Illinois, Indiana, Iowa, Minnesota, and Wisconsin. *Mid-Western.*—Arkansas, Colorado, Kansas, Louisiana, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. *Western.*—Arizona, California, Idaho, Nevada, Oregon, Utah, and Washington.

quently, the Eastern District had from 80 to 90 percent of all engine employment throughout the year. As a result of the entrance of the automobile industry into this phase of aircraft manufacture, the Central District (covering Ohio and Michigan), which had accounted for only 2 to 5 percent of engine employment in 1940, contained 39 percent of the workers by the end of 1943. The proportion in the Eastern District had declined to a third. Michigan led all other States in engine employment by November 1943, with 97,600; this figure was more than double that for either Connecticut or New Jersey, the former leaders in the field. The West Coast, though first in airframe production, had but one small engine plant whose prime contracts were completed by mid-1943.

TABLE 5.—*Percentage Distribution of Airframe, Engine, and Propeller Employment, by Army Air Forces Procurement Districts, June 1940–June 1944* [1]

Army Air Forces Procurement District	1940		1941		1942		1943		1944
	June	December	June	December	June	December	June	December	June
All plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Eastern	48.1	46.5	42.7	36.2	35.0	33.7	31.3	30.3	28.9
Southeastern	.5	.5	.9	.8	.7	.9	1.5	2.3	2.9
Central	.3	1.1	4.7	9.9	15.8	17.6	19.4	19.3	19.7
Mid-Central	2.9	3.8	3.4	4.1	5.2	5.5	7.0	8.7	9.5
Mid-Western	2.3	4.0	5.6	6.9	10.0	12.6	14.6	16.2	17.5
Western	45.9	44.1	42.7	42.1	33.3	29.7	26.2	23.2	21.5
Airframe plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Eastern	35.0	35.1	33.2	30.2	30.7	30.5	28.3	28.1	27.1
Southeastern	.7	.7	1.2	1.1	1.0	1.2	2.0	3.2	4.1
Central			.8	2.7	8.3	11.6	12.6	11.1	11.4
Mid-Central					.1	.6	2.0	2.6	2.7
Mid-Western	3.1	5.4	7.5	9.3	13.8	16.7	19.4	22.0	23.1
Western	61.2	58.8	57.3	56.7	46.1	39.4	35.7	33.0	31.6
Engine plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Eastern	84.8	77.4	66.6	49.9	44.0	41.7	37.6	33.0	30.4
Southeastern									.6
Central	1.5	5.0	17.6	33.1	36.5	36.0	38.0	38.6	36.5
Mid-Central	13.3	17.2	15.5	16.7	19.3	22.2	22.5	25.6	25.9
Mid-Western							1.7	2.8	6.6
Western	.4	.4	.3	.3	.2	.1	.2		
Propeller plants	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Eastern	100.0	100.0	92.3	79.1	61.8	52.9	51.3	49.7	48.0
Southeastern									
Central			7.7	12.4	27.5	37.0	37.6	40.6	41.8
Mid-Central				8.5	10.7	10.1	11.1	9.7	10.2
Mid-Western									
Western									

[1] All data are as of end of month.

In 1940 all propeller employees were in the Eastern District, in the States of Connecticut and New Jersey. As in the case of engines, the assistance of outside industry had the effect of moving part of the production inland. In December 1943, 50 percent of the employment was in the Eastern and 40 percent in the Central District. In June 1944, Ohio had more propeller employment than any other State, with almost 14,000 employees; and Michigan and New Jersey were next, with 9,000 each; Connecticut had approximately 8,000 workers. States on the West Coast had no propeller production.

Labor Turnover

The magnitude of the task confronting persons concerned with the manning of aircraft plants becomes clearer when consideration is

given to turnover in the industry. Before additional workers could be added to the labor force to provide for increased schedules, those who quit or were drafted had first to be replaced. The recruitment problem became more and more difficult as time passed because of increasing competition for a rapidly depleting supply of labor. Thus, in 1941, airframe, engine, and propeller plants had to hire 1,500 workers to increase employment by 1,000, but in the following year to obtain the same increase it was necessary to hire 2,100 workers. The situation was most critical in 1943, though this ratio was no longer meaningful, as the rate of expansion slowed down. The main cause of this situation was separations, 60 to 70 percent of which were voluntary. In 1941, the average monthly rate for all separations was 3.3 per 100 workers. It rose to 5.3 in 1942 and to 5.7 in 1943 (table 6). To meet this situation the War Manpower Commission introduced certificates of availability and a controlled-referral program to help keep the production lines manned. It should be noted, however, that separation rates in airframe, engine, and propeller plants have consistently been lower than the average for manufacturing as a whole. The separation rate averaged 6.3 percent in the first 8 months of 1944, but the increase over 1943 was due to an increase in discharges and lay-offs and not to an increase in the quit rate.

It was more difficult to recruit and maintain the airframe branch of the industry than the engine and propeller branches, not only because more workers were required, but because airframe employees showed a much higher incidence of quits than engine and propeller workers. For the whole year 1941, approximately 30 airframe employees of every 100 on the pay roll quit, as against only 17 in engine and propeller plants. These voluntary withdrawals remained at about the same level in engine and propeller plants in 1942 but increased to approximately 45 quits per 100 employees in airframe plants. All 3 branches recorded increases in 1943, but again the quits rose most in airframe plants, advancing to 55 per 100 employees. There were 37 quits for every 100 employed in propeller plants in 1943 and only 30 in engine plants. The 1944 picture through August remains substantially the same, the poorest showing being made by airframe and the best by engine plants. For a variety of reasons the quit rate among female workers was roughly double that of males in 1943 and somewhat less than double in 1944 (table 7). The female quit rates have been highest in airframe plants. With women accounting for 40 percent of airframe employment and about 30 percent of engine and propeller employment, the effect on separation rates is obvious.

