

CHAPTER 2

WOMEN IN AVIATION

2.1 INTRODUCTION

Flight is, by its very nature, a dangerous activity. It seems illogical for anyone to want to pursue such a sport or career. Yet, since the dawn of aviation, both men and women have been captivated by the idea of soaring into the sky. Early aviation was especially risky and women were thought to be unfit to partake in it, by virtue of their being 'too weak'. It was thought that they would never be able to succeed in such an environment. However, women have made significant contributions to aviation. Indeed, were it not for the Wright brothers' sister, Katherine, the first aircraft might never have left the ground.

Women in aviation have constantly challenged the notion of what was 'expected' of them. No one believed that Amelia Earhart would ever be able to fly across the Atlantic, yet she did exactly that on 21 May 1932. It did not take long though, for it to be suggested, because of Earhart's penchant for wearing trousers in public (few ladies dared to be so bold in the 1930's), that she was in fact the famed aviator Charles Lindberg in drag. For some people, it was easier to believe this than to ponder the implications of a woman's crossing the Atlantic on her own.

Later, the first women to join airlines in Europe experienced sexism, harassment, high visibility and isolation, which resulted in the earlier stages of these women's careers' being treated as a 'rite of passage' (Davey & Davidson, 2000).

This chapter looks at some of these pioneer aviatrixes, as well as some of the many contributions they made. It also suggests some of the gender issues that they faced and the means by which they overcame these problems. Events such as the Second World War greatly affected the involvement of women in the armed forces in general, and also in aviation in particular. Organisations such as The Ninety-Nines, Inc. and changing legislation has further encouraged greater involvement by women in aviation. These issues are discussed in greater detail in the sections below.

2.2 WOMEN IN AVIATION HISTORY

2.2.1 Through the decades – a brief history

From about 1910 onwards, women in the United States overcame a variety of prejudices in order to take to the air. Although it is widely known that Blanche Stuart Scott was the first woman to solo in a heavier-than-air machine, the official credit for becoming the United States of America's first woman pilot went to Bessica Raiche, who went solo on 16 September 1910 (Cadogan, 1992:39).

In England, during the 1920's, a few aristocratic women flyers hopped from continent to continent in their private planes.

By the 1930's women were setting an abundance of aviation-related records. Amongst them was Anne Morrow Lindbergh, who came to share her husband Charles Lindbergh's glory when she helped him map air routes over the Arctic and the Atlantic (Yount, 1995:10).

During the Second World War, British and American women were recruited to ferry fighter and bomber aircraft from the factories to the airfields and between airfields. Some outstanding female pilots were trained in Germany and Russia. During the war, Russia also established the 588th Night Bomber Regiment, which consisted of 254 women, most under the age of 20, who flew more than 24 000 combat missions. In the process, they dropped more than 23 000 tons of bombs (Moolman, 1981:160).

Post-war developments included numerous long distance record flights by women. In the 1950's, Jacqueline Cochran, the first woman to break the sound barrier, competed regularly with Jacqueline Auriol for world speed records (Cadogan, 1992:4). During the 1960's, Geraldine Mock and Joan Merriam Smith competed to be the first woman aviator to fly around the world.

Later, during the 1970's and 1980's, Judith Chisholm and Jeana Yeager established further notable long-distance endurance records. Corporate campaigns advocating women for equal rights and equal responsibilities were eventually established and this in turn culminated in the employment of women in civil airliners and military jets. By 1973, the first group of women aviators were accepted into the United States Navy.

By 1995, the world saw the first aviatrix, Eileen Collins, pilot a space shuttle.

2.2.2 Chronology

In Table 2.1, a time line for aviatrix firsts is set out.

Table 2.1: Chronology of aviatrix firsts

1805	Madeleine Sophie Blanchard: First woman to ascend in a balloon in her own right (rather than as a passenger), France.
1910	Blanche Stuart Scott: First American woman to solo in a heavier-than-air machine. 2 September, Curtis Field, Long Island, USA (Holden, 1991d).
1910	Bessica Raiche: first woman pilot of America. 16 September 1910. (Holden, 1991b).
1911	Harriet Quimby: First licensed woman pilot. August, New York (Boase, 1979:19).
1912	Harriet Quimby: First woman pilot to cross the English Channel. 16 April 1912, England/France (Browne, 2001:1).
1912	Harriet Quimby: First woman to die in an airplane accident. Massachusetts, USA, 1 July 1912 (Thompson, 2000).
1921	Bessie Coleman: First black licensed woman pilot (Thompson, 2000).
1923	Ruth Nichols: First woman to solo in a seaplane and get her licence in flying boat (Holden, 1991h).
1929	Louise Thaden: Set the women's endurance record of 22 hours, 3 Minutes on 16 March 1929. (Holden, 1999l).

1930	Amy Johnson: First woman to fly from England to Australia. 5 May 1930 (Ninety Nines, Inc., 1999).
1932	Amelia Earhart: First woman to fly across the Atlantic. 21 May 1932. Ireland (Shore, 1987:71).
1933	Nancy Bird-Walton: First woman pilot in Australia (Cadogan, 1992:140).
1934	Jackie Cochran: First female test pilot (USAF, 1998a).
1936	Louise Thaden & Blanche Noyes: First women to compete and win a male and female air race.
1942	First female combat pilots in history. Soviet Union, May 1942 (Moolman, 1981:160).
1942	Nancy Harkness Love formed Women Airforce Service Pilots (WASPs). 10 September (Douglas, 1990).
1944	Ann Baumgartner: First woman to <i>unofficially</i> fly experimental jets.
1946	Janet Harmon Waterford Bragg: First black woman to earn a commercial licence (Holden, 1991i).
1953	Jackie Cochran: First woman to break sound barrier. Edwards Air Force Base, USA (USAF, 1998a).
1964	Geraldine Mock & Joan Merriam Smith: Rivals to be the first women to fly around the world successfully (Holden, 1991g).
1973	Emily Warner: First woman to be a pilot for a major airline (Holden, 1991m).
1973	Rosemary B. Mariner: member of the first group of female candidate pilots to be accepted to navy flight school. 5 January 1973.

1974	First United States Army military pilots.
1974	Leslie Halley Kenne: First <i>official</i> military woman test pilot, experimental aircraft (Edwards Air Force Base, 2000).
1974	Mary Barr: First woman pilot in the US forest service.
1976	First group of women candidate pilots are officially allowed in the US Air Force.
1983	Charlotte Larson: First female smoke jumper aircraft pilot.
1984	Beverly Burns: First woman to captain a 747 in a cross country flight.
1984	Lynn Rippelmeyer: First woman to captain a 747 in a trans-Atlantic flight.
1993	First women combat pilots in the US military.
1995	Eileen Collins: First female astronaut to pilot a space shuttle.

2.2.3 Profiles

Even though there have been and are still a great many remarkable aviatrices, few pioneers have made such a large impact as the pilots discussed below.

2.2.3.1 *Harriet Quimby (1875-1912)*

One of the most celebrated of America's pioneer fliers was Harriet Quimby. With her adventurous spirit, she encouraged many women to challenge themselves in her weekly magazine articles. She was also very influential in determining the future of aviation in her visions of passenger airlines and scheduled air routes. Harriet Quimby warned all aviators of the dangers of overconfidence while piloting and she emphasised the importance of safety aspects. She was also the first woman pilot to cross the English Channel.

- The early years

The few historical records that exist of Harriet Quimby's life are filled with a series of contradictions and controversies. Harriet was born in Michigan in May 1875. There are no birth certificates or school records to document her earliest years, but Harriet is listed on an 1880 census of Arcadia as living with her parents on their farm (Browne, 2001). Both her parents, Ursula and William, were from New York, and not from Ireland as people often speculate. Harriet's father worked as the regimental cook for the 188th Infantry in the Union Army, but he was later discharged due to ill health. After this, William worked sporadically and generally unsuccessfully at various jobs. When the family moved to California, Ursula Quimby took control of the family's destiny.

In order to prepare Harriet for a male-dominated world, Ursula started an 'image-building' campaign. She informed people that Harriet was born in 1884, thus disguising her age and making her appear nine years younger than she really was. She also created a fantasy life in which Harriet was said to be born in Boston and educated in Switzerland and France (Holden & Batac, 1991).

- Harriet the journalist

In 1900, at the age of 25, Harriet was listed in the San Francisco census. By the age of 26, she was working in the copy room of a newspaper entitled *The San Francisco Call and Chronicle*. Harriet would search for stories around the city, write them, and then hand them to the editor. The editor soon realized that she had an enormous talent for journalism and began giving her regular assignments as a 'cub reporter'. Harriet soon built up a reputation as one of the paper's best reporters and her by-line became well known in the Northern California area. Harriet was one of the first women to work as a journalist for a major newspaper (Holden & Batac, 1991).

By 1903 Harriet was working as a contributing journalist for *Leslie's Illustrated Weekly*. She wrote over 250 articles and it was often noted that her interviews depicted her sincerity. In 1906, Harriet was on assignment at the Vanderbilt racetrack and was taken on a high-speed automobile ride. This in turn became the subject of an article revealing her passion for fast machines. She purchased her own car and advised other owners and drivers to maintain their automobiles properly. By the time that Harriet was

36, she was living independently in New York, travelling, helping to support her parents and continually exploring her interests (Browne, 2001).

- Aviation

In October 1910, Harriet attended an aviation meet at Belmont Park. There was an impressive gathering of the world's finest aviators of the time but not one of them was a woman. John Moisant, who with his brother Alfred operated a school for aviators at Mineola, particularly thrilled Harriet. John Moisant had won an air race around the Statue of Liberty and upon meeting him, Harriet promptly asked him to teach her to fly. (Moolman, 1981:22).

When John Moisant was killed shortly after in an air meet in New Orleans, Harriet signed up for flying lessons with his brother Alfred, who had opened the Moisant Aviation School at Hempstead, Long Island. She befriended Matilde Moisant, the sister of John and Alfred, and they started flying lessons together. By August 1911, Harriet Quimby qualified for her licence (Boase, 1979:19).

In 1911, she appeared with a gossamer bi-plane at the Long Island headquarters of the Aero Club of America, which licensed pilots before the government took over this responsibility. The Aero Club had never received a request to licence a woman aeronaut before and were not thrilled at the idea. Harriet requested that the club members at least let her demonstrate her flying ability. Club officials watched sceptically as Harriet took off and glided over a potato field. She landed within eight feet of where she had begun her flight, setting a new club record for landing accuracy (Van Wagenen Keil, 1979:10). Harriet Quimby became the first licensed woman pilot and Matilde Moisant became the second (Moolman, 1981:22).

On 4 September 1911, Harriet piloted a Moisant-built monoplane at the Richmond Country Fair in the first recorded night flight by a woman (Browne, 2001). Wearing her self-designed purple satin flying costume, Harriet made a dramatic impression on the public and was soon dubbed the 'Dresden-China Aviatrix' (Moolman, 1981:22).

Harriet wrote about her experiences, lessons, tests and flying exhibitions in *Leslie's*. She was also influential in outlining her vision for the future of aviation: multi-passenger

aircraft with scheduled routes, mail carried by planes around the world, and special uses for aerial photography and mapping (Browne, 2001).

Harriet declared that there was no reason why women should not be as confident and capable in the air as men. In an article entitled 'Aviation as a Feminine Sport' she encouraged women to take up flying. She wrote: 'There is no reason to be afraid as long as one is careful... I never mount my machine until every wire and screw has been tested. I have never had an accident in the air' (Boase, 1979:19). Harriet often warned against over-confidence and of the dangers of flying, cautioning aviators who were careless and did not make safety a priority.

- The Channel flight

In November and December of 1911, Harriet Quimby and Matilde Moisant joined the Moisant International Aviators Exhibition Team and flew to Mexico City to participate in the festivities associated with the inauguration of President Francisco Madero. While Matilde continued the tour, Harriet returned to New York and started formulating her plan to be the first woman to pilot across the English Channel (Browne, 2001).

In Paris she borrowed a 50 horsepower Blériot monoplane, which she secretly shipped to Dover. Because of foul weather, she did not have the opportunity to give the borrowed aircraft a preliminary test, nor had she ever used a compass. British Aviator Gustav Hamel instructed her on how to use a compass shortly before her takeoff. He was so sceptical of any woman's chances for a successful flight over the English Channel that he offered to dress up in her purple satin flying suit and make the flight for her. She declined his extraordinary offer, but allowed him to give her the compass (Moolman, 1981:24).

On 16 April 1912, at 5:30am, Harriet left Dover on a trip across the English Channel which was described as extremely dangerous and death-defying. Only 59 minutes later, she landed approximately 30 miles (48 kilometres) from her destination (Calais). Within minutes, local fisherman toasted her with champagne and carried her on their shoulders in triumph (Browne, 2001).

- The Massachusetts air meet

Later that year, Harriet negotiated a fee of \$100 000 to appear on 1 July 1912 in her new two-seater Blériot monoplane at the Third Annual Boston Aviation Meet at Squantum, near Quincy, Massachusetts. William P. Willard, the manager of the event, had won the flip of a coin and the honour of flying with Harriet in the last show of the day (Holden & Batac, 1991n).

