

## History of Army Women and STEM

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The current spotlight on STEM is a modern effort to emphasize and encourage a competitive American workforce in the areas of Science, Technology, Engineering, and Mathematics. An extra emphasis has been placed on highlighting the accomplishments of women in STEM related fields and in encouraging young women to embrace innovation and imagination. A look back in history reveals that while women have worked for the Army in STEM related occupations for a very long time, the most robust opportunities for women in STEM related jobs occurred during World War II with the establishment of a Women's Army Corps.

In 1942, when President Roosevelt signed into law a bill creating the Women's Army Auxiliary Corps, the slogan "free a man to fight" captured the Army's needs. These women, called WACs, were to assume non-combat positions in order to provide much needed manpower to the Army. The majority of WACs served in administrative, clerical, or supply positions. However, many women were recruited to join the WAC because they had valuable skills in the areas of science, technology, engineering and mathematics and other women received highly skilled training once they entered the Army.

In the Army Ground Forces, Army Air Forces, and Army Service Forces, WACs were utilized in the United States and around the world in STEM related jobs. WAC mathematicians working in the Antiaircraft Artillery Command computed the correct angle of fire and accuracy of fire. In the Army Air Forces, WACs served as weather observers, forecasters, and photo laboratory technicians. WACs in the Army Service Forces who had training in pharmacology, neurology, chemistry, and toxicology were put to work with the Chemical Warfare Service.

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These are just a few of the numerous positions held by Army women during WWII in the highly specialized fields of science, technology, engineering and mathematics.

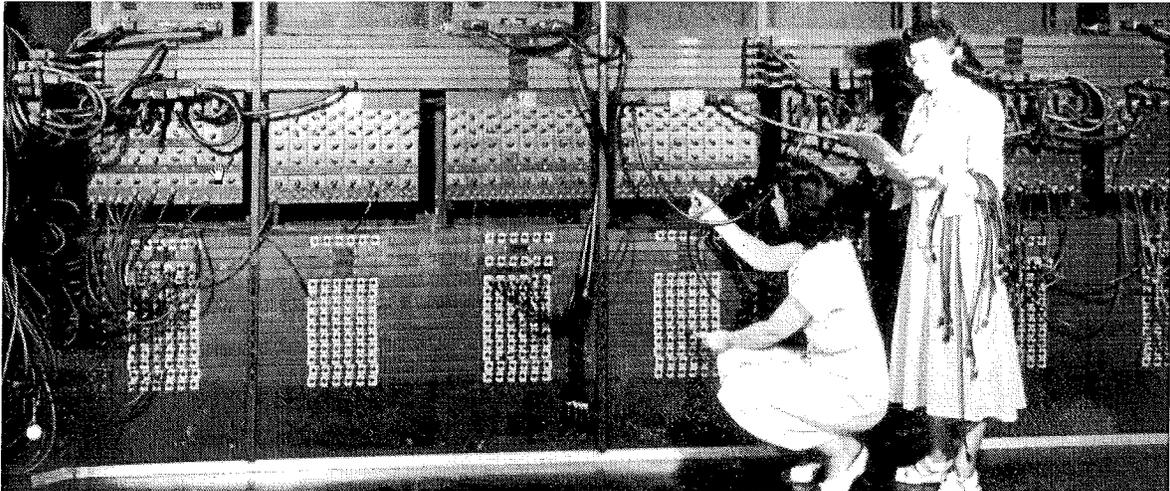


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## Top Secret “Rosies” – Mathematicians

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The millions of Rosie the Riveters who flooded manufacturing plants in World War II to produce tanks, jeeps and weapons for the military are a well known, even iconic, image of the resourcefulness of American women. A much less well known story is that of the “Top Secret Rosies”, a talented group of women whose mathematical skills produced trajectory tables at the Army’s Philadelphia Computing Section (CPS). Their highly confidential work played an integral part in the military’s success in both Europe and the Pacific. Six of these “Top Secret Rosies” also contributed to the first electronic computer: the Electronic Numerical Integrator and Computer, or ENIAC. Their trajectory program was used to demonstrate ENIAC’s capabilities when the computer was first revealed to the public. Sadly, the work of these women was almost immediately overlooked. They were excluded from celebratory dinners and the Army edited them out of photos used for recruiting. It wasn’t until many years later that these talented mathematicians received the recognition they so deserved.