The greater instability among airframe workers is understandable. The difficulty is a basic one inherent in the mushrooming of an industry. The necessity for hiring thousands of workers in a short space of time resulted in the acquisition of many inadaptable to factory employment. Turnover is always greater among those newly hired than among those with longer work experience in an establishment. Reference has already been made to the larger proportion of women in this branch of the industry and the effect of their higher quit rates. Serious housing, transportation, and shopping problems have arisen in centers of large airframe production, and these too have contributed to the higher separations in this branch of the industry. This has affected women especially, many of whom, with home responsibilities as well, found continuous work 6 days a week impossible. Though

there is no record of the number of individuals quitting the industry as opposed to those moving from one establishment to another, it is significant that many of the quits have been temporary as indicated by the numbers rehired. Fortunately, airframe management and labor have recognized the problems involved and have done much to meet them in order to keep production lines fully manned.

TABLE 6.—*Labor-Turnover Rates (per 100 Employees) in Airframe, Engine, and Propeller Plants,[1] January 1941–August 1944*

[1944 figures revised]

Year and month	Total airframe, engine, and propeller plants					Airframe plants				
	Total accessions	Separations				Total accessions	Separations			
		Total	Quits	Military	All other [2]		Total	Quits	Military	All other [2]
1941 [3]										
Annual rate [4]	114.7	39.0	27.0	3.7	8.3	124.1	43.0	30.2	3.6	9.2
January	12.0	3.3	2.2	.4	.7	12.0	3.5	2.4	.4	.7
February	7.8	3.2	2.0	.5	.7	7.8	3.5	2.3	.4	.8
March	8.1	3.9	2.5	.4	1.0	9.0	4.1	2.4	.4	1.3
April	9.5	3.4	2.5	.3	.6	10.3	3.7	2.8	.3	.6
May	9.9	3.5	2.5	.3	.7	10.5	4.0	2.8	.3	.9
June	10.2	2.8	2.0	.2	.6	10.9	3.0	2.3	.2	.5
July	11.3	3.0	2.1	.2	.7	12.5	3.3	2.4	.1	.8
August	10.1	3.2	2.4	.1	.7	11.4	3.6	2.8	.1	.7
September	9.5	3.3	2.7	.1	.5	10.5	3.6	3.0	.1	.5
October	9.6	3.5	2.4	.2	.9	10.6	3.9	2.7	.2	1.0
November	7.4	2.6	1.8	.2	.6	8.2	3.0	2.1	.2	.7
December	9.3	3.3	1.9	.8	.6	10.4	3.8	2.2	.9	.7
1942 [3]										
Annual rate [4]	123.9	63.9	38.5	17.2	8.2	134.6	72.0	45.2	18.0	8.8
January	11.3	3.7	2.0	.9	.8	11.2	4.1	2.4	1.0	.7
February	8.2	3.5	2.2	.7	.6	8.0	3.9	2.6	.8	.5
March	8.7	4.6	3.0	.8	.8	8.7	5.4	3.6	.9	.9
April	9.5	5.3	3.8	.9	.6	10.0	6.1	4.4	.9	.8
May	8.9	4.8	3.4	.8	.6	9.9	5.6	4.0	.9	.7
June	10.3	4.3	2.9	.9	.5	12.0	4.9	3.5	.9	.5
July	10.6	5.1	3.1	1.3	.7	12.5	5.7	3.7	1.4	.6
August	10.9	6.1	3.6	1.8	.7	13.0	7.1	4.3	1.9	.9
September	12.0	7.2	4.1	2.4	.7	13.6	8.1	4.8	2.5	.8
October	12.3	7.4	3.9	2.8	.7	13.3	8.0	4.4	2.8	.8
November	11.6	6.3	3.4	2.2	.7	12.4	6.9	3.9	2.2	.8
December	9.6	5.6	3.1	1.7	.8	10.0	6.2	3.6	1.8	.8
1943 [5]										
Annual rate [4]	91.4	68.6	49.9	11.1	7.6	92.5	73.7	55.0	10.9	7.8
January	10.2	5.6	3.3	1.8	.5	10.5	6.1	3.7	1.8	.6
February	8.9	5.5	3.3	1.7	.5	9.1	5.9	3.7	1.7	.5
March	8.9	6.3	4.3	1.4	.6	8.9	6.7	4.8	1.4	.5
April	7.5	5.6	4.2	.9	.5	7.4	6.0	4.6	.8	.6
May	7.0	5.1	3.9	.6	.6	7.1	5.5	4.3	.6	.6
June	8.1	5.5	4.1	.7	.7	8.5	5.9	4.6	.7	.6
July	8.1	6.2	4.8	.8	.6	8.3	6.6	5.2	.7	.7
August	7.2	6.4	5.1	.8	.5	7.3	6.9	5.6	.8	.5
September	7.9	6.3	5.0	.7	.6	8.1	6.9	5.5	.7	.7
October	7.3	5.8	4.5	.7	.6	7.5	6.2	4.9	.7	.6
November	6.1	5.4	3.9	.5	1.0	6.0	5.7	4.2	.5	1.0
December	4.2	4.9	3.5	.5	.9	3.8	5.3	3.9	.5	.9
1944 [6]										
January	5.4	5.7	4.0	.6	1.1	5.0	6.1	4.3	.6	1.2
February	4.4	5.1	3.6	.5	1.0	4.0	5.5	4.0	.5	1.0
March	4.1	6.4	4.2	.8	1.4	3.8	6.9	4.6	.9	1.4
April	4.1	5.8	4.1	.9	.8	3.7	6.1	4.3	1.0	.8
May	4.8	7.2	4.4	1.1	.8	4.5	6.7	4.7	1.2	.8
June	5.5	6.3	4.9	.8	1.5	5.6	8.0	5.4	1.0	1.6
July	5.0	6.3	4.6	.6	1.1	5.0	6.4	4.9	.7	.8
August	4.2	7.9	5.7	.4	1.8	4.5	8.7	6.2	.5	2.0