After a routine flight to the Boston Light, Harriet circled over the Dorchester Bay as thousands of spectators watched. At an altitude of approximately 1500 feet (457 metres), the plane pitched forward and Willard was thrown from his seat. Harriet appeared to gain control of the aircraft, but was also thrown out seconds later. Both Harriet and Willard fell to their deaths in the tidal mud flats of the Bay (Browne, 2001).

- Technical explanation

In August 1912, *Aircraft* magazine tried to analyse possible reasons for the accident. One article argued the instability of the Blériot monoplane design. The author argued that the fixed horizontal tail surface of the plane was actually a small cambered wing set at a higher lifting angle. The author stated that a 'machine of this type has not the slightest degree of automatic longitudinal stability. It is an extremely tricky and dangerous type to handle. The horizontal tail should act as a stabilizing damper, preventing the machine from either diving too steeply or stalling. Not under any circumstances should it act as a lifting plane' (Holden & Batac, 1991n). The article also listed a dozen other pilots who died in Blériot monoplanes where the planes had dived straight into the ground. The article failed to mention, however, whether the pilots had fallen from the aircraft as Harriet and Willard had done.

- In conclusion

The United States of America and the rest of the world lost a strong advocate of aviation with Harriet Quimby's death. Harriet believed that America was falling behind other nations such as England and France in the development of aircraft, pilot safety, and commercial as well as humanitarian applications. She encouraged women to take

to the air through a series of articles published in *Good Housekeeping* and *Leslie's Weekly*.

Harriet Quimby was buried on 4 July 1912 at the Woodlawn Cemetery in New York. A year later, her remains were moved to her permanent burial site at Kenisco Cemetery at Valhalla, New York (Browne, 2001).

2.2.3.1 Nancy Harkness Love (1914-1976)

Nancy Harkness Love was instrumental in gaining acceptance for women as both career and military pilots. She was twenty-eight years old when she was appointed as Director of the WAFS (Women's Auxiliary Ferrying Squadron) during the Second World War.

- The early years

Nancy was born in Houghton, Michigan, on 14 February 1914. Her parents, Robert Bruce and Alice Graham Harkness, enjoyed the privileges of modest influence. Robert Bruce was a successful physician and always encouraged his children to show spunk. Dr Bruce also insisted that they get a good education and Nancy attended the prestigious New England boarding school of Milton Academy. In 1927, she spent a year travelling and studying in Europe and was able to witness Charles Lindbergh's landing at Le Bourget after his successful trans-Atlantic solo flight (Douglas, 1990).

- Aviation

In the summer of 1930, a pair of barnstorming pilots captured Nancy's attention. Nancy convinced her hesitant parents to allow her to take flying lessons, which she started at age 16. Her instructor, Jimmy Hanson, was only two years older than she was and had very little experience. On 7 November 1930, at age 16½, Nancy received her private pilot's licence (McFadden, 1999).

Soon after, an incident altered any carefree opinions that Nancy might have had about flying. With only fifteen hours of solo time, she took off on her first cross-country trip. She had two passengers and luggage on board and headed from Boston to Poughkeepsie, New York, to visit friends at Vassar. She had not yet learned how to read a compass and soon the weather turned bad. To make the situation worse, an oil

gauge broke and Nancy realized that she had to land the plane. She called it 'a precarious landing', but all aboard were alive. She had learned a lesson that she would never forget (Rickman, 2001:1). Nancy would never again, in a flying career that lasted over 40 years, overestimate her flying skills. Later this sentiment was echoed in a remark she made: 'It's stupid to call flying daredevilish. I don't want to fly to the South Pole. I just want to do a job in the air' (Moolman, 1981:144).

- Career and marriage

Nancy continued to fly while she was in college and received her transport rating in 1933 while she was at Vassar College. She started a flying school at the college and supplemented her allowance by transporting passengers to Poughkeepsie Airport. Nancy had to leave the prestigious school in her sophomore (second) year when the depression affected the family's finances (Holden & Griffith, 1993:56).

In 1935 Nancy was selected along with four other exceptional pilots to staff the Bureau of Air Commerce's National Air Marking Program (Douglas, 1991:28). Air markers were intended as a supplemental but important aid to the United State's airway system of lights and radio beacons. Each pilot was assigned a specific section of the United States and Nancy was given the eastern seaboard, stretching from Maine to Florida. In October 1935, the Boston Post reported that Nancy had worked with the Massachusetts officials to place 290 markers throughout the area (Douglas, 1991:28).

In 1936, Nancy married Air Corps Reserves officer Robert Love (USAF, 1998). The marriage caused headlines in the Boston papers. One such headline read 'BEAUTIFUL AVIATRIX WEDS DASHING AIR CORPS OFFICER'. The media attention placed Nancy in an excellent position to lobby for a women's flying squadron during the war (PBS Online, 2001:1).

- Founding the WAFS

In June 1940, Nancy had earned a Civil Aeronautics Administration (CAA) instrument rating, as well as a seaplane rating (Rickman, 2001). She and 32 male pilots were responsible for flying American airplanes to Canada, where the planes would await shipment to France. The flights bought Nancy into contact with the operations of the

Army Air Corps Air Ferrying Command, known after 9 March 1942 as the Ferrying Division of the Air Transport Command (Holden & Griffith, 1993:57).

As early as May 1940, Nancy had proposed recruiting a select group of qualified women pilots to supplement the all-male ferrying unit. While Jackie Cochran had been pushing for an entirely separate women's military commanded by a woman (namely herself), Nancy was interested only in integrating women into the Air Transport Command (Moolman, 1981:144). The idea was rejected, but resurfaced in June 1942 with the attack on Pearl Harbour. The United States Army was in great need of pilots. Nancy met with Colonel William Tunner, who headed up the domestic wing of the ferrying division. He asked her to write a proposal for a women's ferrying division.

Within months, Nancy became the director of the Women's Auxiliary Ferrying Squadron (WAFS). Nancy set stringent requirements which women pilots had to meet in order to join the WAFS. Although the women would be flying for the military, they would be hired as civilians (Moolman, 1981:144). Nancy was 28 years old at the time and had 25 experienced female pilots under her command (PBS Online, 2001).

Colonel Tunner asked Nancy to fly an important mission which would greatly expand the scope of her operations. The British had asked for the delivery of 100 B-17's. Colonel Tunner suggested that Nancy become the first woman pilot to fly a military plane on an intercontinental flight (PBS Online, 2001). General Hap Arnold heard about the mission and feared a backlash if a woman pilot was shot down by enemy fire. On the day the mission was scheduled, Nancy received a telegram from General Arnold. It read; 'CEASE AND DESIST, NO WAFS WILL FLY OUTSIDE THE CONTIGUOUS U.S.' (PBS Online, 2001:3).

By July 1943, Nancy's WAFS (Women's Auxiliary Ferrying Squadron) were integrated into Jackie Cochran's women's pilot training programme (McFadden, 1999:1). Cochran was named as the director of the combined units, which was called the Women's Airforce Service Pilots, or WASPs. Nancy was put in charge of all WASP ferrying operations. Under her command, aviatrixes flew almost every kind of military aircraft and were often used to demonstrate the safety of aircraft (PBS Online, 2001). The WAFS unit set enviable records of safety and professionalism (Cochrane & Ramirez, 1999 a).

- After the War

On 20 December 1944, the WASP program was officially disbanded. Although many women continued to fly, the majority, including Nancy, made the transition to the only socially acceptable occupation of the immediate post-war period, motherhood (Douglas, 1991:28). Nancy received an Air Medal for her service to the United States. She retreated from public life and raised her three daughters in Martha's Vineyard. In 1976, Nancy died of cancer at the age of 62. She did not live to see the WASPs being accorded military recognition three years later in Washington DC (PBS Online, 2001).

- In conclusion

Nancy Harkness Love's plan for the Women's Auxiliary Ferrying Squadron is an important model for the integration of women into the military. According to Douglas (1991:30), an important factor was that the WAFS programme was never a matter of ego. For Nancy, it was absolutely critical that both men and women believed that members of either sex had something to contribute. According to Nancy, the presence of one gender, even in non-traditional occupations such as flying, should not be viewed as diminishing the contributions of the other (Douglas, 1991:30). Even though the gender debate in the military still continues to this day, Nancy Harkness Love influenced its course greatly.

2.2.3.3 *Geraldine (Jerrie) Cobb (1931-)*

Nominated for the prestigious Nobel Peace Prize for her work in serving humanity's needs on this planet, Jerrie Cobb was also the first woman to qualify to go into space.

- The early years

Geraldyn (Jerrie) Cobb was born in Norman, Oklahoma, on 5 March 1931. Her father, William Harvey Cobb, was a commercial pilot and sold cars during the Depression. Jerrie's mother had planned to become a teacher. Jerrie and her older sister, Carolyn, were very different from one another. Carolyn loved people and was described to be quite extrovert, while Jerrie preferred to be by herself. Yount (1995:90) reports that Jerrie suffered from a speech impediment in her early years and, even though it was surgically corrected, Jerrie remained a shy child.

By 1943, at the age of 12, Jerrie begged her father to teach her how to fly. She was too small to reach the rudders, so William Cobb attached wooden blocks to them and also added several pillows on the seat so that she could see over the edge of the open cockpit. The lessons ended, however, when the Cobb family moved and sold the plane. By the time she was 15, Jerrie had found a way back into the air. Her high school's football coach was a flight instructor and also owned a plane. To pay for her lessons, she picked berries, worked at a movie theatre, waxed airplanes, delivered pharmaceutical prescriptions and typed for a publisher (Briggs, 1991:33). By 16 she had soloed and by her seventeenth birthday, on 5 March 1948, Jerrie obtained her private pilot's license – what she called her 'ticket to the sky'.

After high school, Jerrie announced that she would not be going to college but that she would instead fly professionally. Her family felt that this was a poor decision, as she had only 200 hours of flight time. In addition to this, many military pilots had returned from the Second World War, and this made it an even more unlikely prospect that Jerrie would be able to fly commercially. Jerrie was determined, however, and earned money by playing softball with a semi-professional women's team called the 'Sooner Queens'. After three years she was able to buy her own airplane, a war surplus Fairchild PT-23. She had received her commercial pilot licence at the age of 18 and could now fly professionally (Briggs, 1991:34).

- Career

In 1950, Jerrie got her first paying flying job which was to fly 'low and slow' over oil pipelines to look for leaks. She learned to recognise the signs by stains on plants and soils. By the age of 21, Jerrie had received her instructor's licence and started to teach other oilfield workers how to fly. Some of the male students commented that there was nothing a 'dame' of 21 could teach them, but the formerly shy Jerrie Cobb found she could 'breathe fire' at the tough men and make them respect her with her knowledge of aviation (Yount, 1995:91).

In 1953, Jerrie moved to Florida and managed to persuade the manager of Fleetway, Jack Ford, to hire her to ferry T-6's to South America. They were to be used by the Peruvian airline. The trip was a treacherous one over a distance of 520 miles (832 kilometres). The first leg took her over the rugged Andes Mountains. The third leg of

the four-day trip was from Kingston, Jamaica, to Barranquilla, Colombia. Jerrie would only have four hours and fifteen minutes' fuel supply for a four-hour trip, she would thus have to land the aircraft exactly at its destination (Briggs, 1991:35). On Jerrie's first trip, she stopped in Guayaquil, Ecuador, for refuelling (as per instruction from Jack Ford). Her plane had the markings of the Peruvian Air Force and had bomb racks and machine guns and it was immediately assumed that she was an enemy spy. Jerry was thrown into jail for twelve days until the U.S government was finally able to secure her release. She received a hero's welcome when she finally landed at Peru's air force base in Lima.

Jerrie ferried T6's to Peru for a total of two years. Fleetway then asked her to ferry huge four-engine B-17 bombers to France and bulky transport C-46's to Calcutta, India (Briggs, 1991:37).

Upon her resignation from Fleetway, Jerrie was able to gain some experience as a test pilot. On 25 May 1957, Jerry flew an Oklahoma built Aero Commander 1504 miles (2406 kilometres) non-stop from Oklahoma City to Guatemala City, Guatemala, and back. She completed the flight in eight hours and five minutes and broke a record for that size plane. On 5 July 1957, Jerry set an altitude record by reaching 30 560 feet (9168 metres) in another Aero Commander (Yount, 1995:92).

- Astronaut training

In September 1959, Jerry attended an Air Force Association conference in Miami where she met Dr W. Randolph Lovelace of the National Aeronautics and Space Administration (NASA). Lovelace was the chairman of NASA's Life Sciences Committee for Project Mercury, NASA's first programme to put people into space. Seven men had been chosen as astronauts, but Lovelace was interested in the effects of space on women as well.

On 13 February 1960, Jerrie reported to the Lovelace Foundation in Albuquerque, New Mexico, to start the Mercury astronaut tests. She passed every one of the 75 tests. Lovelace described Cobb's test results at a scientific meeting in Sweden in August. He suggested that women might be better suited for space travel than men: 'Women have lower body mass, need significantly less oxygen and less food and may be able to go

up in lighter capsules, or exist longer than men on the same supplies' (Yount, 1995:94).

