

Gender and Work in the American Aircraft Industry during World War II

Chitose SATO

INTRODUCTION

On January 28, 1942, The San Diego Tribune-Sun reported that sixty Pearl Harbor widows with the motto, "Keep 'em flying to avenge our husbands' deaths," had applied for jobs in Lockheed and Vega Aircraft Companies in Burbank, California. After taking an aptitude test, whose results, according to the companies in question, were much better than average, the widows duly became the "first women to obtain jobs under the new company policy of giving preference to those in need of employment as a result of wartime emergency." These Pearl Harbor widows were particularly eager to get hired by an aircraft manufacturer because they, like most other Americans, believed that making military airplanes would be the most effective contribution to the war effort. Motivated either by patriotism or by pursuit of higher wages and better opportunities, 486,023 women acquired aircraft jobs during the Second World War, accounting for 36.6 percent of the entire aircraft industry labor force. In particular, women were a conspicuous presence in the aircraft plants and their subcontractors in southern California, which formed the core of U.S. military aircraft production. By the fall of 1943, approximately 150,000 female workers obtained aircraft jobs in the region and

Copyright © 2000 Chitose SATO. All rights reserved. This work may be used, with this notice included, for noncommercial purposes. No copies of this work may be distributed, electronically or otherwise, in whole or in part, without permission from the author.



the proportion of women among all employees at some airframe factories in the cities and vicinities of Los Angeles and San Diego reached sixty percent.²

This paper examines the efforts of the wartime aircraft industry in southern California to tap into the large reservoir of unskilled female labor in response to intensified national defense plans for increasing the military aircraft production between 1939 and 1945. Despite the fact that dramatic changes in the composition of the labor force transformed the nature of aircraft production and the industry itself in the early 1940s, few historical works have dealt with this issue. Most of them are official company histories of major aircraft manufacturers which briefly discuss how new employees were integrated into the workforce during the war. Although the image of women aircraft workers has become familiar to us through "Rosie the Riveter," what little is written about women aircraft workers is based upon interviews with former employees and highlights their personal experiences. This approach fails, however, to consider how the influx of women workers affected the whole production system and employers' perceptions of female workers.³

The first part of this paper identifies the issues around which concrete changes in the aircraft industry occurred, such as the expansion of "feeder plants" which actively recruited housewives from the suburbs, employers' racist preference for white female over black male workers, and the speed of technological innovations, especially the introduction of the line production system in aircraft manufacturing. The second part of this paper demonstrates that the discourse on women's ability and aptitude for aircraft production swiftly changed as technological innovations created "women's" aircraft jobs, most of which were simple and repetitive, requiring little skill. Employers found that women could make the most of their female "characteristics" in such segmented and simplified labor processes. The hiring of a large number of women forced the aircraft companies to adopt labor-management policies especially designed for women. The third section of this essay explores how the wartime influx of women workers into aircraft plants led to the formation of new types of labor-management policies in fields such as women's wage and upgrading, job training, absenteeism and turnover, counselor programs, and child care service.

I WOMEN WORKERS IN THE AIRCRAFT INDUSTRY

After the United States lifted the arms embargo on the Allies with the enactment of the Fourth Neutrality Act of 1939, the demand for military airplanes increased on an unprecedented scale. On May 16, 1940, President Roosevelt announced an emergency plan to turn out at least 50,000 planes a year.⁴ As the annual production of military and civilian airplanes was only 5,856 units in 1940, this meant almost a tenfold increase in the current production capacity of the aircraft industry. This plan came under further review after the Japanese attack on Pearl Harbor. In his State of the Union Message on January 7, 1942, Roosevelt informed Congress that he had issued a directive to the agencies concerned, ordering them to increase annual airplane production to 60,000 planes, including 45,000 combat planes. He also stressed the urgent need for a rapid increase in the production of four-engine bombers that would play a crucial role in the Pacific theater.⁵

Before World War II, aircraft plants were "job shops" in which most jobs were done by skilled workers who had spent at least two to three years as apprentices before they became full-fledged craftsmen. In 1939, skilled and semi-skilled workers accounted for ninety percent of the total labor force in the aircraft industry, the highest proportion in any American industry. Due to small output and frequent model and design changes, prewar aircraft production, which consisted of more than 200 operations, relied upon the skill of these experienced workers who handled a variety of production assignments. As late as January 1940, the aircraft industry employed fewer than 100,000 workers with young men in their twenties and thirties constituting the core of the workforce.⁶

Because most aircraft workers were men of draft age, the Selective Service initially delayed military conscription of skilled aircraft workers to avoid disrupting production. Most companies also negotiated directly with local draft boards to obtain exemption of their essential male workers.⁷ However, there were limits to these individual efforts. As more and more local aircraft plants suffered from severe labor shortages, the War Production Board designated Los Angeles as a labor-scarce area of the first magnitude. When aircraft companies built new plants, their main consideration was finding places where a sufficient labor force was still available.⁸

After Pearl Harbor, the hiring of unskilled workers proceeded at an unprecedented rate and the number of workers reached 2,106,000 at its

peak in November 1943. In particular, aircraft plants on the West Coast increased their workforce fifteenfold from 36,848 in 1940 to 474,198 in 1945.⁹ Women became a major source of new workers and the number of female aircraft workers rapidly increased to its peak, 486,073, in November 1943. This accounted for 36.6 percent of the entire labor force in the industry. Airframe plants employed about seventy-six percent of women, while twenty-one percent worked at engine plants and only three percent at propeller plants.¹⁰ In southern California, there were five airframe plants that hired more than 10,000 women workers by June 1943: Douglas at Long Beach (16,2998), Douglas at Santa Monica (13,526), Lockheed at Burbank (13,437), Consolidated-Vultee at San Diego (13,164) and Vega at Burbank (12,406).¹¹

Female aircraft workers were relatively young compared with women in other industries. According to a contemporary survey, their average age was twenty-six to twenty-eight years, thirty percent of them were single, thirty-five percent married, and the rest divorced or widowed. Married women were welcomed at most factories. Especially, many aircraft companies gave priority to the wives of military personnel in their hiring schedule. In addition, the wives and daughters of their male employees were given preference because they could commute together and quickly adjusted to factory life with the help of their husbands and fathers. The management also preferred them because they believed that these women would willingly give up their jobs once the war was over since they were not breadwinners originally.¹²

One reason why major aircraft plants in southern California were able to utilize a large proportion of female labor to achieve a rapid increase in production was their creation of "feeder plants" in metropolitan districts, usually a few miles away from the main factories. Feeder plants were used as satellite factories that concentrated on the production of parts and subassemblies for their main plants. For instance, Lockheed Aircraft Corporation, in addition to its Burbank plant and small factories scattered in the Los Angeles area, built new feeder plants in the Santa Barbara, Bakersfield, and Fresno areas. Consolidated-Vultee of San Diego also established feeder plants in the San Bernardino, Santa Anna, Downey, and Los Angeles areas.¹³ Located in the suburbs, feeder plants attracted housewives who were interested in getting war jobs but did not want to be bothered by commuting many miles to aircraft plants in the cities. Migrant workers, most of whom moved from the Midwest to California in search of higher wages and better jobs in defense indus-

tries, also preferred to work at feeder plants because they could avoid the expense of commuter transportation and housing in the cities.¹⁴

The second reason for a large influx of women into the aircraft industry is that aircraft plants traditionally employed few black workers. In spite of the establishment of the Fair Employment Practice Committee by the administrative order in June 1941, and repeated protests against racial discrimination in employment by black organizations, aircraft companies continued to regard black labor as a last resort. They wanted to maintain a favorable image of aircraft work as light, clean, technologically advanced, and highly paid. Aircraft jobs were generally popular with white job hunters, and even after the pool of white male workers was exhausted, blacks were still shut out of aircraft production.