See footnotes at end of table.

TABLE 6.—*Labor-Turnover Rates (per 100 Employees) in Airframe, Engine, and Propeller Plants, January 1941–August 1944*—Continued

Year and month	Engine plants					Propeller plants				
	Total accessions	Separations				Total accessions	Separations			
		Total	Quits	Military	All other [2]		Total	Quits	Military	All other [2]
1941 [3]										
Annual rate [4]	90.0	27.3	17.2	3.2	6.9	71.0	24.4	17.2	2.6	4.6
January	12.0	1.9	1.0	.4	.5	7.2	1.1	.9	.1	.1
February	8.1	2.3	1.2	.5	.6	5.9	2.8	1.2	1.2	.4
March	6.1	3.5	2.9	.2	.4	6.7	2.8	1.5	.3	1.0
April	7.6	2.5	1.6	.4	.5	6.3	2.3	1.7	.1	.5
May	8.6	2.3	1.6	.2	.5	5.8	1.9	1.3	.3	.3
June	8.5	2.3	1.3	.3	.7	6.3	2.6	2.1	.1	.4
July	8.3	2.3	1.2	.2	.9	6.1	2.6	1.7	.1	.8
August	6.7	2.1	1.2	.1	.8	4.0	1.7	1.4	.1	.2
September	7.1	2.5	1.8	.1	.6	3.9	2.5	2.2	(6)	.3
October	6.7	2.4	1.6	.2	.6	6.1	1.7	1.5	.1	.1
November	4.9	1.4	.9	.1	.4	5.1	1.2	.9	(6)	.3
December	5.4	1.8	.9	.5	.4	7.6	1.2	.8	.2	.2
1942 [3]										
Annual rate [4]	93.1	40.8	19.1	15.1	6.6	90.2	35.9	17.6	13.6	4.7
January	11.7	2.4	1.1	.7	.6	11.3	2.5	1.3	.9	.3
February	8.2	2.3	1.3	.5	.5	11.9	1.9	1.3	.4	.2
March	8.5	2.7	1.6	.5	.6	11.2	2.5	1.6	.5	.4
April	7.8	3.4	1.9	.8	.7	9.9	2.5	1.4	.8	.3
May	6.3	2.9	1.7	.7	.5	7.8	2.7	1.7	.6	.4
June	6.2	2.9	1.6	.8	.5	5.2	2.4	1.2	.9	.3
July	5.7	3.4	1.6	1.2	.6	5.4	2.6	1.2	1.0	.4
August	4.8	3.3	1.4	1.4	.5	4.8	3.6	1.6	1.2	.8
September	7.4	4.6	1.9	2.1	.6	4.7	4.0	1.7	1.9	.4
October	8.9	5.0	1.9	2.6	.5	5.6	4.8	2.1	2.3	.4
November	9.3	4.4	1.7	2.2	.5	6.0	3.8	1.5	1.9	.4
December	8.3	3.5	1.4	1.6	.5	6.4	2.6	1.0	1.2	.4
1943 [5]										
Annual rate [4]	87.1	48.5	29.7	11.3	7.5	82.5	55.7	36.9	10.8	8.0
January	9.3	3.8	1.6	1.7	.5	7.4	3.8	1.8	1.5	.5
February	7.8	3.6	1.3	1.8	.5	7.8	3.8	1.8	1.6	.4
March	8.6	4.5	2.3	1.5	.7	8.0	3.5	1.9	1.2	.4
April	8.0	4.0	2.5	1.0	.5	6.3	3.5	2.0	1.1	.4
May	6.5	3.6	2.3	.8	.5	7.9	3.8	2.5	.9	.4
June	6.6	4.0	2.6	.7	.7	7.0	4.0	2.7	.8	.5
July	7.0	4.6	3.1	.8	.7	8.1	5.5	4.0	.7	.8
August	6.8	4.6	3.3	.7	.6	7.0	5.4	4.1	.7	.6
September	7.3	4.4	3.1	.7	.6	7.8	4.9	3.9	.6	.4
October	6.8	4.1	2.8	.6	.7	6.2	6.2	4.5	.7	1.0
November	6.6	3.8	2.6	.5	.7	4.8	6.1	3.8	.6	1.7
December	5.8	3.5	2.2	.5	.8	4.2	5.2	3.9	.4	.9
1944 [5]										
January	7.0	4.3	3.0	.6	.7	4.7	4.8	3.4	.8	.6
February	5.6	4.0	2.6	.5	.9	4.4	4.3	3.0	.7	.6
March	5.0	5.0	2.8	.7	1.5	4.0	4.7	3.4	.8	.5
April	5.3	4.9	3.1	.7	1.1	5.1	6.1	4.6	.9	.6
May	5.6	4.9	3.3	.6	1.0	4.6	7.3	4.9	.7	1.7
June	5.2	5.1	3.2	.4	1.5	5.7	5.7	4.7	.4	.6
July	4.8	5.7	3.8	.3	1.6	6.3	6.4	5.3	.3	.8
August	3.2	5.9	4.1	.2	1.6	4.6	6.5	5.5	.3	.7