Jerrie then underwent a second battery of psychological tests and a third battery of tests at the navy's School of Aviation Medicine in Pensacola, Florida. At the same time, Dr Lovelace was giving the first tests to a group of 22 other experienced women pilots. Of these women, 12 passed the tests and two of those also undertook the second phase of psychological testing. They performed exceptionally well.

A total of 12 astronaut candidates (including Jerrie Cobb) were chosen for the programme:

- Bernice Trimble (Steadman)
- Myrtle T. Cagle
- Jan Dietrich
- Mary Wally Funk II
- Marion Dietrich
- Sarah Lee Gorelick (Ratley)
- Jane Hart
- Jean F. Hixon
- Rhea Hurrle (Woltman)
- Irene Leverton
- Jerry Sloan (Truhill)
- Gene Nora Strumbough (Jensen)

(Holden & Griffith, 1993:200)

In the end, NASA announced that it would not be training female astronauts for Project Mercury. The reason was said to be that women had no experience as jet pilots. The ruling devastated Jerrie and the other astronaut candidates. On 17 July 1962, Jerrie and the other candidates addressed the Committee of Science and Astronautics of the House of Representatives where she reiterated the findings of the studies. In the meantime, NASA had chosen a second group of astronauts, nine white males, for Project Gemini. President John F. Kennedy had declared that training female astronauts would delay the national goal of putting a *man* on the moon by the end of the decade (Briggs, 1991:42). The United States did not accept female astronaut candidates until 1978, almost twenty years after Jerrie was tested. Sally Ride was the first American woman to go into space in 1982.

- Nobel Peace Prize nomination

Deeply saddened by NASA's decision not to send women into space, Jerrie moved to South America and became a missionary pilot. Calling herself 'Amazonas Airlift Service', Jerrie flew doctors, missionaries and medical supplies to remote villages in the rainforests surrounding the Amazon River, and returned to the city with villagers who needed hospital care.

In 1973, Jerrie received the Harmon Trophy for the year's best woman pilot for her missionary work. In 1981, Oklahoma Representative Mickey Edwards proposed her name for the Nobel Peace Prize. He wrote that she had 'devoted all her skills and resources to providing health, bringing hope, and creating peace for thousands of men, women and children' (Yount, 1995:96).

- In conclusion

Jerrie Cobb once wrote: 'I believe that... space exploration will reveal God's creations and purposes more clearly to us.' In 1998, NASA revealed its plan to send Senator John Glen into space. Jerrie wanted a second chance at this opportunity, but sadly, it was not to be. Even though Jerrie never realised this dream, she won many awards during her aviation career. These included gold wings from the Fédération Aéronautique Internationale, the Amelia Earhart Gold Medal from the Ninety-Nines, the 'Woman of the Year in Aviation' in 1959 from the Women's National Aeronautic Association, and the 'Pilot of the Year' award in 1960 from the National Pilots' Association (Yount, 1995:95).

2.2.3.4 Jeana L. Yeager (1952-)

Jeana Yeager accomplished the last of the 'aviation firsts' when she co-piloted an aircraft which she had co-designed around the world without stopping or refuelling.

- The early years

Jeana Yeager was born in Fort Worth, Texas, in 1952. Her parents were Francis and Lee Yeager. Jeana's parents never assigned gender-related roles to her and her sister

and as a result Jeana was free to explore different adventures growing up (Holden & Griffith, 1993:215). She was interested in horses from an early age and when she was not riding them, she was running with the high school track team. She felt that running and riding gave her 'a feeling of sharing the beauty of strength of horse and the ease with which they flew across the land' (Yount, 1995:126). This combination is said to be the foundation of her lifelong philosophy of persistence to accomplish tasks.

Even though Jeana was not raised around aviation, she had an early fascination with helicopters. She associated helicopters with dragonflies in their ability to hover and manoeuvre in the sky. Jeana decided to pursue a rotorcraft licence, but was told to first gain her fixed wing licence, which she did in 1978. However, for financial reasons, she was unable to continue with her helicopter training at that time (Minnesota Department of Transportation, 1999).

- Career

Jeana had gained experience in virtually all kinds of drafting; mechanical, geophysical, geological, illustrative and architectural. In California, she worked for a company that specialised in offshore drilling and seismic mapping. Later she met and went to work for Captain Robert Truax, USN (Ret.), who was a rocket scientist. Truax's company was called 'Project Private Enterprise' and aimed to build its own manned rocket into space (Yount, 1995:127).

In 1980, at an airshow in Chino, California, Jeana met brothers Dick and Burt Rutan. Burt was a skilled designer of many aircraft and Dick was an experienced pilot who had flown over 395 combat missions in the Vietnam War. He had also received five Distinguished Flying Crosses, 16 Air Medals, a Silver Star and a Purple Heart. Dick and Jeana immediately started a friendly competition of setting up records. Jeana holds five records and Dick holds six records (Holden & Griffith, 1993:216).

- The Voyager Project

Early in 1981, Jeana and the Rutan brothers discussed ways to attract attention to the Rutans' company. Burt suggested that they build a plane that could fly around the world without stopping or refuelling. At Jeana's insistence, the project was launched. Jeana also gave the aircraft its name; 'Voyager' (Minnesota Department of

Transportation, 1999:1). They convinced several companies to donate materials and equipment for the project, but few were willing to donate money. Jeana started the Voyager Impressive People (VIP) club, which people could join by contributing \$100 (Edwards Air Force Base, 2000). Helpers, including friends, family members and people who stopped by, donated most of the labour that was needed to build the plane. A total of 22 000 man-hours was required to build the plane.

The aircraft's wingspan was 111 feet (34 metres) long (longer than that of a Boeing 727), but the fuselage was only seven and a half feet (2.3 metres) long, two feet (0.6 metres) wide and two feet (0.6 metres) high. This would be where both pilots would spend the entire journey. Without fuel, supplies and pilots, the aircraft weighed a mere 1860 pounds (844 kilograms), less than an average size car. In order to make the long journey without stopping or refuelling, the wings and other frame elements would be completely filled with fuel. At take-off, the plane would weigh more than ten times its structural weight. Voyager was essentially made of a cloth called Magnamite, which was woven from graphite fibre. This would prove to be a very lightweight material, but was stronger than steel (Yount, 1995:130).

On 22 June 1984, Voyager underwent its first test flight. However, this was not a flawless attempt. In the following two years, several problems were revealed with the design, the most prominent being that of 'pitch porpoising' – when the plane was fuelled up, the tips of the long, flexible wings would bend up, forcing the fuselage down. Dick Rutan believed that he was the only one who could handle the aircraft when this occurred. Jeana, on the other hand, believed that she would be able to control the aircraft when this happened, provided she was given the chance to try. Jeana was only allowed to fly when Voyager's weight was above where porpoising would occur (Yount 1995:130).

On 14 December 1986, after six years of planning and building, Voyager left from Edwards Air Force Base in California for its journey around the world. Existence on Voyager was almost primitive for the two pilots. Pre-packaged meals were prepared on the radiator of the engine. The lack of space for a bathroom meant that solid wastes were stored in plastic bags in the wing section, and urine was vented through a tube in the fuselage (Holden & Griffith, 1993:216).

Severe weather and several mechanical complexities tested the mental and physical capacities of both pilots, but Voyager landed at Edwards Air Force Base on 23 December 1986. They had arrived a day ahead of schedule and set a record for non-stop flight around the world. Dick Rutan and Jeana Yeager had flown a total distance of 25 012 miles (40 253 kilometres) in nine days, three hours and 44 minutes (Yount, 1995:135).

On 29 December 1986, President Ronald Reagan awarded the two pilots the Presidential Citizens Medal, which is given to Americans who 'have performed exemplary deeds of service for their country or their fellow citizens'. Shortly thereafter, they also received The Smithsonian Institute's National Air and Space Museum Trophy. Other awards included the Collier Trophy (this was the first time it had ever been awarded to a woman) and the Gold Medal from the Royal Aero Club of Great Britain (Edwards Air Force Base, 2000).

Voyager is on permanent display in The Smithsonian Institute's National Air and Space Museum.

- In conclusion

In the late 1980's, Jeana Yeager finally fulfilled her life-long dream of learning to fly helicopters. She also took up harness racing. She married Bill Williams, who invented a chemical that reduces corrosion in metal aircraft parts. They live in Bellingham, Washington. The press has likened Jeana to Amelia Earhart (both are slender and they are near lookalikes), but, unlike Earhart, Jeana has not received the attention because she is a woman, but because of her remarkable achievement.

President Reagan has said of Jeana Yeager and Dick Rutan that they were 'living examples of American pioneerism at its best' (Yount, 1995:135).

2.3 INVOLVING WOMEN IN AVIATION

Since the early 1920's, women pilots have seen the need to associate with and network amongst one another. One of the first organisations formed with this goal in mind was The Ninety-Nines, Inc. Later, during the Second World War, further initiatives in the forms of the WAFS and WASPs were aimed at involving women in aviation. It is through the efforts

of these organisations that women pilots were first allowed to fly for the military, albeit not in combat roles.

In Russia, however, women have always been encouraged to take to the skies, in the form of Russian Aviation Clubs. When the Second World War broke out, it seemed only natural that women would also participate in the war effort. During the most crucial parts of Russia's battle with Germany, Russian women were the first women to fly in combat functions and they assisted greatly in their country's victory. However, despite all the efforts of these organisations, perhaps the most effective way of involving women in aviation has been the relatively recent passing of employment equity and affirmative action legislation.

The next section examines various ways in which women have become more involved in the aviation industry.

2.3.1 The Women's Auxiliary Ferrying Squadron (WAFS)

2.3.1.1 Changing times and laws

In May 1941, Congresswoman Edith Nourse Rogers introduced a house resolution (H.R. 4906) to establish a civilian organisation known as the Women's Army Auxiliary Corps (WAAF) (Douglas, 1991). This draft legislation was not considered until after the attack on Pearl Harbour. Finally, the Rogers Bill (see Appendix A) was passed on 15 May 1942 as Public Law 77 – 554 (Marden, 1990).

By June 1942, both the United States Army and Navy had agreed to the use of women in the military in limited capacities. The Navy WAVES, Women Accepted for Voluntary Emergency Service, was authorized in July 1942 through the establishment of the Women's Reserve, Public Law 689, H.R. 6807 (Women of the Waves, 2001:1). In November 1942, the Coast Guard followed suit, and in February 1943, the Marine Corps established its Women's Reserve.

On 3 July 1943, the army converted the Women's Army Auxiliary Corps (WAAC), into an official branch – the Women's Army Corps (WAC). All WAAC's were given the choice of joining the army as a Women's Army Corps, or returning to civilian life (Woodson Research Centre, 1999-2000).

The newly reorganized Air Transport Command (ATC) was headed up by Brigadier General Harold George and Colonel William Tunner. Pilots were extremely scarce and in great demand. In a chance meeting with the newly arrived deputy chief of staff, Robert Love, Colonel Tunner first had the idea to use women pilots when Major Love mentioned that his wife made a daily flight to commute from Washington, D.C. to Baltimore (Douglas, 1991). Colonel Tunner arranged to meet with Nancy Harkness Love and outlined her proposal to recruit outstanding women pilots in a report to General George on 18 June 1942 (Van Wagenen Keil, 1979:104).

2.3.1.2 *Founding the WAFS*

Even though Nancy Harkness Love's proposals for including women pilots in the Air Transport Command (ATC) were rejected several times by General George, her plan finally came to fruition on 5 September 1942. The group would consist of 28 pilots and would be called the Women's Auxiliary Ferrying Squadron (WAFS). On 10 September 1942, Nancy Harkness Love was appointed as the WAFS director by the Secretary of War, Henry Stinton (Douglas, 1991).

Unlike the Women's Army Corps and the WAVES (Women Accepted for Voluntary Emergency Service), the WAFS did not receive military status. Nancy Harkness Love continued to lobby this issue, but the required legislation was never passed. The WAFS served on a civil service basis, working for the army, and were subject to the Articles of War. They were treated like officers in the army and would be liable to court-martial for a violation of the Uniform Code of Military Justice, just like any other officer in the armed forces (Holden & Griffith, 1993:63). However, this is where the similarity ended. Because of the lack of military commission, women were exempted from receiving any death benefits (the greatest indignity for Love was to 'pass the hat' for funds to transport a woman's body home following a crash) (Douglas, 1991).

Love wanted to recruit pilots of impeccable standards and modified the admissions requirements for women to this effect. Women were required to have 500 hours of flight time, with 50 hours in the past year. They had to be high school graduates and be between the ages of 21 and 35. Male candidates only had to have 200 hours and three years of high school. They could also be between the ages of 19 and 45 (Douglas, 1991). To tighten the entrance requirements for the WAFS even further, Love insisted that the

women have a 200-hp rating (planes of that size rented for \$40 US to \$60 US per hour) and two letters of recommendation (Van Wagenen Keil, 1979:104). It was proposed that women only fly the smaller class of military aircraft and thus their salary was set at \$250 US per month, \$130 US less than male civilian pilots received (Douglas, 1991:4). (See Table 2.2.)