## Third Officer Lorraine Hollingsworth - Engineer

Third Officer Lorraine Hollingsworth was the first WAAC to be assigned to duty with the Army Corps of Engineers. Prior to her service, Hollingsworth worked as a house operator in Seattle and was employed by the Pacific First Federal Savings and Loan Association. Upon enlisting, she was one of the first women chosen to go through Officer Candidate School and she soon became the only woman in the United States to hold a Chief Engineer's license for operating stationary boilers. After OCS, Hollingsworth served at Fort Des Moines as the Assistant to the Post Engineer. Her duties were varied; inspecting steam boilers, investigating and reporting accident hazards, supervising the distribution of the coal and civilian employees who handled it, and maintaining records on post's water consumption. Third Officer Lorraine Hollingsworth was also responsible for all the fuel used at the First WAAC Training Center.



*Lorraine Hollingsworth*  
PUBLIC RELATIONS OFFICER, FIRST WAAC TRAINING CENTER  
FORT DES MOINES, IOWA

FORT DES MOINES, IOWA, MAY 5—The first woman to be assigned to duty with the Army Corps of Engineers, Third Officer Lorraine F. Hollingsworth, 1716 B Street Ave., Seattle, Wash., is the only woman in the United States to hold a Chief Engineer's license for operating stationary boilers. She is stationed at First WAAC Training Center, Fort Des Moines, Iowa.

As assistant to Maj. Robert F. Hartman, Post Engineer at Fort Des Moines, Iowa, she has completed an year's course. Her duties are varied and varied. During the past history, a large part of her time was spent in inspecting the steam boilers on the post. An excellent safety engineer, she investigates and reports on accident records. She also maintains records on water consumption.

The officer responsible for all the fuel used at First WAAC Training Center, Third Officer Hollingsworth inspects each carload of coal to see that it meets the Federal Government specifications and supervises the distribution of the coal and the civilian employees who handle it, and maintains the necessary records on fuel contracts. She is responsible for the maintenance and upkeep of a number of coal elevators, a ballroom and other equipment used in handling coal.

A member of the first group of aviators to be enrolled in the Women's Army Auxiliary Corps, she was one of the first to be named from auxiliary ranks to regular Officer Trainee. Following a Third Officers in Dec. 26, she holds the first year appointment of an Army Second Lieutenant. An apartment house operator in Seattle, Wash., the Army wife, she was employed by Pacific First Federal Savings and Loan Association before she enrolled in the WAAC.

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## Mary Blakemore - Cryptologist

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Mary Blakemore majored in linguistics at Emory & Henry College prior to joining the WAAC in 1942. In March of 1944, Blakemore's captain asked if she wanted to serve in an unknown location overseas using her linguistic skills. Blakemore accepted the challenge and was sent to Washington D.C. for a security clearance by the FBI, Vint Hill, VA, for cryptographic training, and Fort Oglethorpe, GA, for combat skills training. Finally, in November 1944, Blakemore arrived in New Guinea. The WACs worked near MacArthur's Headquarters and worked diligently deciphering and cracking Japanese codes. When she was not code breaking, Blakemore volunteered at the base hospital helping the wounded soldiers bathe and write letters. She quickly learned that the Japanese changed their code system two to three times a day which made the task of deciphering very difficult. Yet, she knew her efforts were successful as she learned of more and more Japanese ship losses. Blakemore spent one year in New Guinea, returning home in November of 1945.



## Sergeant Henrietta Williams - Navigator

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Sergeant Henrietta Williams was the first WAC in the China-Burma-India Theater to receive the Air Medal for meritorious achievement in aerial flight. While serving in China and from April 7 to August 18, 1945, Sergeant Williams engaged in more than a hundred training flights. She was considered one of the most proficient Loran (long-range navigation) navigators in the CBI Theater. Sergeant Williams helped develop the navigational maps for crossing the difficult Himalayan Mountains, nicknamed "the Hump". For her outstanding performance as a communications instructor in the air, Sergeant Williams was also awarded the Legion of Merit.

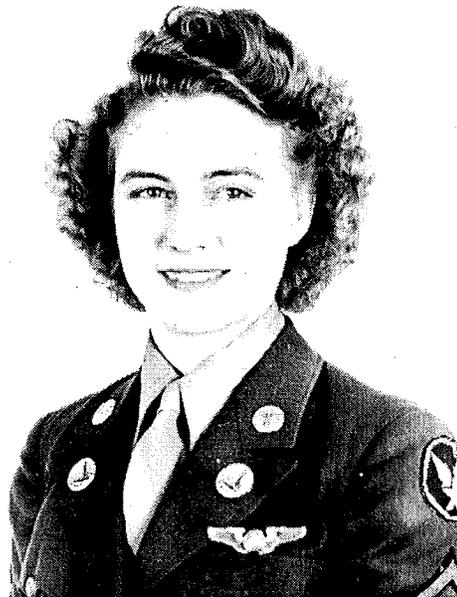


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## Private First Class Emma Jane Burrows Windham