[1] Turnover data are not strictly comparable with employment data, since they have been obtained from different sources and coverage is not identical.
[2] Includes discharges, lay-offs, and miscellaneous separations.
[3] Based on wage earners only.
[4] Annual rates are the sums of the monthly rates per 100 employees.
[5] Based on total employment.
[6] Less than a tenth of 1 percent.

TABLE 7.—*Labor-Turnover Rates (per 100 Employees) in Airframe, Engine, and Propeller Plants, by Sex, January 1943–August 1944*[1]

[1944 figures revised]

Year and month	Total accessions							
	All plants		Airframe plants		Engine plants		Propeller plants	
	Male	Female	Male	Female	Male	Female	Male	Female
1943								
January	7.5	17.1	7.8	17.0	6.9	18.9	4.4	16.7
February	6.7	13.3	6.9	13.2	6.1	14.0	5.8	13.8
March	7.0	12.2	7.2	11.9	6.1	14.2	6.5	12.9
April	6.3	10.3	6.5	9.8	5.9	13.1	5.1	9.5
May	5.5	9.5	5.7	9.3	4.7	10.2	6.1	12.8
June	6.4	11.1	6.9	11.2	4.6	10.0	6.3	13.6
July	6.5	10.5	7.0	10.4	4.4	11.0	7.4	10.3
August	5.8	9.3	6.1	9.3	4.5	9.5	6.6	8.1
September	6.6	10.0	7.0	9.9	5.0	10.9	7.2	9.6
October	6.0	9.2	6.4	9.2	4.5	9.5	5.6	8.0
November	4.9	7.3	5.1	7.4	4.3	7.1	4.6	5.5
December	3.6	4.5	3.5	4.1	3.9	6.7	3.9	5.0
1944								
January	4.5	6.1	4.5	5.8	4.8	7.8	3.4	8.5
February	3.5	5.5	3.3	5.2	4.1	7.2	3.8	5.9
March	3.1	5.7	3.0	5.1	3.4	8.0	3.1	6.4
April	3.2	5.4	2.9	4.9	3.8	7.0	4.0	8.1
May	3.5	6.6	3.6	6.1	3.4	8.8	3.6	7.2
June	4.2	7.7	4.4	7.4	3.7	8.6	4.4	9.0
July	3.8	7.0	3.8	6.7	3.5	7.7	5.3	8.6
August	3.3	5.7	3.5	6.1	2.8	3.9	4.2	5.5

Year and month	Total separations[2]							
	All plants		Airframe plants		Engine plants		Propeller plants	
	Male	Female	Male	Female	Male	Female	Male	Female
1943								
January	5.6	5.7	6.0	6.0	4.0	3.6	3.8	3.0
February	5.5	5.6	5.9	5.9	3.9	3.6	3.6	3.5
March	6.0	6.8	6.4	7.2	4.3	4.7	3.6	4.0
April	4.9	6.8	4.9	6.8	3.6	5.3	3.5	3.7
May	4.4	6.5	4.6	6.9	3.5	4.1	3.5	4.5
June	4.6	7.1	4.8	7.5	3.7	4.7	3.5	5.3
July	5.2	7.8	5.5	8.2	4.3	5.5	5.3	6.3
August	5.5	8.1	5.9	8.5	3.9	6.0	5.1	6.4
September	5.5	7.8	6.1	8.1	3.6	6.3	4.5	6.1
October	4.9	7.4	5.3	7.7	3.2	6.0	6.2	6.3
November	4.3	7.2	4.6	7.5	3.0	5.5	5.6	7.3
December	4.0	6.6	4.2	7.0	2.6	4.7	5.4	4.4
1944								
January	4.7	7.3	5.1	7.8	3.5	5.3	4.8	4.8
February	4.3	6.4	4.7	6.7	3.2	4.9	4.4	4.2
March	5.7	7.5	6.2	8.0	4.3	5.9	4.9	4.2
April	5.3	6.8	5.6	7.1	4.2	5.7	6.1	6.0
May	5.8	7.2	6.2	7.5	4.0	5.7	6.8	8.3
June	6.3	8.7	7.1	9.4	4.4	6.8	5.4	6.3
July	5.2	7.9	5.4	7.9	4.6	8.1	6.3	6.8
August	6.8	9.8	7.6	10.3	4.8	8.2	6.3	6.9

See footnotes at end of table.