2.3.1.3 *The originals*

On 5 September 1942, Nancy Harkness Love sent telegrams to 83 American women who appeared to qualify. Four months later, 28 women pilots, including Nancy Harkness Love, were integrated as part of the WAFS (Rickman, 2001:1). The original WAFS, in order of their acceptance into the squadron, were:

- Nancy Harkness Love
- Betty Gillies
- Cornelia Fort
- Aline Rhonie
- Helen Mary Clark
- Adele Scharr
- Ester Nelson
- Teresa James
- Barbara Poole
- Helen Richards
- Barbara Towne
- Gertrude Meserve
- Florene Miller
- Barbara Jane Erickson
- Delphine Bohn
- Barbara Donahue
- Evelyn Sharp
- Phyllis Burchfield
- Esther Manning
- Nancy Batson
- Katherine Rawls Thompson
- Dorothy Fulton
- Opal (Betsy) Ferguson
- Bernice Batten

- Dorothy Scott
- Kathryn (Sis) Bernheim
- Helen McGilvery
- Lenore McElroy

Nancy Harkness Love’s original 27 WAFS were an élite corps. They were among the most experienced women pilots in the United States. They were articulate, smart and enthusiastic and they exuded an aura of good humour and self-confidence (Holden & Griffith, 1993:60).

Table 2.2: Pilot candidate requirements

	Age	Education	Experience	Type Rating	Remuneration
Female Candidates	21 - 35	High School Graduates	500 Hours (50 in last year)	200-hp	\$250 per month
Male Candidates	19 - 45	3 years of High School	200 Hours	none	\$380 per month

Source: Douglas (1991:4)

WAFS member Cornelia Fort wrote an article for the *Woman’s Home Companion* in June, 1943. An extract reads as follows: ‘Because there were and are so many disbelievers in women pilots, especially in their place in the army, officials wanted the best possible qualifications to go with the first experimental group. All of us realized what a spot we were in. We had to deliver the goods or else. Or else there wouldn’t ever be another chance for women pilots in any part of the service’ (Fort, 1943:1). (The complete article can be found in Appendix B.)

The WAFS original mission was to ferry small single-engine trainer and liaison type aircraft in order to free up male pilots for combat duty. Before long, however, the WAFS were also ferrying high-powered fighter and bomber aircraft such as P-38s, P-47s, P-51s and even the B-17 ‘Flying Fortress’ bomber (Rickman, 2001).

Love’s personal duties included the administration of six ferrying squadrons and planning the operational and training procedures. In addition, Love ferried at least one of each type of aircraft before it was released for training and ferrying (Holden & Griffith, 1993:62).

Love was pleased with the WAFS programme. The women maintained a successful record and statistics were pouring in that indicated male/female performance was equal (Douglas, 1991).

In September and October of 1942, the élite WAFS squadron of 28 pilots were already averaging 1100 hours of flying experience (Van Wagenen Keil, 1979:111).

2.3.1.4 Integration

General Arnold agreed to start the women's training programme under the leadership of Jacqueline Cochran as a result of an earlier agreement with her. The training programme was known as the Women's Flying Training Detachment (WFTD, also called the 'Woofeds'). Eventually, on 5 August 1943, the Women's Auxiliary Ferry Squadron (WAFS) was integrated with the Women's Flying Training Detachment (WFTD) to become the Women's Air Force Service Pilots (WASPs). Cochran was appointed as the overall director and Love was her subordinate in charge of leading the WAFS (Douglas, 1991:43).

2.3.1.5 Conclusion

The WAFS were not only an élite corps of pilots in that they had extraordinary skills, ability and experience; they were also very much a test group. The future of women in military aviation depended on how these chosen women performed professionally and conducted themselves both socially and morally (Rickman, 2001). Both Love and her WAFs were aware of this fact and performed exceptionally.

2.3.2 The Women's Air Force Service Pilots (WASPs)

'On through the storm and the sun
Fly on till our mission is done
From factory to base,
Let the WASPs set the pace.'

From 'WASP Song' by Loes Monk (Douglas, 1991:44)

2.3.2.1 *Introduction*

In 1941, Great Britain was under attack by Germany and in great need of bombers from the United States. Clayton Knight of the British Ferry Command suggested to Jacqueline Cochran that she help fly the bombers to England. Cochran, excited by the idea of being the first woman to fly a bomber to Great Britain, undertook 25 hours of instruction in a Lockheed Lodestar.

After a perfect checkout, it was agreed that Cochran could make the flight, provided that a male co-pilot accompanied her in order to assist her during takeoff and landing, 'when the heavy work of using a hand brake was necessary'. Cochran was furious at this insult but agreed to make the flight anyway (Briggs, 1991:24). When she returned to the United States, she had a meeting with General H.H. (Hap) Arnold in which she explained the benefits of having women fly airplanes to where they would be needed. This would allow men to be freed up for combat duty. General Arnold expressed many reservations about this idea but eventually agreed to let 25 American women join the Air Transport Auxiliary (ATA) in England. Cochran was in charge of selecting these women (Briggs, 1991:24). No one could deny the excellent performance of Cochran's 'ATA girls'. The women were signed up to serve for only 18 months but several stayed for the entire duration of World War II (Yount, 1995:69).

2.3.2.2 *Founding the WASPs*

While Jacqueline Cochran was in England with the ATA, the United States military took her advice to set up an organisation of women pilots to ferry planes and fly other non-combat missions. When Cochran returned to the United States, she was enraged when she learned from the evening newspapers of 10 September of the long awaited announcement by the Roosevelt administration of the institution of the first women pilots' group to fly for the armed forces, the WAFS (Van Wagenen Keil, 1979:107).

General Arnold had reneged on his agreement with Cochran to put her in charge of such a group. To make amends, he contacted the head of the Air Transport Command, General George. On 15 September 1942, the War Department announced the formation of another Army Air Forces (AAF) women pilots group, a flight-training programme to prepare women pilots to serve with the Women's Auxiliary Ferrying Squadron. This program would be called the Women's Flying Training Detachment (WFTD) (Van Wagenen Keil, 1979:108).

The Women's Flying Training Detachment and the Women's Auxiliary Ferrying squadron merged on 5 August 1943 and became the Women Airforce Service Pilots (WASPs). Cochran was appointed Director of Women Pilots, while Love became the WASP executive on the staff of the Air Transport Command's (ATC) Ferrying Division (Moolman, 1981:151). Cochran designed the blue WASP uniforms and the WASPs also received deliberated pilot wings (see Appendix C). Walt Disney personally designed a mascot for the WASPs called 'Fifinella'.

Almost as soon as the new programme was announced, Cochran received more than 25 000 applications from female pilots (Briggs, 1991:25). Cochran eventually accepted 1 830 women, and of those, 1 074 successfully completed the difficult 23-week training course. Of the 1830 applicants accepted of the original 25 000, 30.7% were eliminated due to flying deficiencies, 2.2% for other reasons and 8% passed, but resigned before assignment. This left a total of 1 074 graduates, or about 58.7% of the total who had been accepted (Douglas, 1991:51). This rate of success was about the same as that for the male Army Air Force cadets (Yount, 1995:69).

Table 2.3 indicates the training scheduled for the Women's Flying Training Detachment (Douglas, 1991:50) and Table 2.4 depicts the costs of training individual WASP pilots.

Table 2.3: Women's Flying Training Detachment (WFTD) training schedule

PHASE 1: PRIMARY (50 hours)	Hours
Fundamentals of flying	46
Navigation	4
PHASE 2: BASIC (70 hours)	
Transition (to BTs)	30
Instruments	20
Navigation	20
PHASE 3: ADVANCED (60 hours)	
Transition to AT-6	10
Transition to twin engine (AT-17 or AT-10)	20
Navigation	20
Instruments	10

Source: Douglas (1991:117)

Table 2.4: Cost of individual WASP training

Tuition, Student salary, Airplane depreciation	\$6 265.35
Additional costs:	
- Maintenance cost, Material, Labour, Gas and Oil	\$3 023.50
- Personnel, military and civilian	\$540.10
- Equipment	\$89.56
- Travel	\$18.00
- Uniform	\$326.06
- Medical examination and hospitalisation	\$66.59
- Communications	\$8.80
- Amortisation, Crash truck, Link trainer, Vehicles	\$95.66
- Maintenance, Administrative vehicles	\$13.64
- Adjustment for Eliminees	\$1 703.44
TOTAL Cost per graduate	\$12 150.70

Source: Douglas (1991:117)

2.3.2.3 WASP missions

The WASPs learned to fly almost every plane used by the Army Air Forces, including the huge B-29 Superfortress, P-51 Mustang and P-47 Thunderbolt fighters (Yount, 1995:69). Many of the commanding officers preferred WASPs to male ferry pilots, because the women delivered their planes faster. Due to their enthusiasm and dedication, the WASPs soon became involved in every kind of flying other than combat and overseas ferrying (Moolman, 1981:151).

Cochran assigned 50 of her pilots to tow targets for student anti-aircraft gunners at Camp Davis, North Carolina. It was a mission that military pilots detested and avoided whenever they could. The target was a cloth sleeve tied by a 2500 foot (762 metre) rope to the tail of the plane that the WASP pilot was flying (Yount, 1995:70). The standard procedure was for the pilot to cruise at about 10 000 feet (3 048 metres), while students fired guns as large as 90 millimetres at the sleeve.

Not only were the WASPs facing inexperienced gunners – the planes assigned to target work were old, war-weary and sometimes inclined to quit in mid-air. Because of the fuel rations during the period, such low octane was used that pilots were never confident that the aircraft engines would start, or that they would keep running after take-off (Moolman, 1981:152). Even though ferrying remained the WASP's main function, the women pilots' success in non-ferrying missions led the Army Air Forces command to accept that their capabilities were such that they could be used more broadly.

It was decided that the WASPs would be used for smoke-laying, test flights, simulated gas attacks and in the training of radar and searchlight trackers (Moolman, 1981:152).

One of the missions that the WASP pilots particularly enjoyed was simulated low level strafing while gun crews practiced tracking them (Briggs, 1991:24). WASP Winifred Wood recalls this activity: 'Peeling off with the sun at our backs, we'd dive down on emplacements, trucks, chow lines, or anything visible. It was legalized buzzing and we loved it' (Moolman, 1981:152).

The WASPs delivered an impressive 12 650 planes of 77 different types. They ferried 50% of the high-speed pursuit planes in the United States and flew a total of 60 million miles. Of the 1 074 women who graduated, 38 lost their lives.

2.3.2.4 Disbanded but recognised

In the latter part of the Second World War, combat pilot losses were lower than had been anticipated and Army Air Forces pilots were returning to the United States to take over flying duties normally assigned to the WASPs.

On 20 December 1944, the WASP programme was halted. General Arnold was in favour of keeping women pilots in some capacity, but could not justify doing so unless they were militarised. When a last effort to get a militarisation bill through Senate failed, General Arnold had no alternative but to announce the cancellation of the programme. The announcement came as a great shock to the women pilots. WASP Katherine Landry summed up the general feeling in a telegram to her family: 'Can you use a good upstairs maid with 800 flying hours?' (Moolman, 1981:153).

Since the WASPs had never been militarised, they were not eligible for veterans' benefits. However, in 1977, Senator Goldwater introduced S.247, 'To provide recognition to the Women's Airforce Service Pilots for their service to their country during World War II by deeming such service to have been active duty in the Armed Forces of the United States for the purposes of laws administered by the Veterans' Administration' (Van Wagenen Keil, 1979:310).

On Friday 4 November 1977, the Senate agreed with the compromise version of H.R. 8701 passed by the House. Assistant Secretary Antonia Handler Chayes at the Department of Defence assumed the responsibility for determining the WASPs' military status and issuing them official honourable discharges to be presented to the Veterans' Administration.

On 23 November 1977, President Jimmy Carter signed veterans' status for the WASPs of the Second World War into law (Van Wagenen Keil, 1979:316).

2.3.2.5 Personal differences between Cochran and Love

Both Love and Cochran had to propose their programmes as experimental proof that women could fly. From the offset, Love set stringent acceptance qualifications for the WAFS, much higher than those required of the men.

Cochran made proof the main element of her programme. Only women who met the toughest Army Air Forces (AAF) male physical and intellectual standards and were of high character (Cochran would interview them herself) would be selected (Van Wagenen Keil, 1979:108). Cochran would then guarantee that the women pilots would be as strenuously and thoroughly trained as the Army Air Force's male cadets.

The Army Air Forces' Ferrying Division was delivering almost 3 000 airplanes a month, but was six weeks behind on delivery. Although Love's WAFS would help in alleviating the backlog, Cochran's proposal was far more comprehensive: in order to put more than just a small group of women in the Ferrying Division, she lobbied to have an official training programme instituted (Van Wagenen Keil, 1979:109).

The militarisation of the women pilots was important to both women, but for different reasons. Love had recommended commissioning the WAFS as a way to pay them.