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Before joining the Women's Army Corps (WAC), Private First Class Emma Jane Burrows Windham majored in aeronautical engineering at the University of California, held a civilian pilot's license, and was credited with 349 flying hours. She was the Director of Flying for the New Mexico Wing of Women Flyers when asked to join the WAC. PFC Windham was the Army's first WAC crew chief and flight engineer. She served in the European Theater of Operations where her wings were a matter of such curiosity that Military Policemen stopped her on the streets to ask her authority for wearing the air crew member's insignia. Windham earned her wings while stationed at Gore Field, Montana. Qualifying for the dual rating of crew chief and flight engineer, Windham completed many flights from Montana to Fairbanks, Alaska, and cross-country from Montana to Florida. In England, she was assigned to the Air Inspector's Office of the Air Transportation Command's European Division. She was killed on March 31, 1945 when the C-17 she was in collided with a C-47 over England. The research done by the Army Women's Museum and Windham's family has unearthed evidence of more than 500 women on flight status during WWII.



## Mary Anderson - Innovator

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Mary Anderson, of Los Angeles California, had a very skilled and interesting job in the WAC. She replaced a male soldier in an Army laboratory at Dugway Proving Grounds and was the only WAC glass blower at Dugway. Anderson's work in glass blowing for the Chemical Warfare Service resulted in the creation of special sampling apparatus for experiments. The chemical research conducted in these laboratories led to discoveries valuable both in peace time and in war.



## Harryette Emmerson - WACs and the Manhattan Project

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Little is known about Harryette Emmerson personally, but she was one of the women who worked on the Manhattan Project. WACs had been assigned to the Corps of Engineers since early 1943 but the secrecy of their work on the atomic bomb meant few knew of their contributions until August 1945. In all, 422 WACs worked on the Manhattan project. The Army later acknowledged that little was documented of their efforts since they received no highline acclaim or recognition. Most of these women were assigned as stenographers and clerks; however a few of them were assigned as scientific technicians. Electronic technicians worked on the construction of needed electronics equipment and photographers became skilled in photographing metals and metallurgical processes. Spectroscopic technicians qualified for advanced work with the spectroscope. The WACs in the Engineering Corps were some of the proudest WACs in the Army because they believed they had done more than other WACs to shorten the war and save American soldier's lives.



## Third Officer Helen Robertson (Rogertson-Rogerston) - Veterinarian

Before joining the Women's Army Auxiliary Corps (WAAC), Third Officer Helen Robertson was a veterinary surgeon in Hollywood, California. After Officer Basic Training at Fort Des Moines, Robertson became the only WAAC assigned to the Army Veterinary Corps. She was responsible for the health of all animals owned by the Army at Fort Des Moines; including the pets owned by Officers and Non-Commissioned Officers on post as well as the mascots that WAACs adopted. Another of her important tasks was commissary meat inspection to ensure it met the rigid government specifications. The Museum is currently conducting research to verify the spelling of her last name. All documentation on Helen Robertson has different spellings of her last name.