The industry turned instead to white women. Although by the summer of 1944 the number of black workers gradually increased to around 100,000, only six percent of all aircraft workers, the rate of increase was still relatively small compared with other defense industries.¹⁵ For instance, the percentage of black workers in the shipbuilding industry was much higher than in the aircraft industry in southern California. In Los Angeles in June 1942, black workers accounted for 7.2 percent in shipbuilding, whereas the proportion was only 1.5 percent in aircraft. This difference can be attributed to the nature of these two industries: shipyard jobs were generally regarded as dirty and demanding, and black workers who were not given better job opportunities in other defense industries worked in shipyards disregarding the unfavorable working conditions.¹⁶

However, it is intriguing to note that black women generally could obtain aircraft jobs more easily than black men. It was largely because both employers and white male workers regarded women of any race as temporary workers who would leave their jobs once the war was over. Employers considered black women less of a threat to the prevailing racial hierarchy in the workplace than black men. However, in actuality, only a small number of black women were assigned to production jobs in aircraft factories, mainly because many white women had an aversion to working with black women. White women particularly disliked sharing washing facilities and rest rooms with them. As a result, even when black women were hired by aircraft plants, most worked in segregated teams or as janitors and sweepers.¹⁷

The third reason that a large number of women were able to find employment in aircraft plants during the war was the transformation of

the production system in the aircraft industry. The greatest innovation was the introduction of line production, which was characterized by a controlled flow of segmented and simplified operations that were laid out in a progressive sequence. This assembly line production was modeled after that of the automobile industry, although the number of airplane parts was far greater than that of automobiles. Labor processes, in which skilled workers used to manage a variety of operations, were divided as much as possible to simplify each task. A newly hired worker was assigned to a simple repetitive operation that required little skill. By the fall of 1943, about eighty percent of all aircraft workers were assigned to the production line after having learned how to perform a few simple operations with minimal job training. Output per man-hour greatly increased at aircraft plants.¹⁸

Aircraft companies could afford capital investment to introduce the line production system thanks to generous government loans. In addition, through the Aircraft War Production Council, major aircraft companies also made efforts to standardize the parts for major models of fighters and bombers so that parts would be interchangeable. On the West Coast, the council consisted of Consolidated, Douglas, Lockheed, Vega, North American, Ryan, Vultee, Northrop, and eventually Boeing. A considerable amount of know-how about production, which, as trade secrets, had rarely been disclosed before the war, was now widely shared among its members. The aircraft companies also cooperated in the mass production of certain models when adopted by the military even if they were developed and patented by other companies.¹⁹

II THE CREATION OF WOMEN'S AIRCRAFT WORK

Although women constituted about one-third of all clerical workers in aircraft companies even before Pearl Harbor, only a small number of women were employed as production workers at plants. A survey of seven airframe plants conducted by the Women's Bureau shows that in the spring of 1941 women accounted for as little as one percent of the total aircraft production workforce. In the fall of that year, the Department of War started a campaign for the active recruitment of women for labor deficient plants, but the situation did not change much. On the eve of the Pacific War, according to an estimate, less than 4,000 women were engaged in the manufacturing of airplanes throughout the country.²⁰

Most of these prewar female aircraft workers were concentrated in certain manufacturing jobs that had been historically regarded as suitable for women. Some were within the covering and fabric department where they cut out fabric parts and stitched various covers for airplane bodies and wings, parachutes, and pilot seats. They operated sewing machines and stretched covers on ailerons, elevators, and rudders. The work in this section was similar to needlework, which had traditionally been viewed as “women’s” work. An analogy between dressmaking and covering work was frequently made, which made the influx of women to this department relatively easy.²¹

Electric assembly was another traditional women’s job in the aircraft industry. Assembling electric parts was labor-intensive and most jobs were light and repetitive. Many electric companies had been hiring large numbers of women since World War I because of their manual dexterity. The electric assembly departments of aircraft plants followed the experiences of electric manufacturers, utilizing female labor in the simple assembly work of electric equipment for airplanes. The proportion of female workers in this department varied from one aircraft company to another. At Vultee, which was one of the first aircraft manufacturers that employed female production workers, women did most of the electric assembly jobs by January 1942.²²

Outside of the two departments just described, almost all aircraft jobs were closed to women before 1941. As in other industries, most aircraft manufacturers did not seriously consider hiring large numbers of women either to replace men or to staff new plants. They simply believed that aircraft jobs were “men’s” work which required special skills and experience. They assumed that since women were physically different from men and had considerable physical weakness, they were not suitable for most of the jobs. In fact, however, despite such misgivings, 486,073 women were working for the aircraft industry by the end of 1943. Conventional explanation attributes this to the massive drain of young men to the armed services as well as the physical expansion of the industry that forced all aircraft manufacturers to explore new sources of labor.²³

However, certain characteristics of aircraft jobs greatly contributed to the relatively smooth introduction of tens of thousands of women over a short period of time. When the war came, aircraft companies specialized in the production of technologically advanced military fighters and bombers composed of thousands of small and light parts. As a result, rel-

atively few jobs required much physical strength. After 1942, as employers gradually hired women provisionally, they “discovered” that women were actually competent in many aircraft jobs. In particular, women’s manual dexterity and attentiveness were considered very advantageous in the precise assembly of aircraft parts. Employers also found that women were more patient than men and rarely minded simple repetitive operations in which men usually got quickly bored and grew careless. Furthermore, employers paid special attention to women’s allegedly more acute sense of sight, hearing, and touch. They believed that with women’s concentration and meticulousness, female workers would be good at sorting and inspecting small parts and components. The sensitivity of their hands and delicate touch were regarded as useful assets in the operation of precise machines and small tools.²⁴

Physically demanding jobs as the final assembly of bodies and the installment of engines still continued to be regarded exclusively as men’s preserve because they required strength for pushing, pulling, and lifting heavy weights. But, responding to the pressures of wartime production, aircraft factories pioneered the introduction of devices for reducing the amount of work requiring brute strength. Installing mechanical aids such as conveyors, automatic hoists, elevators, and mobile cranes was the most practical way of assisting female workers in dealing with heavy components. A work manager at Wright Aeronautical Corporation reported that these mechanical aids contributed not only to assigning women to “men’s” jobs but also to reducing the number of industrial accidents.²⁵