Cochran, however, wanted to be in command of a substantial and prestigious military organisation (Van Wagenen Keil, 1979:109). Love sought to be included and influential in the Air Transport Command, while Cochran insisted on founding an entirely new military programme over which she would have control. Love was not interested in administrative power, and would take every opportunity to get out of her ferrying offices and into a cockpit.

It was evident that Cochran and Love not only had widely different personal ambitions but also different understandings and uses of personal power. However vast their differences were, though, they managed to work together respectfully for a period of two and a half 'turbulent' years (Van Wagenen Keil, 1979:110).

2.3.3 The South African Women's Auxiliary Air Force

'Ad manum' – Always at hand.

(South African Women's Auxiliary Air Force motto)

2.3.3.1 Introduction

After the First World War, many women successfully flew the Europe to Cape air route. Their daring and sense of adventure inspired many South African women to join local flying clubs. However, the local student pilot scheme was reserved exclusively for men.

At that time, Marjorie Egerton-Bird, herself an accomplished 'A' pilot licence holder, made a study of the British state-subsidised Civil Air Guard, with the intention of establishing a similar organisation for women in South Africa (Jameson & Ashburner, 1948:1). Doreen Hooper, an instructor at Grand Central airport, was approached to head this proposed organisation for women pilots. At a public meeting held in Johannesburg on 6 December 1938, the Women's Aviation Association (WAA) was launched.

The aim of the Women's Aviation Association was to train women to assist in the ground handling of aircraft so as to provide assistance to the Air Force in the times of need. The organisation succeeded in its aim by awarding bursaries and attracting subsidies from private organisations (Jameson & Ashburner, 1948:1). By 1939, 300 women had joined the association. Of these, 32 members took turns at ground duties such as cleaning engine parts (this task was thought up by men who felt that the women would not enjoy the

dirty work and would thus be discouraged from getting involved in the technical aspects of aviation), swinging propellers and pushing aircraft.

The Women's Aviation Association was determined to purchase its own aircraft for the purposes of training. After a fund-raising effort, they were able to purchase a Taylorcraft 65 De Luxe Monoplane for the price of 650 pounds (Jameson & Ashburner, 1948:3). The Women's Aviation Association did not have much time to make use of the aircraft, however, as all civilian flying ceased in 1940 and all private aircraft were taken over by the government and distributed amongst air schools.

2.3.3.2 *Establishing the South African WAAF*

By the late 1930's, many South African women had begun to enquire about joining and/or being trained by the Union Defence Force. On 8 May 1939, this interest led the Director General of the Reserve Force, Brigadier J.J. Collyer, formally to approach Lieutenant Colonel H.C. Daniel (who was the director of Technical Services) to investigate the utilisation of women in the Union Defence Force. Lieutenant Colonel Daniel was not keen on this idea, but Colonel J. Holthouse (the Director of Air Services) proposed that the women be trained and utilised as typists, clerks, store assistants, canteen and mess personnel, telecommunication operators, drivers, ground personnel and instructors (Nöthling, 1995).

On 3 September 1939, war broke out and the Women's Aviation Association offered their services to the government. On 17 November 1939, it became the Women's Auxiliary Air Force (WAAF). The establishment of the WAAF was officially gazetted on 1 May 1940 and a parade was held at Grand Central airport to celebrate the event. On 1 June 1940, Doreen Hooper was appointed to command the South African WAAF and was given the rank of squadron officer (the equivalent to Major). On 28 June 1940, the first group of 120 women were taken into full-time service (Jameson & Ashburner, 1948:5).

The Women's Aviation Association had visualised a women's organisation with a separate identity as an auxiliary unit, even conducting its own training and governing its own conditions of appointment. The South African Air Force (SAAF) regarded the WAAF as an integral part of the organisation. Eventually the WAAF did fall under the SAAF, but retained its own director. Each SAAF unit had a Commanding Officer from the WAAF

detail to look after the interests and discipline of women. Suitable WAAF members could now hold any SAAF post.

All WAAF recruits did a three week basic training course at Valhalla near Pretoria under the watchful command of the WAAF Sergeant Major (Mrs) Edwards. The WAAF technical personnel did their advanced training of a year at the Pretoria Technical College, while other training was undertaken at 73 Air School at Wonderboom in Pretoria. In addition, the first female Physical Training Instructors graduated from the military college on 19 August 1941.

It had been made policy that women who were to be appointed as non-commissioned officers (NCOs) first undertake the NCOs' course at 100 Air School (Voortrekkerhoogte, Pretoria). These officers' courses, however, were designed to imbue every WAAF officer with a strong sense of her responsibility to other ranks and the privilege of wearing a commissioned rank (Nöthling, 1995).

Upon the completion of their training, the WAAF members were transferred to various Air Depots and Air Stations throughout South Africa. By June 1942 there were 34 WAAF camps in South Africa. The WAAFs did valuable work in 75 different career fields, 35 of which were technical. The WAAFs served as typists, parachute packers, welders, truck drivers, draughtsman and worked at a host of other trades.

Pilots of the WAAF flew communication and ferry flights and served as duty pilots and second pilots on the SAAF Shuttle Service. The other fields in which women took to the air were as meteorological assistants on the early morning flights and as photographers on survey flights. By special legislation WAAF women were allowed to be employed on combatant duty. They served on ack-ack sites on instruments to direct the guns and as searchlight operators (Nöthling, 1995).

2.3.3.3 Disbanding the South African WAAF

The end of the Second World War led to the eventual disbandment of the South African WAAF, the last women's camp being closed on 1 April 1947. While the majority of these women returned to civilian life, a number of the former members were accommodated in the Women's Auxiliary Defence Corps and utilised in the Air Force.

The Amendment Act for Defence (Act 39 of 1947) authorised women to serve in the military on a voluntary basis, but only in non-combatant roles, with effect from 3 June 1947. The use of a woman in a non-combatant role would only be considered if she gave her written consent to such an application. This amendment to the Defence Act made it possible for the Women's Defence Corps (WDC) to be established on 28 November 1947, in accordance with Proclamation number 3900 of 28 November 1947.

The creation of the WDC meant that the General Regulations for the Permanent Force had to be drastically revised. This was done by a proclamation in Government Gazette number 3291 of 19 January 1948. The regulations concerning the service conditions of the WDC were contained in Chapter XVI, which consisted of three sections; Officers, Minorities, and All Ranks General. The distinction that this regulation made between members of the WDC and male members of the Permanent Force was discriminatory. Colonel C.J. Nöthling of the South African Air Force believes that the most demeaning regulation was that concerning seniority: 'PRECEDENCE – Male members of the Force take precedence over those of the WDC of the same rank, irrespective of the date of appointment or promotion to the rank' (Nöthling, 1995:1).

After a new government came into power in 1948, the Minister of Defence, F.C. Erasmus, called for a report on women serving in the Permanent Force. According to the statistics provided in the report, the South African Air Force had four officers and thirty other ranks in the WDC. No full-time Air Force volunteers remained in the Women's Auxiliary Defence Corps.

On 28 April 1949, the Defence Headquarters sent out a circular that stated that women members were no longer permitted to drive military vehicles. The death blow came on 9 May 1949 when the Chief of General Staff advised the Adjutant General that 'the Minister has decided that the recruiting of women for the WDC Permanent Force is to cease'. This was the beginning of a gradual phasing out of women in the Permanent Force. Only female military nursing personnel and medical officers were retained.

2.3.3.4 *In conclusion*

Although women served in the South African WAAF during the period from 1939 to 1947 and as volunteers in the WDC in 1948, it was only on 2 October 1972 that the Minister of

Defence granted permission for the appointment of women in the permanent force (Nöthling, 1995).

The initial three women to join the South African Air Force in 1974 as permanent force members had all been trained at the Civil Defence College in George. They were all Candidate Officers. On 19 January 1974, 33 women began their Basic Training at the Air Defence School at Waterkloof, Pretoria.

On 21 February 1995, an all-women's parade was held at the South African Air Force Gymnasium to celebrate 21 years of women's serving in the Permanent Force. This was followed by a formal dinner. Colonel Diane Boote handed an address to the Chief of the Air Force on behalf of all the women members. The address read as follows: 'It is with pride that, after 21 years, the ladies in Air Force uniform reaffirm their active support to the mission of the South African Air Force. Therefore, as a visible token, this address is presented to the Chief of the Air Force' (Nöthling, 1995:3).

2.3.4 Soviet women combat pilots – the Night Witches

*'Even if we were to place at your feet all the flowers of the earth,
they would not be big enough tribute to your valor.'*

Soviet Union's tribute to the Night Witches (Duncan, 1990:1)

2.3.4.1 Introduction

Even though the United States included women in military aviation in the Second World War (as discussed in Section 2.3.1 on the WAAFS and Section 2.3.2 on the WASPs), it was not until 1993 that women were able to start training for air combat service in the United States. However, in 1942, the Soviet Union formed three regiments of women combat pilots who flew night combat missions in harsh weather conditions. They were so efficient and deadly that the Germans feared them and called them *Nachthexen* [Night Witches] (Duncan, 1990:1).

2.3.4.2 Background

In 1939, the Soviet Union and Nazi Germany had signed a mutual non-aggression pact. The Soviet Union had placed such faith in the treaty that in 1941 they ignored more than

500 flights by German photographic reconnaissance aircraft (Gorbach, Polunina & Khazanov, 2000).

The Soviet Union was caught completely off guard when on 22 June 1941 at 03h15, Operation Barbarossa was put into effect and Germany's *Blitzkrieg* hit Russia. The Soviet Air Force was completely annihilated by the attack. Soviet fighter aircraft were limited in number along the borders, they were not camouflaged and were therefore vulnerable. The Russian pilots who managed to get into the air on average had no more than 15 hours of flying experience, some had as little as four hours (Duncan, 1990).

2.3.4.3 *Establishing the regiments*

Until the war, female pilots' requests to join the active forces had fallen on deaf ears –the Soviet Commanders were not interested. Aviation clubs had been *en vogue* in the the Soviet Union in the 1930's, and many women had logged an impressive number of flying hours. The specialities of an aviator and military pilot were seen as synonymous at the time (Gorbach *et al.*, 2000).

On 8 October 1941, however, the People's Defence Committee issued Order Number 0099, for the 'Activation of Female Regiments for the Air Force of the Red Army' and to obey the order to 'draw on female flying personnel'.

Three air regiments, namely the 586th IAP (IAP is the Russian Abbreviation for Fighter Aviation Regiment), 587th BAP and 588th NBAP (Pratt Institute, 1999), were to be activated and staffed entirely by female personnel serving with the Voenno-Vozdushniye Sily (Russian Air Force), Civil Aviation and the Osoaviakhim Army Assistance Society (Gorbach *et al.*, 2000).

Marina Mikhailovna Raskova initiated the activation of the women's air regiments. In 1938, Roskova and two other women had set a world record for a non-stop direct flight by women when they flew a Soviet-built, twin-engine aircraft named Rodina (Homeland), 3 672 miles (5 910 kilometres) from Moscow to Komsomolskon-Amur in the Far East. It took her 26 hours, 29 minutes (New Zealand Fighter Pilots Museum, 2001). Raskova was the embodiment of pre-war success by female pilots in the Soviet Union and was the logical choice to recruit, interview and oversee the training of the aviatrices.

A total of 450 recruits were selected and, on 16 October 1941, they reported to the military training school at Engels in the Saratov Region (Duncan, 1990). Marina Raskova and Yevdokia Bershanskaya (who was appointed as second-in-command) had to assess the volunteers, most of whom wanted to be fighter pilots. The women went through an intense training schedule. Two years of training was condensed into six months.

Raskova appointed Bershanskaya as the commanding officer of the 588th NBAP and Yevgeniya Prokhorova as the commanding officer of the 586th IAP (later she became second-in-command and Tamara Kazarinova took over the leadership of the regiment). Roscova herself retained command of the 587th BAP (Duncan, 1990).

- The 586th Fighter Regiment

The women had trained in old Polikarpov PO-2 biplanes and found the conversion to the much more powerful, single-seater Yak-1 very difficult. All the instructors could do was drum into them the characteristics and limits of power and control before their first flight.

The 586th Women's Fighter Regiment was the first to go to the front. On their second night in Saratov, they got their first call to go into combat. Their principal role was to drive off enemy bomber formations before they reached their targets and to protect railway and ammunition factories (New Zealand Fighter Pilots Museum, 2001). The German bombers were believed to be two minutes from Saratov when the squadron leader, Galia Boordina, with guns firing, flew into the middle of the bomber formation. The German bombers thought that the onslaught had come from more than one fighter and they jettisoned their bombs short of the target and broke up. The 586th Fighter Regiment has been successful in its first mission (Gorbach *et al.*, 2000).

On 14 May 1942, the 586th IAP redeployed to the Anisovka airfield, where it was reassigned to the 144th IAD. Beside the 586th female IAP, the division was also comprised of the 963rd IAP.

Patrols were most often carried out at a high altitude of between 16 404 ft and 19 685 ft (5 000 metres to 6 000metres) and, because the Yak-1's cockpit was not pressurised, the women had to be quite skilled in the use of their oxygen equipment (Duncan, 1990).