## Army Women in Meteorology

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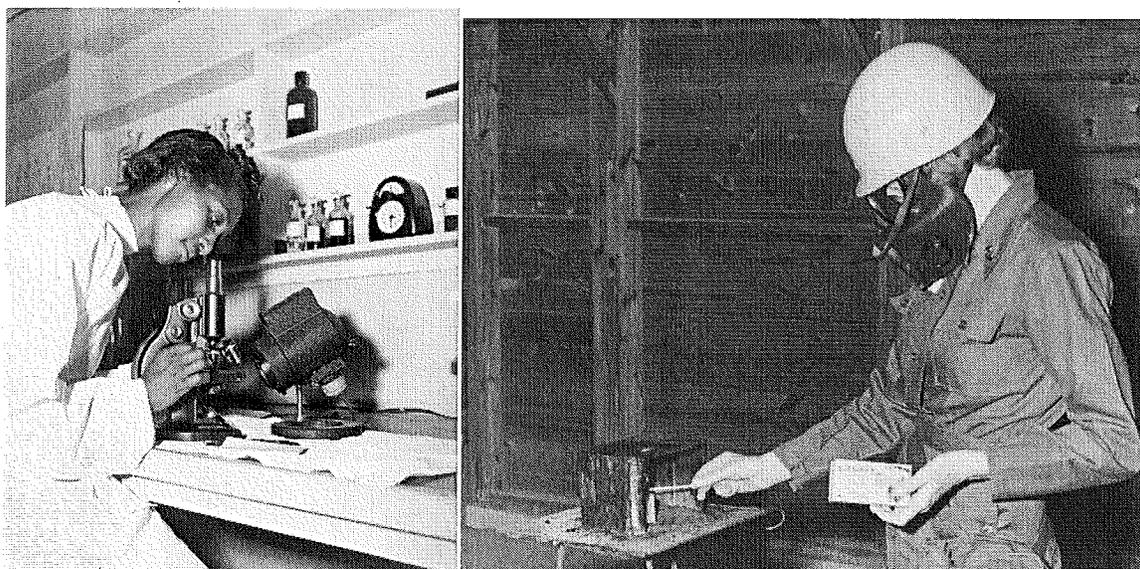
The Army Air Forces Weather Wing obtained a quota of five hundred WACs, stationing five to six at each weather station on air bases where they could be housed with a WAC company. At the height of World War II, WACs had taken over more than a fourth of all the jobs assigned to the enlisted personnel at the AAF Weather Wing. The first five enlisted WACs completed the weather forecaster course at Chanute Field, Illinois, in 1944. All were previous graduates of the weather observers course. Two WACs came with prior civilian experience in weather before entering the WAC; one with the weather bureau and the other as a weather observer. The WACs were trained in the theory and practice of weather forecasting as well as the analysis of surface weather maps, theory of air masses, synoptic and descriptive meteorology, upper air analysis, and climatology. WACs in the Weather Wing worked in many technical jobs, most notably; weather forecasters, weather observers notating wind velocity, and draftsmen preparing intricate weather maps for statistical and training purposes.



## Army Women in the Chemical Corps

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Chemical Warfare Service was one of the first Army Service Forces agencies to receive WACs. WACs served as instructors on radio theory and as decontamination experts. CWS looked for women who had previously trained in pharmacology, neurology, chemistry, and toxicology. WAC laboratory technicians were numerous at most installations and WAC draftsmen were employed to design protective equipment. This is not to say that all WACs with the Chemical Warfare Service were stuck inside with a microscope; many worked outside testing smoke grenades and experimenting with chemicals. WACs who served with the Chemical Warfare Service during WWII were kept stateside and few ventured overseas. By the end of the war, over 700 WACs had served in the Chemical Corps. During the 1960s, all Chemical Corps jobs were closed to women. It was not until the 1970's and the military's renewed interest in chemical warfare that the shortage of manpower once again allowed women to work in the Chemical Corps.



## Doctor Marion Loizeaux - Surgeon

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Dr. Marion Loizeaux was a graduate of Cornell University's School of Medicine and a former assistant physician at Wellesley College. She and eleven other female practitioners went to England in 1941 on a lend-lease arrangement to help over-taxed medical personnel in the treatment of blitz casualties. She became a contracted surgeon attached to the Office of the Chief Surgeon in December of 1942 and was the only female physician serving with the United States Armed Forces in the European Theater of Operations at that time. Dr. Loizeaux was tasked not only with medical care but with preparing for the medical service branch to be rendered to members of the WAAC.