A less costly alternative was to assign unskilled male workers to assist a team of women. These men specialized in such physical labor as lifting and carrying heavy loads. Most employers also made efforts to make adjustments in instruments, tools, and machines to accommodate women’s physiques. For instance, employers changed the standard wheels and grips of machines to smaller and lighter ones so that even women whose pull and grasping power were much weaker than men’s could easily handle them. Workbenches were also lowered to fit women’s average height and ease the exertion of performing tasks. In actuality, these modifications were significant not only for incoming women but also for newly employed male workers who included young men under draft age, middle-aged men above draft age, and elderly men in retirement.²⁶

Apart from their alleged physical weakness, a persistent concern about women’s potential as aircraft workers was their technical aptitude for the

production of fighters and bombers, which was one of the most technologically advanced fields of manufacturing. The dominant view was that women had neither the ability nor aptitude for machines and technology. Most employers basically assumed that technological and mechanical jobs were inherently men's, rejecting the notion that everyone regardless of their gender was able to acquire skills and learn technology through proper training and experience. We now know that the fact that many women were neither interested in nor good at things mechanical was largely due to a social environment which gave women less opportunity to learn about machines since their childhood. But most employers did not see it that way in the 1940s.²⁷

Interestingly, as more women entered the workplace in aircraft factories, quite a few foremen found that women's lack of work experience and mechanical knowledge was an asset rather than a liability. For instance, a work manager at a GM engine plant noted that women were very attentive pupils who diligently carried out instructions down to the minutest detail. Based upon his observation, he pointed out that because women usually had little previous work experience, they were highly motivated to learn operations to overcome their limited knowledge of mechanics. Many other contemporary observers also found that women generally took great pains to carry out their tasks exactly as instructed and, therefore, produced better and more uniform output. In contrast, male semi-skilled workers had a tendency to stick to their own way and were reluctant to unlearn bad habits. Recognizing gender differences in the learning process, many employers came to believe that women who started learning jobs from scratch generally acquired proper skills and, in time, became desirable workers.²⁸

Another widely held assumption about women workers was that they were less inventive and more indecisive than men, but these "female" traits also proved to be valuable. In the production lines, where most operations were simplified and standardized, the range of workers' discretion was limited to the minimum and workers no longer needed to be inventive. A work manager of Vultee also pointed out that when a machine broke down, men generally tried to fix it by themselves, but most women just left it and called their supervisors. This kind of behavior contributed to the reduction of industrial accidents.²⁹

Yet another purported "women's" characteristic, which many employers had at first regarded as an obstacle, was oversensitivity to, and dependence upon, human relations in the workplace. The presumption

that women were conditioned more by their associates than by the nature of their work created the contention that women were not good at teamwork. In fact, however, as an individual worker was assigned to each operation in the line production system, employers found that women's adaptability to the work environment mattered little. Further, most women aircraft workers were assigned to "women's" work and thus segregated from male workers. As a result, the contention that men and women would work at different speeds, disturbing the whole production flow, never became an issue. Overall, female employees in aircraft plants were highly commended as conscientious workers who not only worked diligently but also were more appreciative of increased remuneration and advancement than men. The fact that female employees could be obedient and loyal workers was particularly attractive to the management of aircraft companies, which needed an additional work force for the duration of the war.³⁰

Analogies between "women's" work at home and in aircraft plants were frequently made to promote the image that any woman could do a defense job by taking advantage of her domestic skills. Some of the propaganda stressed similarities between factory tools and kitchen utensils. For instance, one company insisted that "instead of cutting the lines of a dress, this woman cuts the pattern of aircraft parts" and that "women can handle delicate instruments better than men because they have plied embroidery needles, knitting needles and darning needles all their lives."³¹ Employers also praised women's skills in all kinds of "house-keeping," saying that they could be utilized in the workplace. For instance, the above mentioned GM manager reported that his female employees excelled at planning, time saving, and economizing materials. A foreman of an aircraft factory also noted that women sometimes offered practical advice on how to reorganize the work processes. He reported that one of his new female workers, after operating a lathe for several days, made some good suggestions about the floor- and motion-saving layout of machine tools. The woman said that she simply had applied her experience in the kitchen to the shop floor.³²

Seventy-six percent of all female aircraft workers worked in airframe plants, which most actively introduced new production methods and strove to reorganize labor processes at the government's expense under war contracts. Airframe production was usually divided into three departments: development work, bench fabrication, and assembly. The first two employed ten percent of all airframe workers each and the

assembly department was the largest, employing about seventy-five percent of the labor force. Most airframe plants assigned newly hired unskilled workers to this department, while placing skilled workers who specialized in several advanced operations in the other two sections.³³ The development of sub-assembly systems, in which a series of assemblies was divided into components as small as possible before the final assembly, greatly reduced the level of skill and amount of training required for assembly jobs. Each sub-assembly was done separately by different groups of workers and sometimes at different plants. In many cases, small components were assembled at feeder plants or subcontractors and then brought for final assembly at the main plant. Not only did this promote an efficient segmentation of assembly jobs but also shortened the final assembly line, thus saving floor space. This significantly contributed to a rapid increase in airframe output.³⁴

Women workers concentrated in certain subassembly jobs which employers regarded as appropriate for women because of their characteristics such as manual dexterity, attentiveness, and meticulousness. Precision bench assembly and electric assembly employed the largest proportion of female airframe workers. Most of the jobs were fine assemblies of small-machine parts and components that even unskilled workers could do without the aid of jigs. In electric and radio assembly, women were engaged in what employers regarded as traditional "women's" jobs such as cutting wires, soldering, attaching terminals, and screwing parts together with the use of various bench tools. A large proportion of female airframe workers also assembled the precision devices of instrument panels such as altimeters, tachometers, turn-banks, and radios, and installed them using small hand tools. While generally men did the checking and adjustment after the installation, women, if trained, also performed these functions. Sometimes, the workers had to read blue prints or pictured layouts to understand the assembly process. Female assemblers in this section had a higher productivity and a lower turnover rate than male workers.³⁵

The introduction of the line production system also allowed an influx of women workers into fuselage assembly, which had been a typical men's domain. A tubular fuselage covered with metal skin was carried in jigs on a slow moving conveyor while female workers installed power lines, electrical systems, rudder pedals, and control parts and attached bulkheads, firewalls, and canopies to it. Platforms were provided so that even short women could reach the top parts. There were also low mov-

able benches on which women slid under the fuselage to install various fittings beneath. Generally, women worked on the fuselage to the point where the engine met up with the fuselage and the plane was ready for the wing and empennage sections.³⁶ Skilled male workers still dominated the assembly of monocoque skin and most of the final assembly jobs even during the war. However, a number of women were assigned to certain operations that employers found suitable for women. Among others, some played an important role in the final assembly of the empennage. Their main job was riveting inside the empennages of small-sized fighters and trainers. Foremen found that women about five feet tall were especially desirable as assemblers of the small tails.³⁷