German pilots were always astonished to encounter women Russian Air Force pilots in active combat roles. One Luftwaffe pilot, Major D.B. Meyer, remembered being attacked by a group of Yak fighters near Orel. During the air battle, the canopy of Meyer's fighter struck the propeller of one of the pursuing Yaks, forcing it to crash. Upon landing, Meyer discovered the dead adversary to be a woman without rank, insignia or parachute (New Zealand Fighter Pilots Museum, 2001).

The 586th Women's Fighter Regiment totalled 4 419 operational sorties and it was credited with 38 victories. Squadron Commander Olga Yamshchikova flew 93 combat missions, was credited with three confirmed victories, and after the war, became the first woman Soviet test pilot to fly jet aircraft (New Zealand Fighter Pilots Museum, 2001).

- The 587th Dive Bomber Regiment

The 587th Dive Bomber Regiment did not go into battle until January 1943 because of an abrupt change of aircraft. The women of this regiment had trained on two-seater SU-2's but would fly the Petylakov PE-2, which carried a three-woman crew – a pilot, navigator and radio operator/gunner. Two guns fired forward and a swivelling machine gun in an acrylic bubble was positioned behind the navigator (Gorbach *et al.*, 2000).

During the later part of the war, the regiment began to receive male replacements. There were simply not enough women trained to fill all the positions.

- The 588th Night Bomber Regiment

The 588th Night Bomber Regiment flew antiquated Polikarpov Po-2 biplanes with a top speed of a mere 94 mph (150km/h), less even than that of most First World War fighters. Although the planes were slow, they were highly manoeuvrable. The Night Witches, like all other night bomber regiments, practised harassment bombing. This consisted of their flying over the encampments, rear area bases and supply bases where the enemy was resting from a day of heavy fighting, and bombing the enemy there. According to the Pratt Institute (1999), the strategic importance of the targets was seldom high, but the psychological effect of terror and insecurity, and constant restlessness, was very effective.

Tactics that ensured their enduring success were developed and perfected by the Night Witches:

- Often German Messerschmitt Me-109's were sent to intercept the Russians, but the Po-2's could turn so quickly that they forced the Germans to make a wide circle in order to come in for another pass. So effective were the Night Witches in their abilities that German pilots were promised an Iron Cross for shooting down a Po-2 (Pratt Institute, 1999).
- Another tactic used by the Night Witches was to fly to a certain distance near the enemy encampments where they would cut their engines and glide silently to their targets. By the time the Germans heard the whistle of the wind against the Po-2's wing braces, the Night Witches would release their bombs, restart their engines and fly back to their base.
- Po-2's would pass undetected by radar because of the mildly radar absorbing nature of the canvas surfaces and also because they flew so close to the ground, often low enough to be hidden by hedgerows. German planes equipped with infrared heatseekers would not spot the low heat generated by the small, 110hp engine (Pratt Institute, 1999).
- The Germans had however, developed their own tactics, which the Russians called a 'flak circus'. The strategy was to assemble as many as two-dozen 37mm anti-aircraft guns in concentric circles around a target. The gunners would be supported by a searchlight platoon. Many Russian bombers would fly straight into the targets lit by the German searchlight, at which point they were pounded by ring after ring of anti-aircraft fire. The bombers seldom made it to the targets (Gorbach *et al.*, 2000).

The Night Witches in turn, developed a counter-strategy to deal with the 'flak-circus'. They would fly in formations of three, two of whom would go in first and attract the attention of the searchlights. When all the lights were aimed at these two aircraft, they would suddenly separate in opposite directions and manoeuvre wildly to shake the lights. The searchlights would follow them, while the third bomber, who had been further back, would sneak in through the darkened path made by the separation of the other two bombers and hit the target unopposed. The three pilots would then get out, regroup, and switch places until all three had delivered their payloads (Pratt Institute, 1999).

The Night Witches fought from Kuban to Berlin and flew over 24 000 combat missions and dropped 23 000 tons of bombs from the Po-2's (Moolman, 1981:160).

The Soviet women bomber pilots earned a total of 23 'Hero of the Soviet Union' medals and dozens of Orders of the Red Banner. Two women bomber pilots, Katya Ryabova and Nadya Popova, raided the Germans 18 times in one night. Most of the women pilots who survived the war had totalled almost 1 000 missions each. The women served so well during the war that they participated in the final onslaught on Berlin (Pratt Institute, 1999).

The 588th Night Bomber Regiment later received the honour of the 46th Guards Bomber Aviation Regiment, the first women's regiment to receive this honour. This placed them among the élite of Russian fighting units (New Zealand Fighter Pilots Museum, 2001).

The following is a list of female pilots who logged 100 combat missions or more:

- Lt. M.M. Kuznetsova - 204 sorties
- Sr. Lt. A.N. Demchenko - 203 sorties
- Sr. Lt. T.U. Pamyatnykh - 191 sorties
- Sr. Lt. V.M. Lisitsina - 160 sorties
- Sr. Lt. M.S. Kuznetsova - 157 sorties
- Lt. G.P. Burdina - 152 sorties
- Lt. I.I. Olkova - 150 sorties
- Lt. O.I. Shakhova - 144 sorties
- Gds. Lt. L.V. Litvyak - 138 sorties
- Lt. V.I. Gvozdikova - 128 sorties
- Lt. R.N. Surnachevskaya - 104 sorties

(Gorbach *et al.*, 2000:20).

The 588th Night Bomber Regiment remained entirely female throughout the war and was demobilized on 20 July 1945 (Duncan, 1990).

2.3.4.4 *In conclusion*

The WAFS and WASPs were unable to convince the United States military bureaucracy of their ability and willingness to partake in air combat. United States policy would only be changed to this effect fifty years after these women had been in service.

The Soviet Union used pilots of both genders in the Second World War out of dire necessity. It is important to note that women not only served in the Soviet Union in air combat. In 1944, 1 749 women served on the Zabaikalsky Front, 3 000 women served with the Far East 10th Air Army and 437 women served with the 4th Air Army of the Second Belo Russian Front. The 4th Air Army was comprised of the élite 46th Guards Women Air Regiment that included 237 women officers, 862 sergeants, 1 125 enlisted women and 2 117 auxiliaries. All bomb loaders and mechanics of the 586th IAP, 587th BAP and 588th NBAP were also women (Pratt Institute, 1999).

2.3.5 The Ninety-Nines, Inc.

Perhaps the most influential organisation in involving women in aviation has been The Ninety-Nines, Inc.

2.3.5.1 *Introduction*

In 1929, approximately 100 women were licensed pilots in the United States. The first Women's Air Derby was held during that year and it brought together female pilots from all over the United States. The air race was held over nine days and pilots flew from Santa Monica, California, to Cleveland, Ohio (Briggs, 1991:7).

Louise Thaden, who had won the race, recalled watching the other planes come across the finishing line. A bond had been forged amongst the women and when the race ended, the group seemed aimless. Thaden recalls: 'We were all there, an undetermined, aimless group, now that the Derby had ended' (Moolman, 1981:57). It was this shared moment that spurred the creation of a more formal organisation to bring female pilots together.

2.3.5.2 *Founding The Ninety-Nines, Inc.*

On 9 October 1929, Fay Gillis, Margorie Brown, Frances Harrel and Neva Paris sent a letter to 117 women pilots to invite them to attend a meeting with the aim of establishing an organisation to promote mutual support as well as the advancement of aviation. (A transcript of the original letter can be found in Appendix D.)

A group of 26 women gathered at Curtis Field, Valley Stream, Long Island, New York, on 2 November 1929. The meeting was held in a hangar, with tea served from a toolbox wagon on wheels (the Ninety-Nines, Inc., 1999). It was agreed that membership was to be open to any licensed female pilot. Of the 117 women who had been invited, 99 had responded to the first call for members. After much discussion, it was decided that the name of the group be taken from the sum total of charter members. Thus, the group was first the Eighty-Sixes, then the Ninety-Sevens, and finally the Ninety-Nines (The Ninety-Nines, Inc., 1999). In 1931, Amelia Earhart became the group's first elected president.

The Ninety-Nines, Inc. is registered in the State of Delaware as a non-profit, charitable membership corporation, holding 501c(3) U.S. tax status. In 1965, the Ninety-Nines, Inc. opened its headquarters building at the Will Rogers Airport in Oklahoma City, Oklahoma, and in 1988, a second, two-storey building expanded the facility to twice its original size.

The Ninety-Nines, Inc. is governed by a nine-member board of directors elected by its membership. The President, Vice President, Secretary, Treasurer, four Directors and the immediate Past President serve two-year terms of office. An Executive Director, Headquarters Secretary and Bookkeeper are responsible for the daily operations of the organisation. Membership currently stands at over 6 500 licensed women pilots in 35 countries (The Ninety-Nines, Inc., 1999).

2.3.5.3 *Contributions to aviation*

The Ninety-Nines, Inc.'s mission, to 'promote world fellowship through flight; provide networking and scholarship opportunities for women, and aviation education in the community, and to preserve the unique history of women in aviation' is implemented in several ways.

- Preserving history

The Ninety-Nines, Inc. owns and manages the Amelia Earhart Birthplace Museum in Atchison, Kansas. Restoration of the home to its original form in the era when Amelia Earhart lived there has been ongoing since 1984.

The organisation also owns The Ninety-Nines Museum of Women Pilots, which is located at its headquarters in Oklahoma City. The museum contains a resource centre, and a media centre and displays archives focusing on the history and memorabilia of women in aviation (The Ninety-Nines, Inc., 1999).

- Networking

The Ninety Nines, Inc. has 178 chapters in 23 sections, spanning an area from Arabia to Canada. A large majority of these chapters have monthly meetings where official chapter proceedings are combined with social activities. Members are encouraged to participate in various activities which promote education and camaraderie. A points system allocates points to chapters for participation in various events such as FAA (Federal Aviation Administration) Safety Seminars, School Presentations and the publication of articles in newspapers and magazines.

Governors' meetings also occur annually. At these meetings issues of importance to The Ninety-Nines, Inc. are discussed. These meetings also serve to increase awareness of sectional and chapter accomplishments and to set agendas for the coming year.

The Ninety-Nines, Inc. publishes a bimonthly magazine for members called 'International Women Pilots' and an Annual Membership Directory. Other publications by the Ninety-Nines, Inc. include the 'History of the Ninety-Nines, Inc.' and 'Sixty and Counting'.

- Air marking

The Air Marking programme was initiated in 1935 by then president, Blanche Noyes. The programme was established because early pilots often did not have radios such as OMNI, ADFs or DME, in their aircraft, and charts were not always reliable. To keep

pilots from getting lost, members of the Ninety-Nines, Inc. painted location signs in large white letters on the tops of warehouses, on drag strips, on water towers and on airport terminals (Briggs, 1991:9). Even though technology has improved greatly, pilots may still fly off course. Air marking is still continued by the Ninety-Nines, Inc. to this day.

- Air shows and races

In March 1947, the Florida chapter of South Section of the Ninety-Nines, Inc. sponsored the first All-Woman Air Show at Tampa, Florida. Over 13 000 people were in attendance and witnessed Murge Hurlburt's setting of a new international woman's speed record of 337 miles per hour (539 kilometres per hour) over a three-mile (4.8 kilometre) course in a clipped-wing corsair (The Ninety-Nines, Inc., 1999). Other events included sailplane flying, aerobatic competition, and the first All-Women Transcontinental Air Race (AWTAR).

The All-Women Transcontinental Air Race (AWTAR) originated when the Los Angeles chapter of the Ninety-Nines, Inc. flew to the 1947 air show. Just for fun, the Los Angeles members decided to turn their trip into a race. Carolyn West won the first race, and made the trip from Palm Springs, California, to Tampa, Florida, in 21 hours and 45 minutes, averaging 102 miles per hour (163 kilometres per hour). The race became an annual event organised by the Ninety-Nines. Each year, the women would fly different routes across the United States.

The AWTAR became the oldest, longest and largest air race for women in the world, but unfortunately, in 1976, due to the gasoline shortage in the United States, the air race was cancelled. Briggs (1991:8) also concludes that in addition to the fuel shortage, the race was getting so large that it became almost impossible to accommodate the hundreds of entrants at each rest point. Also, the constant search for funding to support the race had become too large a burden for the Ninety-Nines, Inc. Hence it was decided no longer to run the race. The names of each year's AWTAR winners and trophies are housed in the National Air and Space Museum at the Smithsonian Institute in Washington, D.C. (Briggs, 1991:9).

Other races that the Ninety-Nines, Inc. have developed and flown in include the Powder Puff Derby, the Formula 1, the Kachina Doll Air Race in Arizona, the Indiana

Fairladies Air Races, the Palms to Pines Air Races, the Michigan Small Race, and the New England Air Race. These races draw competitors from all over the United States and Canada (The Ninety-Nines, Inc., 1999).

- Humanitarian efforts

The Ninety-Nines, Inc. have also become involved in projects to help those in need. Examples of such efforts include 'Happy Flyers', 'Flying Samaritans', 'Blood Flights' and medical airlifts.