TABLE 7.—*Labor-Turnover Rates (per 100 Employees) in Airframe, Engine, and Propeller Plants, by Sex, January 1943–August 1944* [1]—Continued

[1944 figures revised]

Year and month	Quits							
	All plants		Airframe plants		Engine plants		Propeller plants	
	Male	Female	Male	Female	Male	Female	Male	Female
1943								
January	2.5	5.0	2.8	5.3	1.3	2.9	1.4	2.6
February	2.5	4.9	2.8	5.2	1.4	2.9	1.4	2.8
March	3.4	5.9	3.8	6.3	1.9	3.4	1.7	3.3
April	3.2	6.1	3.6	6.4	2.0	4.1	1.5	3.2
May	2.9	5.7	3.2	6.0	1.9	3.3	2.0	3.8
June	2.9	6.2	3.2	6.6	2.0	3.9	2.0	4.4
July	3.6	6.9	3.9	7.4	2.6	4.4	3.9	4.4
August	3.8	7.3	4.2	7.8	2.4	5.2	3.6	5.6
September	3.8	7.1	4.3	7.4	2.1	5.7	3.4	5.4
October	3.2	6.6	3.5	7.0	1.7	5.1	4.5	4.6
November	2.8	5.7	3.1	5.9	1.7	4.5	3.7	4.0
December	2.5	5.4	2.7	5.7	1.4	4.0	4.0	3.4
1944								
January	3.0	5.8	3.2	6.2	2.3	4.5	3.2	4.1
February	2.8	5.2	3.0	5.5	1.9	3.8	2.9	3.3
March	3.3	5.8	3.6	6.3	2.1	4.0	3.3	3.5
April	3.1	5.7	3.2	6.1	2.4	4.2	4.3	5.3
May	3.3	6.0	3.5	6.5	2.3	4.1	4.4	6.1
June	3.8	6.7	4.2	7.3	2.5	4.7	4.4	5.4
July	3.5	6.6	3.6	6.7	2.7	6.2	5.1	5.9
August	4.5	7.7	4.9	8.2	3.2	6.2	5.4	5.9

[1] Data not available prior to January 1943.
[2] Includes quits, military separations, discharges, lay-offs, and miscellaneous separations.

Military separation rates were about the same for the 3 branches of the industry (table 6). Withdrawals for the armed forces were very small during 1941, amounting to less than 4 per 100 employees. With the United States' entrance into the war, inductions increased, resulting in 17 of every 100 employees being taken into the services during 1942. While the average monthly rate for 1941 was 0.3 per 100 workers, it increased to approximately 1.5 for 1942, with the peak of 2.8 coming in October. Manning and replacement schedules did much to slow down the rate of induction during the beginning of 1943. However, the demand for workers was so great and the supply of available manpower so limited that West Coast airframe manufacturers made it clear that their plants could offer airplanes or men for the services but not both. There was agitation for draft deferment for West Coast airframe workers in October 1943, and a stay of induction was finally ordered early in November for this area. The military separation rate consequently declined to 0.5 per 100 by November 1943. Nevertheless, about 11 out of every 100 airframe, engine, and propeller workers entered the armed forces during 1943. Cancellation of occupational deferments held by men under 26 years of age increased the military separation rate during the first half of 1944, but the industry's increased productivity was

relied upon to offset the manpower taken by the armed forces. Since then the rate has been declining in line with the retarded rate of induction.

Discharges and lay-offs were of little significance until 1944. With workers so hard to get, discharges were largely confined to cases of serious infraction of company regulations. This was particularly true through 1943. Later, plants began to weed out unsatisfactory personnel. Lay-offs, except in a few isolated cases, were unheard of prior to 1944 but have been increasing. Contract terminations and cutbacks, inevitable after the defeat of Germany, will cause the discharge and lay-off rates to become more important in the near future.

Absenteeism of Workers

Absenteeism became of major concern during the present emergency because lost time could not be afforded in the production of vitally needed war goods. The aircraft industry, particularly the airframe branch, realized that a reduction in absenteeism was possible only by a determination of the causes and the adoption of remedial action designed to keep worker morale high both on and off the job. The measures taken, especially with reference to the provision of community facilities, were never adequate to counteract the strains imposed upon living and working conditions by the exigencies of the war. Efforts were made to provide more adequate wash- and lunchroom facilities. Absence-control measures were undertaken, to give assistance where needed or to institute disciplinary action where necessary. In addition, health and recreation facilities were established and personal services provided, such as assistance in finding housing and making car-pooling arrangements. Day nurseries were established so that women workers could be on the job regularly. Provisions were also made for additional housing, better transportation facilities, and more convenient shopping hours.

Despite the vigorous action generally adopted by airframe plants, absence rates were slightly higher in this branch of the industry than in engine and propeller plants in 1943. Rates in 1943 were generally about 7 to 8 percent in airframe plants and 6 to 7 percent in engine and propeller plants (table 8). During the influenza epidemic in December 1943, the absence rate slightly exceeded 10 percent for airframes and approximated 9 percent for engines and propellers. With the turn of the year, the rates returned to their former level. However, during March and April the propeller branch, with rates of about 8 percent, exceeded the airframe figure. The sharp drop registered from April to May for the three branches is not a real measure of change, since the figures for April and all previous months were computed for direct workers alone and all subsequent figures are based on total employment. Since April, the rate for all branches has been around 6 to 7 percent. Throughout the period covered, the combined airframe, engine, and propeller rate showed slight variation from the average for all manufacturing. Thus, in March 1943 the combined aircraft figure was 6.6 percent as compared with 6.1 for all manufacturing. In August 1944 the rates were 6.5 and 6.6, respectively.