In all subassemblies, riveting, which required the least skill, was the most typical women's operation. Usually only after a few weeks' training, a large number of women were assigned to riveting as their first operation. They assembled fuselage, ailerons, rudders, elevators, bulkheads, and wings by using bucking and explosive rivets. Some of them were also engaged in riveting thin metal skins to instrument panels, which required manual dexterity and sensitive touch. Instruments for riveting were greatly improved and even unskilled workers could handle them easily and rivet with precision.³⁸

In contrast, fewer women initially worked as welders at aircraft plants because welding required special training and employers paid a skilled worker's wage for the job. However, as electric arc welding, which was light and easier to learn, replaced torch welding, more women took up welding. The women who were experienced in riveting were often promoted to welding especially as the latter was replacing riveting in some parts of airframe assembly. In particular, technological improvements in spot welding made it light work. Just like riveting, welding required manual dexterity and some employers considered it suitable for women. Because foremen gave specific instructions on the position of welding, pressure on materials, welding time, and the amount of electricity, welders had to make few decision on their own. However, since welders had to endure the heat from hot torches and other unpleasant working conditions, some employers did not assign women to welding on the grounds that it would harm women's health and maternity.³⁹

With the increasing technological complexity of military airplanes, the number of inspection jobs increased at every stage of assembly and more and more women were assigned to them. Technological advancement in measuring instruments greatly lowered the level of skills

required for the job and it became relatively easy for inexperienced workers to examine a wide array of airplane parts to ensure they came up to the standards. Inspectors used instruments such as micrometers, calipers, scales, and gauges, which required care and concentration, but the operation was repetitive. They also checked castings for any defaults inside with Magnaflux testing equipment and measured the hardness of metal by Brinnell. Many foremen recognized that although men became bored rather quickly with repetitive inspection, women were more patient and attentive and excelled at measuring and checking small objects at a constant pace.⁴⁰

In the machine shops of airframe plants, women were also employed as machine operators. There were more female machine operators in aircraft engine and propeller firms than in airframe plants. Starting with burring and filing small metal parts and castings, women were promoted to drill press operations as opportunities arose. As drill press operators, they worked on jigs, sensitive drills, and multiple progressive drills for usual drilling, reaming, and spot facing operations. At Vultee, a personnel director commented that in one operation where a small hole of 1/64 of an inch had to be drilled, no man could drill more than 650 holes a day, but a woman exceeded this record on her first day and kept up the production of 1000 holes or more a day.⁴¹

Only a small number of women, most of whom were trained at vocational school, were employed on milling machines that ground metal parts by revolving cylindrical cutting tools. Operating them became relatively easy with technological improvements in control buttons and levers. Most female operators were engaged in repeated holing and grooving of small metal parts. Fewer women operated small turret lathes that processed precise metal parts with more than one cutting tool in sequence. Operation was repetitive and the setting up of machines and most of maintenance work for operators were done by skilled male machinists.⁴²

III LABOR-MANAGEMENT POLICIES FOR WOMEN AIRCRAFT WORKERS

A. Wages and Upgrading

In the aircraft industry, wage differences between the sexes were relatively small compared with other defense industries. Since the industry itself was new and employed only few women before the war, most com-

panies had no tradition of wage discrimination based on sex. Furthermore, as the industry was expanding on an unprecedented scale during the war, employers had to attract a large number of female as well as male workers by offering higher wages than other industries. A survey conducted by the Women's Bureau on twenty-three aircraft companies shows that twenty manufacturers paid the same wages to both sexes when they were hired. Nine major aircraft manufacturers in California paid sixty cents per hour to all workers and there was no sexual discrimination in wages at least at the entry level.⁴³ Women's wages in the aircraft industry varied from job to job, but they were relatively higher than those in other manufacturing industries. The most highly paid women were welders who usually started at \$1.32 per hour. There were few differences in remuneration for typical "women's work": light assembler \$1.10, riveter \$1.00, inspector \$1.10 to \$1.20, filer \$1.15 to \$1.30, punch press operator \$1.10 to \$1.15. The big exception, however, was the covering department where women usually got paid as little as ninety-five to ninety-eight cents per hour. As covering had employed a small number of women since prewar years, it had a separate wage scale exclusively for this "traditional" women's work.⁴⁴

Although some progressive companies had formal employee-rating systems with periodic reviews, they were the exception rather than the rule. In many companies, foremen determined merit increases and upgrading. Their prejudices and preconceptions about women's inferior abilities tended to keep women workers at lower rates and delayed their promotion. Because of the unmeasurable quality of judgement and personal opinion, it is difficult to arrive at any objective conclusion as to how much the principle of equal pay for equal work was realized at each plant or in the industry as a whole. Particularly when a job was often changed to adapt it for inexperienced women workers through provision of manual or mechanical assistance or elimination of certain heavy work and advanced operations, it is difficult to determine whether a woman was being paid at a proper rate compared with the man whom she replaced.⁴⁵

Most employers argued that there should be a wage differential between men and women because additional overhead costs often rose when women were hired, due to the installment of new mechanical devices, provision of women's rest rooms, and the high absenteeism and turnover rates of women. A number of foremen also pointed out that women were not always eager to change from what they called "wom-

en's" work to "men's" work, even though it meant an increase in compensation. They reasoned that women's lack of interest in upgrading came from their belief that the working conditions in "men's" jobs were likely to be less pleasant and their fear that they might not be able to do the new work. Some women did not want promotion because they liked their present group of co-workers. Although it is questionable whether employers were correct in noting that all women aircraft workers lacked motivation for upgrading, women's economic situations partly explain their perceived reluctance. According to a typical wage scale, the earnings of newly hired workers increased five cents every four weeks, reaching seventy-five cents after twelve weeks, which was the minimum wage for unskilled workers in California. Women workers, who got paid the minimum wage, received a weekly wage of thirty-nine dollars including some extra benefits at aircraft plants, which was sufficient to satisfy their basic needs. As a result, most women workers had little enthusiasm for upgrading and pay raise during the war.⁴⁶

B. Job Training

Defense job training programs in southern California in the 1940s were among the most extensive in the country and enjoyed a high reputation. Before Pearl Harbor, however, most aircraft companies expressed no interest in the training of women for production, believing that even if they employed women, it was sufficient to give them only makeshift on-the-job training as they would be temporary workers for the duration of the war. But most companies lacked even a basic staff for on-the-job training and had no appropriate training methods for incoming women with little experience of factory work. Only some major aircraft companies developed pre-employment training programs for two to six weeks for new employees, including women, in order to maintain the level of productivity and morale and prevent an increase in industrial accidents. Although there were some exceptional cases like a private vocational school in Long Beach, which began training women for aircraft jobs as early as April 1941, it was not until Pearl Harbor that most private training schools opened aircraft courses to women.⁴⁷