In 1976, Janie Postelthwaite and her husband Hartley co-founded the 'Happy Flyers', an international organisation of amateur radio operators (hams) and pilots (Briggs, 1991:9) that aided in the search and rescue of downed aircraft. Through the development of new techniques and special equipment for ELT monitoring and DF radio location, rescuers could be accurately and quickly led to a crash site.

In 1961, Powder Puff Derby winner Aileen Saunders was weathered-in in El Rosario, Mexico. The village was in desperate need of food, clothing and medical supplies due to the weather conditions that had contributed to Saunders's being stranded there. Her first pre-Christmas airlift to the town included a doctor. From this experience, the Flying Samaritans started, running bi-weekly airlifts, year-round to Mexico (The Ninety-Nines, Inc., 1999).

The Ninety-Nines, Inc. also sponsor 'blood flights' for the American Red Cross. After blood is donated, it needs to be processed within four hours. This is often an impossible feat when blood is donated in communities that are far from a processing centre. In 1975, the Minnesota Ninety-Nines began flying blood from small towns to larger cities for processing. The arrangement benefited the Red Cross, but also allowed the women to build up valuable flying time and to qualify for advanced aviation ratings (Briggs, 1991:9). The Ninety-Nines Inc. have also set up an informal system of transportation of medical supplies. Often medicines need to be transported cross-country and into Mexico. A Ninety-Nine flies her own aircraft with the medicine to another Ninety-Nine, who flies the next leg, and so on until the medicine is delivered to its destination (The Ninety-Nines, Inc., 1999).

- Aerospace education

One of the most important activities of the Ninety-Nines, Inc. in the field of aviation is education. Chapters within the group have sponsored more than 300 educational programmes, including aerospace education workshops for teachers, airport tours for school children, aviation talks to service clubs, co-pilot clinics for airline passengers and flight instructor revalidation courses (The Ninety-Nines, Inc., 1999).

The group also maintains a resource centre and library at its headquarters at the Will Rogers Airport in Oklahoma City, Oklahoma. In addition, they sponsor seminars on aviation safety and work with schools and youth groups to develop programmes and courses designed to give students a better understanding of aviation (Briggs, 1991:9).

The Ninety-Nines, Inc. have historically sponsored more than 75% of the Federal Aviation Administration's (FAA) pilot safety programmes in the United States every year. The FAA and the Ninety-Nines, Inc. formed a partnership to promote a three-year programme designed to promote an intensive aviation safety effort. The 'Back to Basics' programme was founded due to the realization that most general aviation accidents are the direct result of not using basic flying skills learned as a private pilot (The Ninety-Nines, Inc., 1999).

NASA and the Ninety-Nines share the goal of promoting aeronautics education and public awareness of flight, and have developed a system whereby educational supplements that stimulate mathematics, science and technology learning through aeronautic activities is disseminated.

The Ninety-Nines, Inc. have hosted many international level activities, including two World Aviation Education and Safety Congresses in New Delhi in 1986, and in Bombay in 1994, hosted by the India Sections of the Ninety-Nines (The Ninety-Nines, Inc., 1999).

The Ninety-Nines, Inc. received the National Aviation Hall of Fame's *Spirit of Flight Award* for 'outstanding contributions to progress in aviation and space'.

- Scholarships, grants and awards

Scholarships, grants and awards are presented at the annual International Conference of the Ninety-Nines, Inc. and several Ninety-Nine Chapters offer additional scholarships. The most noteworthy are listed below:

- *Amelia Earhart Memorial Scholarship*

A total of 23 scholarships of \$1 000 each were awarded to qualified members in 2001. Scholarships are awarded for advanced flight training or courses in specialized branches of aviation. This scholarship is awarded annually and all members are encouraged to apply for this prize.

- *Amelia Earhart Research Scholar Grant*

This grant is awarded periodically for a highly specialized professional scholar to work in her field of expertise to expand knowledge about women in aviation and space.

- *The Ninety-Nines Award of Merit*

The Award of Merit recognises individuals or organisations outside The Ninety-Nines, Inc. who have made significant contributions in aviation, aviation education, science, aviation history or to The Ninety-Nines, Inc.

- *The Award of Achievement*

The Award of Achievement recognises individuals, sections or chapters within The Ninety-Nines, Inc. for outstanding contributions to aviation, aviation education, science, history, or The Ninety-Nines, Inc.

- *The Award of Inspiration*

This is an award of special recognition given by the Board of Directors to an individual, group, organisation or agency whose participation, achievements or activities has had a significant impact on The Ninety-Nines, Inc., the world aviation community, the art and science of aviation or aerospace, or whose deeds of world citizenship and courage have enhanced or safeguarded the quality of life.

- *The Katherine B. Wright Memorial Trophy*

This trophy, in honour of the sister of Wilbur and Orville Wright, is presented to a woman who has made a personal contribution to the advancement of the art, sport and science of aviation and space flight over an extended period of time (The Ninety-Nines, Inc., 1999).

2.3.5.4 *In conclusion*

The Ninety-Nines, Inc. have done much to increase the role of women in aviation; however, their interest has not only been limited to this goal. They have significantly increased safety awareness for all pilots through their collaboration with the FAA and its WINGs programme. The organisation has also done much to promote aerospace education amongst younger enthusiasts and makes a number of charitable contributions.

2.4 LEGISLATION: AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY LAWS

Even though women have been involved in aviation for almost as long as men, the aviation industry has long been a predominantly male-oriented industry. This is especially true in the military and commercial aviation fields.

Perhaps one of the most effective ways in which women have been enabled to cross over into these fields is the passing of affirmative action and equal opportunity legislation.

2.4.1 Introduction – the difference between affirmative action and equal opportunity

It is important to note that there is a significant difference between the concepts involved in affirmative action and equal opportunity laws.

Affirmative action aims at creating a diverse work force through the recruitment and hiring of (ethnic) minorities, women and people with disabilities. *Equal opportunity* aims at the elimination of discrimination based on race, religion, retaliation, age, national origin, colour, handicap and gender.

While affirmative action's primary focus is acting positively in terms of recruitment, hiring and succession planning for underrepresented groups, *Equal opportunity's* primary focus is identifying, eliminating and preventing discrimination and harassment, and addressing allegations of such incidents when accusations are made (FAA, 2001).

2.4.2 Affirmative action and equal opportunity in the United States

In the 1950's and 1960's, the question of civil rights came under the spotlight in the United States. Two laws, the Equal Pay Act of 1963 and Title VII of the 1964 Civil Rights Act proved to be of vital importance to women in all professions, not just aviation.

The Equal Pay Act of 1963 required equal pay for equal work, and Title VII of the 1964 Civil Rights Act prohibited all discrimination on the basis of sex for any reason in determining employee compensation (Douglas, 1991:82). As a result of these laws, the National Organisation for Women (NOW) was created in June 1965. This organisation became an important advocate for women's rights, and especially so for women in the aviation industry.

Women had, until then, been working as professional pilots in limited capacities; local flight schools and light plane dealerships hired them as a way of demonstrating women's apparent limitations in selling aviation products. The majority of women pilots in the United States were involved in general aviation. In 1960, there were 12 471 licensed women pilots, 3.6% of the total number; and by 1970 the number had increased to 30 000, which still only accounted for about 4.3% of all aviators in the United States (Douglas, 1991:83).

Commercial airlines had at that time not even considered hiring women pilots (Douglas, 1991:85). More recently, airline companies in the United States have realised that there is a disproportion between male and female pilots. In an effort to boost the number of women pilots in cockpits, one American airliner, Delta Airlines, has created a partnership with Western Michigan University's College of Aviation. The terms of the agreement entailed that Delta provide \$1.65 million over four years (starting in 2001) and Western Michigan University begin training a minimum of 24 female pilots (Valia, 2001). The announcement of this diversity programme came after a discrimination suit was filed against Delta Airlines in which five African-American women said they had witnessed systematic discrimination in promotions, performance evaluations and compensation (Valia, 2001:1).

The Federal Aviation Administration (FAA), the governing body for all pilots, airports and airlines in the United States (and to some extent internationally), has also established an office of Civil Rights which addresses issues of discrimination and affirmative action. Their mission is the following: 'The Office of Civil Rights advises, represents, and assists the Administrator on civil rights and equal opportunity matters that ensures the elimination of

unlawful discrimination on the basis of race, colour, national origin, sex, age, religion, creed, and individuals with disabilities in federally operated and federally assisted transportation programs; that ensures that all beneficiaries and potential beneficiaries of these programs, including employees and potential employees, are offered equal opportunities to participate in them; and that ensures a positive working environment in the Federal Aviation Administration by valuing, using, and managing the differences that individuals bring to the workplace.' (FAA, 2001:2).

The United States military also has a formal training laboratory at Patrick Air Force Base in Florida, which trains facilitators in the techniques of 'sensitivity training'. Though these techniques have been utilised in affirmative action programmes since the 1970's, such training has drastically increased since the early 1990's when females were first allowed to participate in combat aviation (Atkinson, 1999).

The training centre is called the Defence Equal Opportunity Management Institute (DEOMI) and its mission is to 'enhance leadership and readiness by fostering Equal Opportunity (EO) and Equal Employment Opportunity (EEO) programs and positive human relations through world class education, training, and research' (Defence Equal Opportunity Management Institute, 2001a). The Defence Equal Opportunity Management Institute also compiles reports and maintains demographic statistics for the armed services and Coast Guard of the United States.

1976 saw the first group of women candidate pilots officially allowed in the United States Air Force. By 1993 the first women were authorised for combat flight in the United States military.

2.4.3 Affirmative action and equal opportunity in Australia

As stated above, anti-discriminatory laws influence the career choices and development of women in all industries, not only in aviation. Important laws in Australia are:

- *The Sex Discrimination Act 1984*

The Sex Discrimination Act arose from Australia's signing of the United Nations' International Convention on the Elimination of All Forms of Discrimination Against

Women. This Act makes it unlawful to discriminate against people on the grounds of their

- sex; meaning whether they are male or female;
- *marital status*; that is, whether people are single, married, widowed, divorced, separated, or living in a *de facto* relationship;
- *pregnancy and family responsibilities*; this means the responsibilities of an employee to care for or support a dependent child or any immediate family member.
- *sexual harassment*; that is, behaviour that has a sexual element to it and which makes a person, with reason, feel humiliated, intimidated or offended.

▪ *The Human Rights and Equal Opportunity Commission Act 1986*

This Act makes it unlawful to discriminate against people on the grounds of their race, colour, sex, religion, political opinion, national extraction or social origin, age, medical record, criminal record, impairment, marital status, mental, intellectual or psychiatric disability, nationality, physical disability, sexual preference, or trade union activity.

▪ *Equal Opportunity for Women in the Workplace Act 1999 (Formerly the Affirmative Action Act)*

When the original Affirmative Action Bill was being discussed in Parliament it was argued that

- the percentage of women in the workforce and the percentage of the workforce who are women have continually increased in Australia since the end of the Second World War;
- the role of women in Australian society also has changed in that time;
- however, women remain concentrated in low status, low paid, low power positions in a small number of occupations (clerical, sales, community services, retail and clothing manufacturing);

- one major reason for this is that women often encounter barriers to entering certain jobs, or to receiving training or promotion;
- a law insisting on the breaking down of those barriers would encourage employers to change their behaviour and their attitudes.

The Equal Opportunity for Women in the Workplace Act of Australia requires higher education institutions, and employers of more than 100 employees to put into place programmes that break down the barriers that have prevented women from having equal involvement in their organisations.

The aims of the Equal Opportunity for Women in the Workplace Act are:

- to promote the principle that employment for women should be dealt with on the basis of merit; and
- to promote, amongst employers, the elimination of discrimination against, and the provision of equal opportunity for, women in relation to employment matters; and
- to foster workplace consultation between employers and employees on issues concerning equal opportunity for women in relation to employment.

The Act does not require that a certain number of women must be employed, nor does it imply that women must be given jobs over more skilled or better qualified men. It does, however, mean that barriers which are unfairly blocking the roles women can play be removed (Equal Opportunity for Women in the Workplace Agency, 2001).

In spite of these anti-discriminatory and affirmative action laws, Australia's first female military pilots did not graduate until 1988. Furthermore, women were only permitted to fly jet fighter aircraft in 1995. 1999 saw the first Australian female military aerobatic pilot, as well as the graduation of the first female F-111 navigators. These women were the first Australian female jet fighter crew (Smart, 1998).

Australia's first appointment of a woman passenger airline pilot came in 1974 and the first woman pilot to fly for a major airline followed in 1980 after a dispute with the Equal Opportunities Commission (National Pioneer's Women Hall Of Fame, 2001).

2.4.3.1 Time Line

Table 2.5 provides a time line for Australian aviatrix firsts.