TABLE 8.—*Absence Rates* [1] *in Airframe, Engine, and Propeller Plants, January 1943–August 1944*

Month	1943 [2]				1944 [2]			
	All plants	Airframe plants	Engine plants	Propeller plants	All plants	Airframe plants	Engine plants	Propeller plants
January	(3)	6.3	(3)	(3)	7.1	7.4	6.3	6.5
February	(3)	6.8	(3)	(3)	7.5	7.7	6.7	7.5
March	6.6	6.7	6.1	6.0	7.1	7.3	6.5	7.9
April	6.5	6.7	5.8	6.3	7.9	8.1	7.3	8.4
May	6.9	7.1	6.1	5.9	6.4	6.5	6.3	6.5
June	6.9	7.2	6.1	6.4	6.2	6.2	6.2	5.2
July	7.4	7.8	6.2	6.9	6.4	6.2	6.9	6.2
August	7.6	8.0	6.6	7.6	6.5	6.2	7.3	6.1
September	7.1	7.4	6.1	7.2				
October	7.3	7.5	6.6	7.3				
November	7.1	7.3	6.8	6.5				
December	9.7	10.1	8.7	9.1				

[1] Based on workweek nearest 15th of month.
[2] Absence rates for period January 1943–April 1944 based on man-hours lost as a percent of time worked plus time lost by direct workers. Beginning with May 1944 absence rates are based on total employment and represent man-shifts lost as a percent of man-shifts scheduled.
[3] Reports for engine and propeller plants not submitted prior to March 1943.

Hours and Earnings [6]

As in other war industries, aircraft workers have experienced materially increased earnings. This was the result primarily of the extended workweek and resulting overtime pay (time and a half for all hours in excess of 40) as well as increases granted in hourly rates. Upgrading as a result of acquired skill and differentials for second- and third-shift employment also had their effect.

When the National War Labor Board assumed responsibility for wage structure, there was no uniformity in hourly rates paid to airframe workers performing identical jobs. The Board considered it impossible to act equitably under the circumstances and appointed a special committee to study the wage structure of West Coast airframe plants. On the basis of this study, which covered eight companies, the committee in March 1943 proposed various changes for the region. This served as a pattern for the airframe industry and, together with subsequent orders, resulted in the establishment of basic rates for specified occupations and grades, entrance rates, provision for automatic upgrading, and shift differentials.

Average hourly earnings in airframe plants increased steadily from $0.69 in January 1940 to $1.16 by August 1944 (table 9). The average weekly earnings rose from $27.85 to $54.15 during the same period. This exceeded the income for manufacturing workers generally, since the average hourly earnings for this group rose from $0.66 to $1.02 and average weekly earnings from $24.56 to $45.85 during the corresponding period. However, the workweek of airframe wage earners was longer than that prevailing in manufacturing as a whole, namely, 41 hours as against 38 in January 1940 and 47 as against 45 in August 1944. The airframe hourly earnings continued to rise in 1944, probably because of the decrease in the number of learners and the effects of upgrading resulting from acquired skill.

[6] The aircraft figures shown here cover all prime contractors of completed airframes, engines, and propellers, including converted plants. They should not be compared with monthly data for the aircraft and aircraft-engine industries released by the Bureau's Employment Statistics Division which exclude converted plants but cover subcontractors and parts manufacturers as well as prime contractors.

TABLE 9.—*Average Hours and Earnings* [1] *of Wage Earners in Airframe, Engine, and Propeller Plants, January 1940–August 1944*