Private vocational schools were numerous and advertised daily in local papers and on the radio. Fees charged by these private schools ranged widely between 25–125 dollars. From the outset, aircraft companies were suspicious of the quality of training at these schools. As a result, private training schools could not as a rule persuade any of the

major companies to support them and only local subcontractors and small firms sponsored the training of women there. Several schools in Los Angeles, which started their first aircraft courses for women in February 1942, reported that failure to offer courses earlier was due to the unwillingness of local companies to sponsor such training.⁴⁸ Although attendance at aircraft courses offered by these private vocational schools did not necessarily guarantee future employment in aircraft companies, applicants were often misled into believing that they were assured placement. Trouble arose frequently between training schools, aircraft companies, and students who completed the courses. For instance, Solar Aircraft Company in San Diego stopped hiring students trained at Women's Aircraft Training Company in Long Beach when they learned that the Training Company had been giving false guarantees of jobs at Solar to their students.⁴⁹ However, most aircraft plants did give preference to graduates of vocational schools over persons without any training.⁵⁰

National Defense Training Schools sponsored by the federal government were generally slower to offer aircraft courses for women than private schools, but they had better curriculums and instructors and were highly praised by most manufacturers after 1942. These schools offered mainly two types of courses: Supplementary National Defense classes which were open to workers in industries essential to national defense and designed to up-grade them in their trade, and Pre-employment National Defense classes which were open to anyone eighteen years of age and above who could meet certain requirements. Any citizen of the United States registered with the state employment office could take classes at no cost. These aircraft courses trained 323,000 and 374,000 women in 1942 and 1943 respectively, and aircraft companies in California benefited most from these national schools for the initial training of women.⁵¹

National Defense Training Schools enjoyed great popularity among women who sought aircraft jobs. For instance, when one of these schools in San Diego started aircraft courses for women in early 1942, women outnumbered men in defense pre-employment courses two to one. After completing 150 to 300 hours of courses, ninety percent of women trainees found jobs at Consolidated-Vultee and others at Solar Aircraft. According to Mr. Boeing, principal of the school, "the school aimed to give all women who enrolled basic knowledge in the handling of different kinds of tools, some knowledge of metals, and basic training in some

fields of their choice so that they would be able to qualify at least for one or more specific aircraft jobs.” Popular courses with women were electrical assembly, sheet metal assembly, tube bending, riveting, and drill press. Preference was given to twenty-two to thirty-five years old women, but small proportions of younger and older women were also trained according to their aptitude. In addition to pre-employment training, at least fifty to sixty women always took supplementary courses to acquire advanced skills such as drafting, blue print reading, and stock keeping. Local aircraft companies sponsored a course in gas welding for women. After 250 hours of training, students were sent to these companies for a test and if they passed, they were placed on the payroll as trainees.⁵²

Another national project for vocational training was provided through the Engineering, Science, and Management Defense Training (ESMDT) of the U.S. Office of Education. In southern California, the University of California at Los Angeles and the University of Southern California played a central role in developing the ESMDT. Some ESMDT courses were designed to train women enrolled at universities for immediate employment in technical positions at defense plants. For instance, UCLA offered a twelve-week aircraft engineering drafting course for women which aimed to train selected women as tracers and detailers for the engineering drafting sections of local aircraft companies. Prerequisites were completion of two years of college curriculum, but preference was given to college graduates with mathematics, architecture, or the physical sciences degrees. After studying subjects such as aircraft materials, mechanics, drafting, drawing, and design sketching, these women were employed as skilled workers or technicians at plants. Women made up around twenty-three percent of all enrollees at the ESMDT in 1943. Unlike the majority of female aircraft workers, most of these women continued to work as technicians with expertise even after the war.⁵³

C. Counseling

Like other defense industries, aircraft manufacturing suffered from a high turnover rate of female workers during the war. In April 1943 the average labor turnover rates per 100 employees at ten major aircraft plants in California were 5.8 for men and 9.0 for women. For women it ranged from 11.1 at Northrop-Hawthorne to 7.0 at Douglas-Long Beach.⁵⁴ Turnover was especially high among women aged twenty-five to thirty-five. Major reasons for quitting were family matters, especial-

ly childcare and visiting or joining husbands or boyfriends at military camp. Some quit to get married or give birth. Others left because they were exhausted and got ill due to the double burden of factory work and household duties. Only a few gave up their jobs because they were not satisfied with wages and working conditions and planned to change jobs, probably because aircraft work was one of the most popular manufacturing jobs particularly among working-class women.⁵⁵

Aircraft companies sought measures to reduce the high labor turnover of their female employees. At many plants, whenever it transpired that an employee intended to quit, the personnel section would conduct an interview to find out if there were any remedies for the dissatisfaction. For instance, at Consolidated, a foreman first tried to persuade the worker to stay on and, if that failed, then the interviewer tried again at the time of termination. After this method had become compulsory, about sixteen to eighteen percent of those wanting to quit were retained.⁵⁶ However, there were obvious limitations to this "consult and persuade" method to reduce labor turnover and absence, especially as many women were leaving jobs not out of dissatisfaction with work or plants but for family reasons.

Recognizing a special need to deal with "women's problems" by developing all-encompassing programs for female employees, many aircraft companies started a counseling service after 1942 in the personnel division that was particularly designed for women. Because more than forty percent of the labor force in the California aircraft industry was female, employers realized that management responsibilities should be broadened not only to reduce their absenteeism and turnover rate but also to advise them on labor issues in general. The decision was based upon their belief that personal difficulties had a definite effect on productivity and that it was the responsibility of employers to provide the best working environment possible.⁵⁷

In the counseling programs, women counselors listened to female employees' complaints and opinions about working conditions, supervisors, co-workers, promotion and transfer, and sometimes racial integration in the workplace. They acted as intermediaries for male supervisors who did not know how to treat incoming women, particularly in matters pertaining to conduct, health, clothing, observance of safety rules, and protection of maternity. In a survey of female counselors in defense industries seventy-two percent of the companies

responded that counselors had contributed to the reduction of absenteeism, eighty-four percent that they had held down turnover.⁵⁸

For instance, Lockheed hired its first counselor, Susan Laughlin, when preparations were being made for the massive influx of women in the fall of 1942. She had at first worked as a clerk in the medical unit of Lockheed but a personnel manager noticed her caring personality and assigned her to the job. With few guidelines, she forged ahead and eventually coordinated a counseling program which, by the end of the war, grew to include seventy counselors. Like Laughlin, most counselors were white middle-class women in their thirties and forties, but they had to be able to identify with production workers who were mostly working-class women and help them with not only labor but also personal problems. An industrial relations manager reported that the successful counselor often turned out to be an attractive woman with a good personality who "had raised a family and had helped a husband make a success of his career." Most of these counselors who started their career in major aircraft companies during the war continued to work in the field of personnel management after the war.⁵⁹