Table 2.5: Timeline of Australian aviatrix firsts

1909	Florence Taylor: First Australian woman in flight in a glider. Narrabeen sandhills near Sydney. 5 December 1909 (National Pioneer's Women Hall of Fame, 2001).
1927	Millicent Bryant: First Australian woman to obtain a pilot's licence (National Pioneer's Women Hall of Fame, 2001).
1929	Bobby Terry: First Australian woman to own her own aircraft (National Pioneer's Women Hall of Fame, 2001).
1930's	Lores Benney: First Australian woman to fly around Australia, to fly solo from Australia to England, and to fly solo from Australia to South Africa. Irene Dean-Williams: First Australian woman to gain a commercial pilot's licence and also the first woman to fly a solo return trip from Perth to Sydney (National Pioneer's Women Hall of Fame, 2001).
1935	Nancy Bird: Organises the first Ladies' Flying Tour in Australia (National Pioneer's Women Hall of Fame, 2001).
1938	Formation of the Women's Flying Club (National Pioneer's Women Hall of Fame, 2001).
1941	WWII: Women's Air Training Corps is created and develops into the Women's Auxiliary Australian Air Force. Established 5 March 1941 (National Pioneer's Women Hall of Fame, 2001).
1949	Margaret Clarke: First Australian woman crop-duster and aerial spraying pilot though she was paid as an unskilled worker as no wage was set for women at that time (National Pioneer's Women Hall of Fame, 2001).
1950	Australia Women Pilot's Association (AWPA), incorporating the Women's Flying Club, is formed (National Pioneer's Women Hall of Fame, 2001).

	Fame, 2001).
1960	Olga Tarling: Appointed as Australia's first woman air traffic controller at Brisbane airport (National Pioneer's Women Hall of Fame, 2001).
1967	Rosemary Arnold-Harris: Australia's first female commercial rotorcraft pilot (National Pioneer's Women Hall of Fame, 2001).
1974	Christine Davy: First Australian woman passenger pilot (National Pioneer's Women Hall of Fame, 2001).
1980	Deborah Wardley: First Australian woman to fly for a major commercial airline (National Pioneer's Women Hall of Fame, 2001).
1982	Kath Meyering: First Australian woman to fly an ultralight (National Pioneer's Women Hall of Fame, 2001).
1987	Mary O'Brien: Appointed as Examiner of Airmen – the highest aviation appointment given to a woman (National Pioneer's Women Hall of Fame, 2001).
1988	Female Pilot Graduations in the Royal Australian Air Force (RAAF) crew (Smart, 1998).
1995	Adelaide hosted the first international conference for women in aviation in Australia (National Pioneer's Women Hall Of Fame, 2001) and first women to be permitted to fly jet fighter aircraft in the RAAF (Smart, 1998).
1999	First Australian female military aerobatic pilot. Graduation of the first female F-111 navigators (Smart, 1998).

2.4.4 Affirmative action and equal opportunity in South Africa

As in the United States in the mid 1960's, South Africa faced many civil rights issues under the old Apartheid system. Prior to 1994, any person not categorised as white was denied job and educational opportunities. The system also curbed the participation of white women in the work force. While exclusion in this case was not always due to legislation, women were denied access to employment by conservative ideas within Afrikaans and

English communities about women's place in society (Msimang, 2001). However, legislation was often the reason for the exclusion of women in many employment fields.

Given the political history of South Africa, the government of President Nelson Mandela focused its attention on changing the laws of the country. Many of the old laws had to be discontinued and rewritten in line with South Africa's new Constitution and international human rights agreements. In addition, the government set about establishing proactive laws that would encourage the hiring of blacks, disabled people and women (Msimang, 2001).

The Ministry of Labour drafted numerous pieces of legislation that would ensure that all South Africans would be able to compete for jobs on an equitable basis. The Labour Relations Act of 1995 (LRA) and the Employment Equity Act of 1998 were instrumental in regard.

- *Employment Equity Act of 1998*

The purpose of this Act is to promote equity in the workplace, by

- promoting equal opportunity and fair treatment in employment through the elimination of unfair discrimination, and
- implementing affirmative action measures to redress the disadvantages in employment experienced by designated groups, to ensure their equitable representation in all occupational categories and levels in the workforce.

The Act promotes fair treatment by prohibiting unfair discrimination on the basis of 'race, gender, pregnancy, marital status, family responsibility, ethnic or social origin, colour, sexual orientation, age, disability, religion, HIV status, conscience, belief, political opinion, culture, language and birth' (Office of the President, 1998:1).

- *Labour Relations Act of 1995*

The purpose of the Act is to advance economic development, social justice, labour peace and democratisation of the workplace by the following:

- giving effect to and regulating the fundamental rights conferred by the constitution;

- giving effect to the obligations incurred by the Republic of South Africa as a member of the International Labour Organisation (ILO);
- providing a framework within which employees and their trade unions, employers and employer organisations can
 - (a) collectively bargain to determine wages, terms and conditions of employment and other matters of mutual interest, and
 - (b) formulate industrial policy;
- promoting orderly collective bargaining at sectoral level, employee participation in decision-making in the workplace, and effective resolution of labour disputes.

It is important to note that not all workers are covered by the Labour Relations Act. The following do not fall under the LRA:

- members of the South African National Defence Force (SANDF), which includes the Army, Navy and Air Force;
- members of the National Intelligence Agency (NIA); and
- members of the South African Secret Service.

The result of this exclusion is that all members of the South African National Defence Force, including women pilots in the South African Air Force (SAAF), are not afforded the same rights as their counterparts in the public sector.

Section 8 of the Constitution of South Africa states that 'no person shall be unfairly discriminated against, directly or indirectly, and, without derogating from the generality of this provision, on one or more of the following grounds in particular: race, sex, ethnic or social origin, colour, sexual orientation, age disability, religion, conscience, belief, culture or language'.

Lieutenant Colonel G.A. Lennox of the South African National Defence Force believes that the inclusion of the term 'unfair discrimination' could permit the military to rule that it is 'fair' and in the interest of women that they be excluded from participation in certain roles, such as combat (Lennox, 1995:35).

This view can be challenged in that it can be considered as being unfair discrimination, in which case the military would have to prove otherwise. Unfair discrimination could include setting selection criteria based on unreasonable physical strength requirements, which

would effectively bar women from appointment to certain posts. Lt. Col. Lennox states that in general, the South African National Defence Force practises fair discrimination by excluding persons with physical disabilities from serving in combatant roles, where their chances of survival would be limited (Lennox, 1995:35).

Lennox feels that to promote equal opportunities for women in the South African National Defence Force, goals rather than quotas must be set. He believes that these goals must encompass the recruitment of women who have a strong desire to serve the South African National Defence Force under all circumstances, women who are prepared to be transferred to other geographic areas and who could be developed for leadership positions. He unwisely adds that another goal should be set; that of recruiting young women on the same basis as that on which men are recruited. He adds the further inflammatory comment that women will no longer be able to claim the sole right to an afternoon off for shopping! Lennox (1995:40), in an article in the South African National Defence Force *Personnel Bulletin*, writes that women will have to undergo exactly the same training as men and should have their hair cut and styled in accordance with the hair regulations on reporting for Basic Military Training.

This kind of naïve and outdated paradigm needs urgent attention in order for women to receive fair consideration for both combative and support roles in the South African National Defence Force.

In 1996, the South African Air Force (SAAF) recruited the first five women for pilot training. Since that time, 15 women have received their wings, and currently 13 of them still function as pilots in the South African Air Force. One of these aviatrices is an instructor pilot. Ten female candidate pilots are currently being trained, though none of the women pilots, both qualified and in training, have been assigned to combat aviation roles.

In 1998, the first three women pilots joined South African Airways (SAA). In January 2000, SAA appointed a team of pilots to spearhead and promote its Pilot Employment Equity Recruitment (PEER). The team was tasked to stimulate an interest in flying among qualifying designated groups as required by the Employment Equity Act (SAA, 2000). Currently (October, 2004), the airline has 970 pilots in its employ, of which 66 are non-whites and only 37 are women. Thus women constitute a mere 3.8% of the commercial pilots in South Africa's biggest airline.

2.5 WOMEN IN OTHER AVIATION AND AEROSPACE CAREERS

It is important to realise that a career in aviation is not limited only to piloting. Although this study is specifically aimed at aviatrices, other aviation sectors in which women can participate should also be mentioned. A concerted effort is currently underway in the United States by various organisations such as the Department of Transportation and the FAA to educate the public, and especially women, of other aviation career avenues.

Examples of these careers include

- *Education and training*
This may include the design and development of aviation and aerospace programmes, as well as presenting these courses at various levels from junior school to university level. The design and presentation of training manuals and industry specific courseware design is also included. Candidates are encouraged to pursue degrees in education.
- *Government*
A career in government may involve the design and implementation of policies and procedures, the management of a budget, recruitment, training, administration and logistical support as well as the operation, modernisation and maintenance of air traffic control and navigational systems.
- *Engineering*
Although engineering is traditionally considered a male environment, more and more women are finding success in engineering careers. By its very nature, engineering encompasses a vast spectrum of specialities. In the aviation industry, these may include stress and integrity analyses, composite materials research, aircraft design, propulsion engineering, system mechanical engineering, and aerospace engineering, to mention just a few.
- *Air Traffic Control*
Air Traffic Control Specialists use radar, visual information and radio communications to direct and monitor air traffic so that it flows smoothly, efficiently and safely through airspace. Tower or Local Controllers work from airport control towers. They monitor the movement of aircraft and give instructions to pilots for taxi and takeoff procedures. They give clearance to pilots for landing and takeoff and relay current weather

information. One of their primary duties is to provide and maintain separation between landing and departing aircraft in the vicinity of the airport. This position usually rotates between the two other controller positions also located in the tower: clearance delivery and ground control (NASA, 2002:1).

- *Airport Management*

Airport management includes the day-to-day operations of safety and security issues. Airport *authority* management provides technical support in terms of environmental compliance, planning capital improvements and business development.

- *Space*

A career in space usually implies the function of mission specialist, which in turn can encompass a great number of forms of technical expertise. These may include scientific and physics functions, neuropathology, atmospheric and solar studies as well as robotics, electrical engineering and medical functions.

- *Aircraft maintenance*

This field usually implies that mechanical training of some sort as well as 'hands on' experience is necessary. Maintenance may also include a manufacturing environment. Women are encouraged to progress to supervisory positions in the maintenance and manufacturing field.

- *Business*

Aviation-specific business encompasses a wide variety of possible functions. These may include marketing, operations, sales, public relations, executive and strategic level decision-making, regulatory compliance, etc. Candidates who have an interest in this field are encouraged to pursue an education in business management.

2.6 INTEGRATED CONCLUSION

Women have been contributing to aviation in one way or another for almost as long as men have, yet stereotypes still govern people's perceptions of women flyers. Aviators knew the dangers of early flight and the first licensed woman pilot was not only a great advocate of women in aviation, but also a great proponent of the importance of safety in aviation. Harriet Quimby was also a visionary in that she speculated that aviation would branch out into multi-passenger air travel and be utilised for couriers mail. This was

indeed a revolutionary concept, as airplanes had only been invented nine years earlier and were still being developed.

In the United States, the advent of the Second World War also introduced women to military aviation. These pioneer aviatrices were subject to the same rules of war as their male counterparts; they were commissioned and flew every type of fighter and bomber aircraft of the time. Their missions were often as dangerous as combat missions, but despite this, they were never militarised, in effect precluding them from any benefits they were entitled to. An attempt to militarise the WASPs failed in 1944, and the members of this élite unit had to wait more than 30 years to be recognised and militarised. In fact, the only socially acceptable occupation for women of the time was thought to be that of motherhood.

Similarly, in South Africa, female pilots offered their services to the military during the Second World War and were able to perform in various roles until 1947. In 1949 the recruitment of women into the military ceased and it took 23 years before women were again permitted to join the South African military.

Beyond military aviation, women proved better suited to space travel and performed exceptionally in the Mercury tests. In fact, 12 women were chosen as candidates to travel into space, but all were rejected as it was felt that the training of female astronauts would delay the national (United States) goal of putting a man on the moon by the end of the 1960's. It did not seem relevant to the decision-makers of the time that training would have to be received by all astronaut candidates, regardless of gender. In the end, the first American woman travelled into space in 1982.

It seems ironic that a country such as the former Soviet Union, which has at times been perceived as trailing in the wake of more technologically advanced countries, was in fact progressive in its utilisation of women as aviators. This trend was clearest in the USSR's use of female fighter and bomber pilots during the Second World War, and the success of its first women in space in 1963 – more than 30 and 20 years respectively ahead of the United States.

With more women taking to the sky, the need for association between women pilots also gave rise to the formation of an international organisation of women pilots. The Ninety-

Nines, Inc. enjoys an enthusiastic international membership. After 70 years, the group still holds true to its goals of promoting women in flight and aerospace education.

Government legislation has also gone a long way toward promoting the idea of women as competent pilots by in fact allowing women to participate in once male-dominated occupations such as commercial aviation. Women have proved their abilities in the field of aviation on many levels – from design and development to piloting skills, yet it seems that public awareness of their ingenuity and courage is only just emerging. Early pioneers such as Nancy Harkness Love did much to promote women in aviation, but perhaps the most important contribution these aviatrixes have made has been the inspiration of generations of women who will follow their dreams in aviation. It seems, however, that even though women have the initiative and determination to pursue these goals, their presence in aviation still remains something society needs to get used to. Past history has shown that this has taken at least 20 to 40 years, and in some cases, still has to be achieved.