Year and month	Airframe plants			Engine plants			Propeller plants		
	Average			Average			Average		
	Weekly hours [2]	Weekly earnings	Hourly earnings	Weekly hours [2]	Weekly earnings	Hourly earnings	Weekly hours [2]	Weekly earnings	Hourly earnings
1940									
January	40.6	$27.85	$0.69	47.0	$40.09	$0.85	45.8	$35.29	$0.77
February [4]	39.9	27.55	.69	44.9	38.90	.87	37.6	27.69	.74
March	41.1	28.48	.69	45.4	38.15	.84	45.5	34.94	.77
April	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
August	43.6	31.87	.73	46.1	38.65	.84	44.2	33.71	.76
September	44.3	32.34	.73	47.1	38.50	.82	44.7	34.09	.76
October	44.0	32.64	.74	45.9	38.61	.84	44.1	33.77	.77
November	44.3	32.95	.74	43.4	37.23	.86	37.6	29.37	.78
December	44.5	32.97	.74	46.5	39.39	.85	44.7	34.30	.77
1941									
January	44.7	34.08	.76	46.3	41.22	.89	45.1	37.26	.83
February	45.3	34.85	.77	45.5	39.57	.87	47.4	39.28	.83
March	44.9	34.50	.77	45.8	40.79	.89	47.7	41.15	.86
April	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
August	45.5	37.85	.83	47.0	48.71	1.04	[3] 42.1	46.26	[3] 1.10
September	45.4	37.81	.83	48.1	50.82	1.06	45.7	46.50	1.02
October	44.9	38.63	.86	47.2	52.04	1.10	48.6	49.26	1.01
November [4]	44.0	39.34	.89	47.7	55.28	1.16	44.8	51.37	1.15
December [4]	45.8	41.53	.91	48.3	55.63	1.15	53.2	63.95	1.20
1942									
January	48.9	46.12	.94	50.6	62.09	1.23	52.0	59.10	1.14
February	47.5	44.35	.93	49.7	59.34	1.19	49.7	54.15	1.09
March	47.6	44.33	.93	49.3	60.93	1.23	50.1	56.42	1.13
April	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
August	46.0	44.78	.97	48.3	60.21	1.25	48.9	57.47	1.18
September [4]	45.8	45.34	.99	47.6	61.00	1.28	47.7	59.44	1.25
October	45.7	44.35	.97	48.8	61.14	1.25	48.3	60.18	1.24
November	46.1	44.91	.97	47.3	59.25	1.25	46.2	56.38	1.22
December	46.4	45.59	.98	47.1	58.92	1.25	48.9	59.89	1.22
1943									
January	46.3	45.82	.99	47.2	59.84	1.27	49.0	59.62	1.22
February	45.9	45.89	1.00	47.8	60.21	1.26	47.4	58.05	1.23
March	46.1	46.48	1.01	48.5	61.33	1.26	47.7	58.18	1.22
April	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
August	45.6	48.97	1.07	47.1	59.70	1.27	49.0	61.27	1.25
September [4]	46.5	51.58	1.11	47.7	62.25	1.30	49.0	64.11	1.31
October	46.6	51.30	1.10	47.7	61.14	1.28	47.0	58.89	1.25
November	46.6	51.84	1.11	47.4	61.14	1.29	47.6	59.75	1.26
December	45.6	51.12	1.12	46.2	58.47	1.26	47.2	59.89	1.27
1944									
January	47.6	53.94	1.13	47.7	61.51	1.29	48.8	62.02	1.27
February	47.3	53.64	1.13	46.9	60.39	1.29	47.4	59.52	1.26
March	46.8	53.55	1.14	47.1	60.97	1.29	46.5	58.54	1.26
April	46.6	53.54	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	60.93	1.31	47.3	60.61	1.28
July	46.5	53.90	1.16	42.2	55.32	1.31	44.3	57.00	1.29
August [5]	46.8	54.15	1.16	45.4	59.19	1.30	48.3	62.72	1.30

[1] Based on workweek-nearest 15th of month. The figures shown cover all prime contractors of completed airframes, engines, and propellers, including converted plants. They should not be compared with monthly data for the aircraft and aircraft-engine industries released by the Bureau's Employment Statistics Division which exclude converted plants but cover subcontractors and parts manufacturers as well as prime contractors.

[2] Average weekly hours are for all wage earners and therefore not strictly comparable with the average weekly hours shown for direct workers in other series.

[3] Fluctuation of hours and earnings in this month was caused by a strike in 1 plant.

[4] Fluctuation of hours and earnings in this month caused by holiday. [5] Preliminary.

Both engine and propeller plants reported higher earnings than airframe plants, with the hourly average for engines slightly more than that of propellers. A longer workweek and more second- and third-shift employment had some effect. However, the greater proportion of skilled workers in these branches was primarily responsible for the higher earnings. In January 1940 engine wage earners averaged a 47-hour week and earned an average of $0.85 per hour or $40.09 per week. Propeller wage earners had a 46-hour week and averaged $0.77 per hour or $35.29 per week. Because of longer hours the weekly earnings for propeller wage earners at times slightly exceeded those of engine workers. The variation in earnings between the two branches was narrowed in June 1944; at that time both engine and propeller wage earners approximated a 47-hour week with hourly earnings of about $1.31 for the former and $1.28 for the latter. This resulted in weekly earnings of $60.93 for engine wage earners and $60.61 for propeller workers. Both branches of the industry reported hourly earnings averaging $1.30 for August. However, propeller hours exceeded those of engines, resulting in an earnings figure of $62.72 as compared with $59.19 for engines.

Production Trends

The number of completed airplanes accepted each month has risen steadily from January 1941. At that time approximately 1,000 completed planes were accepted monthly. The figure had risen to almost 2,500 by the end of the year, around 5,000 by the end of 1942, and 8,800 by the end of 1943. In March 1944 alone, 9,117 completed units were accepted, the record for any one month (table 10).

While this eightfold increase in acceptances is in itself considerable, the performance it represents is actually even more outstanding. Prior to 1943, production was concentrated on lighter airplanes. There was need for large numbers of primary, basic, and advanced trainers. Fighters predominated among the combat airplanes. Beginning with 1943, particularly the latter part of the year, heavy bombers and cargo ships became a significant part of total acceptances. To evaluate properly this shift in type of production, together with the fact that each airplane has its complement of spare parts, it is necessary to consider the airframe acceptances in terms of weight rather than units. The total weight of monthly acceptances including spare parts was about 4 million pounds early in 1941; it had almost tripled by the last quarter of the year, reaching about 10 million pounds per month. The increase continued during 1942 and by the end of 1943 the acceptance figure was close to 90 million pounds. In May 1944 over 102 million pounds were accepted, more than in any previous month and 30 times the number in January 1941.

The average weight per acceptance each month was about 4,500 pounds in 1941 and increased to 9,800 pounds by the end of 1943. It rose during 1944 because of continued large-scale production of heavy bombers and transports and the introduction of superbombers into our aircraft program. The highest average weight per acceptance ever attained was 12,150 pounds reached this June, roughly 3 times the average weight of acceptances in the early stages of the production program.