In addition to labor issues, counselors' extensive activities included almost all concerns relating to working women's everyday life. Not only did they deal with such problems as childcare, housing, laundry facilities, transportation, and shopping, but they often advised on marital difficulties, family quarrels, financial difficulties, and health problems. They sometimes relied on community services to find appropriate nurseries for the children of their employees, talked to local merchants to keep the stores open late so that women could shop after work, and arranged laundry service. Laughlin said that she always worked closely with school boards, social welfare organizations, the YWCA, and dozens of local women's groups to find solutions to a wide variety of problems.⁶⁰ Women counselors in major aircraft companies in southern California regularly had meetings as part of the Aircraft Production Council to share information and visited one another's plants. This created a new professional network among industrial counselors during the war.⁶¹

D. Child Care

Turnover reports from aircraft plants indicated that child care was the most urgent issue in the problem of maintaining a stable work force. Although some companies considered setting up nurseries for their employees' pre-school children, it was too costly and time-consuming

to build and staff such facilities, considering that most women were temporary workers who would give up their jobs once the war was over. As a result, most aircraft plants chose to rely on the establishment of public childcare centers in the local community with federal aid.⁶²

With the enactment of the Lanham Act of 1943, federal funds were appropriated for community facilities in war-impacted areas. In most areas, funds for childcare were funneled through, and the programs were administered by, the local board of education. Although there was never adequate funding for facilities and the application process was complicated by red tape, Los Angeles managed to develop one of the most extensive childcare programs in the nation. By obtaining federal funds, the Los Angeles Area Committee of the Aircraft War Production Council built sixty-four nurseries for pre-school children and sixty-nine extended care centers for school children aged six to sixteen. In Los Angeles thirty-seven percent of female aircraft workers had young children under fourteen at home and it was estimated that each child-care center in Los Angeles serving forty mothers made possible 8,000 productive "man-hours" monthly. However, in California, as elsewhere, less than ten percent of all preschool children in need of childcare attended local nurseries set up under the Lanham Act.⁶³

In San Diego, the situation was similar. Even at the peak of women's employment in the fall of 1943, eleven nurseries (two at Navy) and seventeen extended day care centers in the city were being used only up to about fifty percent of their capacity. According to a community survey by the Women's Bureau in November 1943, about twelve thousand working women in San Diego had children under sixteen and approximately forty percent of these children were cared for in childcare centers. In most cases, grandparents, relatives, husbands, housekeepers, and neighbors took care of children, but some were cared for by older children or just left alone at home.⁶⁴

Advocates of public childcare service pointed out that mothers were not well informed about childcare facilities available in the local communities and that some mistakenly believed public service was a kind of charity for destitute children whose parents could not afford adequate care at home. There were rumors in San Diego that children were not being fed and cared for properly in these centers. In addition to the lack of appropriate publicity, public nurseries remained underused because of the relatively high fees they charged. Although the fees were graduated according to family income with the maximum amount of one dol-

lar per day, they were set high because under the Lanham Act centers were financed fifty percent by the federal government and fifty percent by fees from parents.⁶⁵

There was constant demand for nursing facilities for the care of children under two years of age. But administrators themselves were not enthusiastic about starting programs for infants because of their belief that the employment of mothers with children under two was absolutely undesirable. Indeed, most employers insisted that mothers with small children should be discouraged from accepting jobs unless they proved that they could count on reliable persons to care for their children at home. Despite frequent funding crises, local administrators took the request of aircraft plants in San Diego for twenty-four-hour care for mothers working in the second and third shifts seriously. When labor shortages became increasingly critical in the area in the latter half of 1943, the first twenty-four-hour nursery opened in Chula Vista adjacent to the Rohr Aircraft Company. From the outset, however, both administrators and employers intended to maintain these child care facilities only until the end of the war. As more and more women left aircraft jobs after late 1944, they were either scaled down or closed.⁶⁶

CONCLUSION

Most female aircraft workers faced massive layoffs as soon as the Allied victory was assured, more than one year before August 1945. Although a survey taken in late 1943 by the Los Angeles Chamber of Commerce shows that fifty-one percent of women aircraft workers in Los Angeles County indicated a desire to stay on with their present employers, only fourteen percent of them did actually retain their jobs in June 1946. As a result, in the aircraft industry in Los Angeles, the percentage of women rapidly decreased from a high of over forty percent in the fall of 1943 to less than eighteen percent in 1946 and 11.9 percent in 1948.⁶⁷ Except for sporadic protests by female unionists against the postwar policy of firing women, most women placidly accepted the layoffs, believing that once the war was over their proper place was in the home. The prevailing ideology of demobilization propagated by the government, mass media, and the management stressed the resurgence of domesticity, which made some women even look forward to returning home. A female employee at Vultee recalled that she had not felt any disappointment when she was asked to leave her job, because "there were

too many things that I wanted to do with my family.”⁶⁸

Even though many women hoped to keep working in the postwar period for economic reasons, most of them were forced to leave aircraft jobs for other occupations because of their lack of seniority and the discriminatory treatment they received from unions. The Selective Service Act protected the right of male employees who had gone into the military to return to their prewar jobs. And in a majority of companies seniority continued to accumulate even during their absence. Although most employers were highly satisfied with female workers' abilities and job performance and the sex differentials in wages were economically advantageous to them, they did not consider the possibility of permanent female substitution. As with other defense industries, aircraft manufacturers attempted to restore the sexual division of labor almost along prewar lines during postwar demobilization of the labor force.⁶⁹

However, aircraft production had been dramatically transformed during the war. Men who returned to their plants after being discharged from the military found that the importance of their skills and expertise had decreased significantly due to the technological advances and the reorganization of work processes that had taken place while they were away. After the abrupt contraction of the production of military aircraft, the industry gradually expanding again as it converted to the production of civilian airplanes in the late 1940s. With the outbreak of the Korean War, the industry faced a growing demand for fighters and bombers again during the military build-up of the Cold War.

Under these circumstances, by the early 1950s the aircraft industry had increased its labor force beyond its World War II peak. Between 1949 and 1953 when the Korean War ended, employment in the aircraft industry increased from 281,800 to 779,100. In Los Angeles, the proportion of women among all aircraft workers rose to twenty-five percent in 1952 and continued on that level throughout the next decade.⁷⁰ By that time, the postwar aircraft industry was again utilizing female labor intensively in specialized operations such as assemblies, inspection, and the operation of simple machine tools. These jobs, which employers had regarded as “appropriate” for women during the war years, were established as “women's” work in the postwar aircraft industry. The wartime reorganization of work processes and the creation of new labor-management policies for women had laid the groundwork for the postwar employment of women in the industry.