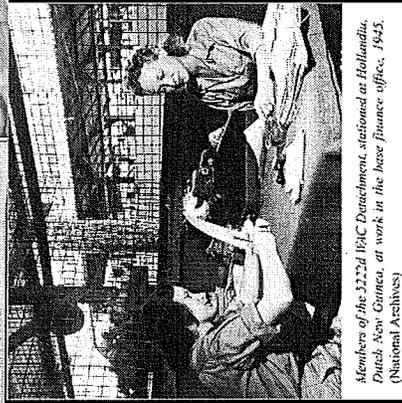
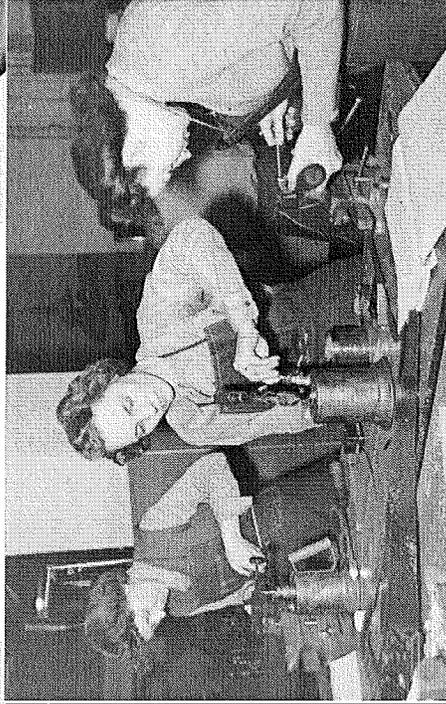
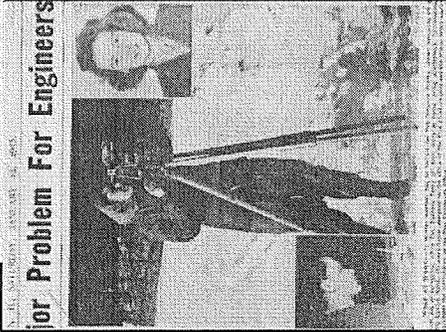
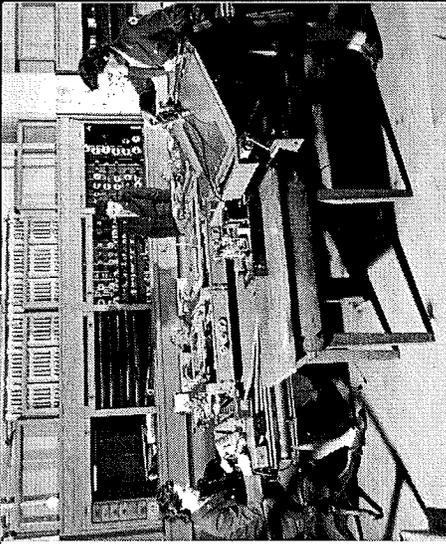
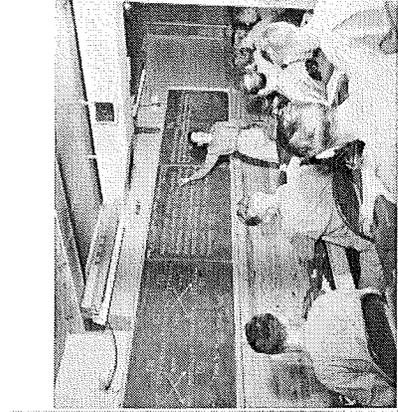
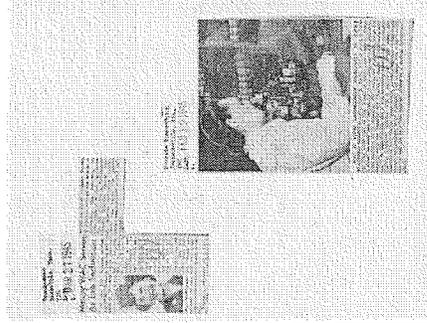
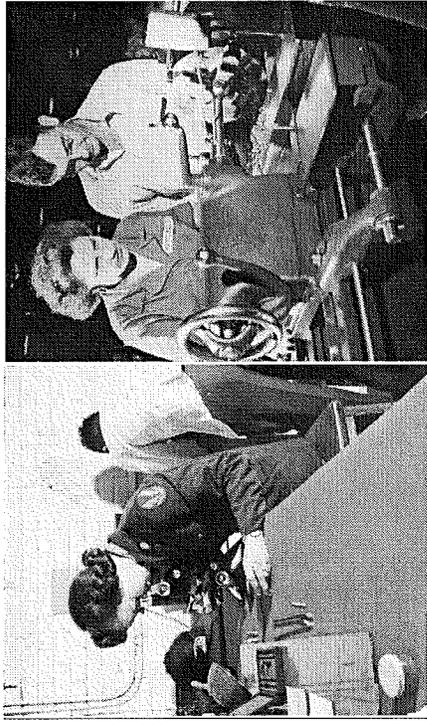
## Captain Charlotte McGraw

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Captain Charlotte McGraw was the only official Women's Army Corps (WAC) photographer during WWII. After joining in 1942, McGraw's civilian skills as a photographer were put to use when she was assigned to take recruiting and publicity photos of the WAC Training Center in Fort Des Moines, Iowa. Recognizing the professionalism of her technique, the Army designated McGraw as the official WAC photographer. Sent abroad to North Africa, Europe, Asia, and the Pacific, Captain McGraw produced a vast body of work that captured the experiences of Army women overseas during World War II. Her images were published by the Army, as well as the nation's leading newspapers and magazines. As an archival collection, they document a pivotal time of change in the history of the US Army.



# Army Women in STEM (Science, Technology, Engineering, Math)



Problem For Engineers

Members of the 322d 19C Detachment, stationed at Hollandia, Dutch New Guinea, at work in the base finance office, 1945. (National Archives)

241. Army University, Signal School, Monterey, California, 1945.