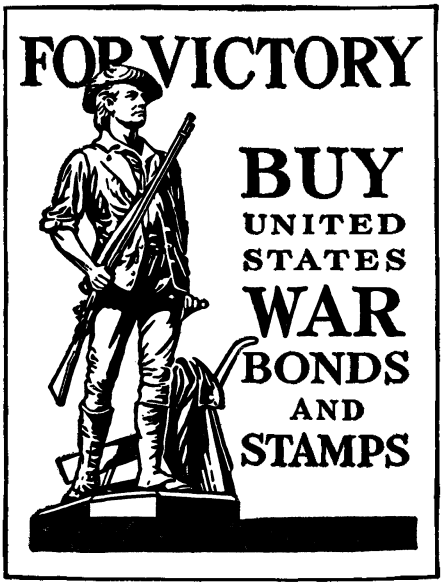
TABLE 10.—*Number and Weight of Airframe Acceptances and Number of Airframe Workers (Including Subcontracting), January 1941–August 1944*

Year and month	Acceptances		Total employment, including estimate for subcontracting	Average weight [2] per unit accepted (in pounds)	Average weight [2] accepted per employee (in pounds)	Average number of employees per complete unit accepted
	Total number of complete units [1]	Total weight including spares [3] (in pounds)				
1941						
January	1,012	3,420,300	162,200	3,380	21	160
February	963	4,120,100	170,600	4,278	24	177
March	1,136	4,699,500	179,200	4,137	26	158
April	1,391	6,386,900	191,200	4,592	33	137
May	1,329	6,056,200	203,100	4,557	30	153
June	1,478	6,908,000	222,300	4,674	31	150
July	1,462	6,263,600	242,900	4,284	26	166
August	1,854	8,713,500	265,500	4,700	33	143
September	1,946	9,077,100	283,800	4,664	32	146
October	2,284	10,588,200	310,800	4,636	34	136
November	2,138	9,658,100	327,600	4,517	29	153
December	2,462	13,497,100	356,300	5,482	38	145
1942						
January	2,977	15,021,700	388,600	5,046	39	131
February	3,047	16,660,500	423,700	5,468	39	139
March	3,483	20,318,000	448,300	5,833	45	129
April	3,506	20,057,400	479,900	5,721	42	137
May	3,984	23,237,000	510,200	5,833	46	128
June	3,738	24,846,300	553,800	6,647	45	148
July	4,106	27,402,700	594,300	6,674	46	145
August	4,281	29,025,000	658,200	6,780	44	154
September	4,307	32,148,800	710,500	7,464	45	165
October	4,063	30,848,400	774,100	7,593	40	191
November	4,812	35,064,700	840,500	7,287	42	175
December	5,501	41,178,600	913,000	7,486	45	166
1943						
January	5,014	37,532,100	975,500	7,485	38	195
February	5,423	43,961,600	1,013,100	8,107	43	187
March	6,265	51,038,900	1,037,800	8,147	49	166
April	6,472	55,252,100	1,062,300	8,537	52	164
May	7,087	60,692,700	1,084,200	8,564	56	153
June	7,097	61,535,600	1,115,100	8,671	55	157
July	7,376	65,458,500	1,139,600	8,875	57	155
August	7,613	69,296,700	1,148,100	9,102	60	151
September	7,598	71,103,900	1,170,900	9,358	61	154
October	8,363	76,256,500	1,179,100	9,118	65	141
November	8,791	82,444,600	1,185,500	9,378	70	135
December	8,802	86,353,400	1,167,900	9,811	74	133
1944						
January	8,789	89,989,000	1,156,100	10,239	78	132
February	8,761	93,500,000	1,137,900	10,672	82	130
March	9,117	101,400,000	1,108,400	11,122	91	122
April	8,331	96,400,000	1,084,300	11,571	89	130
May	8,902	102,400,000	1,063,400	11,503	96	119
June	8,049	97,800,000	1,027,600	12,151	95	128
July	8,000	93,900,000	1,009,000	11,738	93	126
August	7,937	93,900,000	973,300	11,831	96	123

[1] Latest revisions released by the Army Air Forces. Excludes spares.
[2] Data from January 1941–December 1943 are latest revisions released by the Army Air Forces. Data for January–August 1944, from War Production Board.
[3] Weight of spares included in computation of average.

The remarkable achievement in productivity is particularly evident from the decrease in the number of employees per acceptance (including subcontractors as well as prime contractors) and the substantial increase in the weight accepted per employee. During the period 1941–43, the number of employees per acceptance varied considerably from month to month but ranged roughly from 130 to 180 workers. However, with the beginning of 1944, the range was at a much lower level, namely, between 120 and 130. The average weight accepted per employee doubled between the early months of 1941 and

the summer of 1942. Then, with the beginning of a new phase in the production program, there was no increase in accepted weight per employee until the early spring of 1943. From that time onward the increase in accepted weight per employee has been rapid, almost doubling in a year and reaching 96 pounds in May 1944, as compared with only 21 pounds in January 1941 and 49 pounds in March 1943. Part of the increase in 1941 was due to a lengthening of hours, but since 1942 the increase described is an increase in hourly output as well as per worker per month. Because of this increase in output, the labor cost per pound of airplane is only about a third as great as it was early in 1941, despite the fact that earnings per hour are over half again as large. The pattern of increasing productivity in the airframe branch as shown here may be taken as an illustration of the production experience of the other branches of the aircraft industry.



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