NOTES

¹ "Widows Seek Plane Jobs," *San Diego Tribune-Sun*, 28 January, 1942, in Records of the Women's Bureau of the U.S. Department of Labor, 1918-1965, Part II: Women in World War II, Series A: Unpublished Studies and War Community Survey. 10 reels of microfilms produced by the University Publications of America in 1991 (hereafter WB-A), Reel 10. The original records are held in Record Group 86, Women's Bureau of the Department of Labor, National Archives, Washington, D. C.

² "Employment in Airframe, Engine, and Propeller Plants, November 1943-June 1944," *Monthly Labor Review* (September 1944): 478.

³ Gerald D. Nash, *World War II and the West: Reshaping the Economy* (Lincoln, Neb.:University of Nebraska Press, 1990); James Ric Wilburn, "Social and Economic Aspects of the Aircraft Industry in Metropolitan Los Angeles during World War II" (unpublished Ph.D. dissertation, University of California, Los Angeles, 1971). Historical studies of women aircraft workers that rely upon interviews include Sherna Berger Gluck, *Rosie the Riveter Revisited: Women, the War and Social Change* (New York: Meridian, 1987), which focuses upon female aircraft workers in Los Angeles, and Judith R. Johnson, "Uncle Sam Wanted Them Too!: Women Aircraft Workers in Wichita during World War II," *Kansas History* 17, no.1 (Spring 1994), which examines female workers' experiences at Boeing, Beech, and Cessna. Chester W. Gregory's pioneering work, *Women in Defense Work during World War II* (New York: Exposition Press, 1974) examines types of women's aircraft work, training, and working conditions, but does not explain why the employment of a large number of women became possible in the aircraft industry. To my knowledge, there appeared no work in Japanese on this subject.

⁴ U.S. Congress, Address of the President of the United States on National Defense, House Miscellaneous Documents, II, no. 751, 76th Congress, 3rd session, May 1940, 3.

⁵ G.R. Simonson, "The Demand for Aircraft and the Aircraft Industry, 1907-1958," *The Journal of Economic History*, 20, no.3 (September 1960): 374.

⁶ Tom Lilley et al., "Conversion to Wartime Production Techniques," in G.R. Simonson, ed., *The History of the American Aircraft Industry: An Anthology* (Cambridge: M.I.T. Press, 1972), 135.

⁷ Nash, *World War II and the West*, 76.

⁸ John B. Rae, *Climb to Greatness: The American Aircraft Industry, 1920-1960* (Cambridge: MIT Press, 1968), 152.

⁹ "Wartime Development of the Aircraft Industry," *Monthly Labor Review* (November 1944): 925.

¹⁰ The ratio between employees of prime contractors and sub-contractors was sixty-six to thirty-four percent in November 1943. Among workers of prime contractors, seventy-one percent were employed for the production of airframe, twenty-five percent for engine, and four percent for propeller. See "Wartime Development of the Aircraft Industry," 912-913; "Employment in Airframe, Engine, and Propeller Plants, November 1943-June 1944," 478.

¹¹ "Employment of Women in California Aircraft Industry, June 1943," WB-B, Reel 21.

¹² "Productive Women Employees in Principal Aircraft Plants," in Record of the Women's Bureau of the U.S. Department of Labor, 1918-1965, Part II: Women in World War II, Series B: Subjects and Correspondence Files on War Industries. 35 reels of microfilms produced by the University Publications of America in 1991 (hereafter WB-B), Reel 21. The original records are held in Record Group 86, Women's Bureau of the Department of Labor, National Archives, Washington, D. C.

¹³ William Glenn Cunningham, *The Aircraft Industry: A Study in Industrial Location* (Los Angeles: L.L. Morrison, 1951), 83–85.

¹⁴ United States Employment Service, San Diego, “Study of New Applications,” WB-A, Reel 10.

¹⁵ Robert C. Weaver, *Negro Labor: A National Problem* (Port Washington, NY: Kennikat Press, 1969), 109, 121; Ruth Milkman, *Gender at Work: The Dynamics of Job Segregation by Sex during World War II* (Urbana: University of Illinois Press, 1987), 55; and Paul R. Spickard, “Work and Hope: African American Women in Southern California during World War II,” *Journal of the West*, 32, no.3 (July 1993): 73.

¹⁶ “Sources of Labor Supply in West Coast Shipyards and Aircraft-Parts Plants,” *Monthly Labor Review* (November 1942): 931. On wartime shipyards in California, see Marilyn S. Johnson, *The Second Gold Rush: Oakland and the East Bay in World War II* (Berkeley: University of California Press, 1993).

¹⁷ Karen Tucker Anderson, “Last Hired, First Fired: Black Women Workers during World War II,” *Journal of American History*, 69, no.1 (June 1982): 82–97; Weaver, *Negro Labor*, 112–113.

¹⁸ Rae, *Climb to Greatness*, 157; Simonson, “The Demand for Aircraft,” 377.

¹⁹ Nash, *World War II and the West*, 73–75.

²⁰ “Women Workers in Two Wars,” *Monthly Labor Review* (October 1943), 658; U.S. Department of Labor, Women’s Bureau, *Women’s Factory Employment in an Expanding Aircraft Production Program* [Bulletin of the Women’s Bureau, no.189-1] (1942), 1.

²¹ Ethel Erickson, “Factory Inspection and Jobs of Women at Vultee Aircraft, January 1942,” WB-B, Reel 10.

²² *Ibid.*

²³ National Industrial Conference Board, *Women in Factory Work* [Studies in Personnel Policy, no.41] (NY: NICB, 1942), 5; Anna M. Baetjer, *Women in Industry: Their Health and Efficiency* (Philadelphia: W.B. Saunders, 1946), 15.

²⁴ NICB, *Women in Factory Work*, 7; Department of Labor, Women’s Bureau, *Effective Industrial Use of Women in Defense Program* [Special Bulletin of the Women’s Bureau, no.1] (1940), 2–3; American Management Association, *Special Abilities of Women* [Special Research Report, no.2] (NY: AMA, 1943), 259–260; “Mass Production of Skilled Workers,” *Automotive Industries*, 84, no.7 (April 1, 1941): 363–402; “Mass Production of Airplanes,” *Automotive Industries*, 84, no.16 (August 15, 1941): 26–27, 52; “West Coast Airplane Industry Zooms into Big Production,” *Automotive Industries*, 84, no.24 (December 15, 1941): 18–23, 68, 70.

²⁵ National Industrial Conference Board, *Wartime Pay of Women in Industry* [Studies in Personnel Policy no.58] (NY: NICB, 1943), 8, 10; R.C. Turner, “Putting Women to Work on More and More Jobs,” *Factory Management and Maintenance*, 101, no.11 (November 1943): 94; and Laura Nelson Baker, *Wanted: Women in War Industry: The Complete Guide to a War Factory Job* (NY: E.P. Dutton, 1943), 31.

²⁶ NICB, *Wartime Pay of Women in Industry*, 10.

²⁷ Baker, *Wanted: Women in War Industry*, 71–72; Evelyn Steele, *Wartime Opportunities for Women* (NY: E.P. Dutton, 1943), 44.

²⁸ Paul S. Gilbert, “Women? They’re Here to Stay,” *Factory Management and Maintenance*, 100, no.9 (September 1942): 95–97.

²⁹ W.G. Guthrie, “Why We Like Women in Our Shop,” *Factory Management and Maintenance*, 101, no.2 (February 1943): 94.

³⁰ Donald A. Laird, “Problems with Female Help,” *Factory Management and Maintenance*, 101, no.1 (January 1943): 88, 202, 204.

³¹ Jacob Vander Meulen, *Building the B-29* (Washington, D.C.: Smithsonian Institution Press, 1995), 42.

³² Guthrie, "Why We Like Women," 94; Wendell E. Whipp, "Machinist Mates," *Steel* (January 11, 1943): 91-92; and Milkman, *Gender at Work*, 61.

³³ "Employment in Airframe, Engine, and Propeller Plants, November 1943-June 1944," 478; "Mass Production of Skilled Workers," 364, 365, 367.

³⁴ "How Vega Engineering Simplifies Production Methods," *Automotive Industries* 186, no.12 (June 15, 1943): 21.

³⁵ Department of Labor, Women's Bureau, Ethel Erickson, *Women's Employment in Aircraft Assembly Plants in 1942* [Bulletin of the Women's Bureau, no.192-1] (1942), 7-8; "Factory Inspection and Jobs of Women at Vultee Aircraft," 2.

³⁶ *Ibid.*, 3.

³⁷ *Ibid.*, 3

³⁸ *Ibid.*, 2; Erickson, *Women's Employment in Aircraft Assembly Plants in 1942*, 6.

³⁹ Erickson, "Factory Inspection," 2; Erickson, *Women's Employment*, 6-7.

⁴⁰ Department of Labor, Women's Bureau, Elizabeth D. Benham, *Employment Opportunities in Characteristic Industrial Occupations of Women* [Bulletin of the Women's Bureau, no.201](1944), 14-19; Women's Factory Employment in an Expanding Aircraft Production Program, 12; "Training Women to Test Aircraft Engines," *Factory Management and Maintenance* 102, no.2 (February 1944): 124-126.

⁴¹ Erickson, "Factory Inspection," 1; Erikson, *Women's Employment*, 4.

⁴² Erickson, "Factory Inspection," 1; Erikson, *Women's Employment*, 3-5.

⁴³ "Wage Data in Assembly Plants in the Aircraft Industry, California," WB-B, Reel 31.

⁴⁴ *Ibid.*; "Ten-Hour Day," WB-B, Reel 31.

⁴⁵ National Industrial Conference Board, *Wartime Pay of Women in Industry* (NY: NICB, 1943), 6, 22-23.

⁴⁶ American Management Association, *Assimilating Women Workers: Reducing Absenteeism* [Production Series, no.141] (NY: AMA, 1942),10; *Ibid.*, 26.

⁴⁷ "Training Women Workers: As Observed in Three Large War Production Plants," *Personnel*, 20, no.2 (September 1943): 100-112; "Memo: Defense Training in Southern California," WB-A, Reel 10.

⁴⁸ "National Defense Training, Long Beach" and "Defense Training, LA City Schools, March 1942," WB-A, Reel 10.

⁴⁹ "Elden R. Carl, Solar Aircraft Company to Mr. Hostler, California State employment Service, January 14, 1942"; "Carl to Women's Aircraft Training Company, January 14, 1942," WB-A, Reel 10.

⁵⁰ "Memo: Defense Training," WB-A, Reel 10.

⁵¹ Bureau of Training, War Manpower Commission, *Training Womanpower*, (Government Printing Office, 1943), 1-5.

⁵² "Community Notes, Defense training for women in San Diego, January 1942," WB-A, Reel 10.

⁵³ Bureau of Training, *Training Womanpower*, 6-7. See also "University of California, Engineering, Science, and Management Defense Training, Los Angeles Campus" WB-A, Reel 10; "The University of Southern California, Engineering, Science, and Management Defense Training, January-June 1942," WB-A, Reel 10.

⁵⁴ "How Three War Plants Are Training Women," *Factory Management and Maintenance* (August 1943): 300; John Meade, "Why Women Quit," *Factory Management and Maintenance* (February 1944): 103-105; "Turnover-Women Employees in War Industry Plants," Table Labor Turnover-April and May, 1943, WB-B, Reel 30.

⁵⁵ American Management Association, *Assimilating Women Workers: Reducing Absenteeism* [Production Series, no.141] (NY: AMA, 1942), 14–23; “Absenteeism among Women Workers,” WB-B, Reel 30; “Percent Distribution of Separations by Reasons and Sex in Selected War Industry Plants-Turnover,” WB-B, Reel 30.

⁵⁶ “Methods Used to Reduce Turnover-Women’s Bureau Plant Interview during World War II,” WB-B, Reel 30.

⁵⁷ AMA, 25–29; “Here Is Industry’s Verdict on Women Counselors,” *Factory Management and Maintenance* (March 1944): 125–129.

⁵⁸ “Here Is Industry’s Verdict on Women Counselors,” 126.

⁵⁹ W.E. Landis, “We Like Women Counselors for Women Workers,” *Factory Management and Maintenance* (October 1943): 102–103; Sherna Berger Gluck, *Rosie the Riveter Revisited* (NY: Meridian, 1988), 239–55.

⁶⁰ Gluck, *Rosie the Riveter*, 253.

⁶¹ *Ibid.*, 252.

⁶² About wartime child care, see Howard Dratch, “The Politics of Child Care in the 1940s,” *Science and Society* 38 (1974): 167–204; William H. Chafe, *American Woman: Her Changing Social, Economic, and Political Roles, 1920–1970* (Oxford: Oxford University Press, 1972), 166–170; The Women’s Bureau, *Women Workers in Ten War Production Areas and Their Postwar Employment Plans* [Bulletin of the Women’s Bureau, no.209] (1946).

⁶³ Gerald D. Nash, *The American West Transformed: The Impact of the Second World War* (Bloomington: Indiana University Press, 1985), 66, 243; Gluck, 241, 272; The Women’s Bureau, *Women Workers in Ten War Production Areas*, 22.

⁶⁴ “Community Factors Contributing to Turnover among Women in San Diego War Industries-November 1943,” “Child Care Facilities in San Diego Area,” “Analysis of Child Care Problems of Local Women Applicants,” WB-A, Reel 10.

⁶⁵ “Community Factors Contributing to Turnover among Women in San Diego War Industries–November 1943,” WB-A, Reel 10.

⁶⁶ “Community Factors Contributing to Turnover among Women in San Diego War Industries/November 1943,” WB-A, Reel 10.

⁶⁷ Gluck, *Rosie the Riveter*, 261.

⁶⁸ *Ibid.*, 168–169.

⁶⁹ “Postwar Adjustment of Aircraft Workers,” *Monthly Labor Review* (November, 1946): 707.

⁷⁰ *Ibid.*, 708.