

AFEHRI File 100.020

Research Materials/Source Documents
STUDENT PAPERS

FILE TITLE: Aircraft Maintenance in the U.S. Army Air Forces

AUTHOR: SMSgt Erick D. Nilson, 20 Feb 1997

Reviewed by:

AFEHRI Representative G. R. Akin date 5 Dec 97

EPC Representative John A. Akin date 12 Dec 97

Scanner Operator Sung B. Akin date 12 Dec 97

APPROVED BY:

Gary R. Akin

GARY R. AKIN, CMSgt, USAF

Director

Air Force Enlisted Heritage Research Institute

AIRCRAFT MAINTENANCE IN THE US ARMY AIR FORCES

CSA 13 - Preserving Enlisted Heritage

SMSgt Erick D. Nilsen

SNCOA - 20 February 1997

Aircraft Maintainers in the US Army Air Forces

The history of aviation is full of the exploits of pilots and aircrew, and rightly so!

These individuals serve as the most visible members of the United States Air Force and its predecessor, the United States Army Air Forces (AAF). However, then as now, there were thousands of others who performed their duties out of the public view and we should do more to bring their efforts to the forefront. This paper will provide a very brief glance at the evolution of one very important group -- the aircraft maintainers. While researching this paper, I discovered very limited documentation of their experiences. I found this to be a very challenging task and soon found myself wishing I had more time to devote to this project. I undertook this project with the hope that this paper, and the attached materials, provides information needed to build upon my efforts. In this paper, I will briefly describe how the AAF conducted basic training, technical training, and provide a small glimpse of life on the flightline during World War II. Again, this is a story worth telling. The efforts of the men and women of the AAF paved the path for those of us in the Air Force today. Like us, the path to life as a maintainer in the Army Air Forces began in a familiar way--in basic training.

The first step to becoming an AAF aircraft mechanic was the same as it is today: basic Training. New AAF recruits found basic training much different from their pre-war predecessors. Prior to 1932, aircraft mechanics received training only in their specialty and all mechanics were basically crew chiefs. However, the person responsible for maintenance of the aircraft was generally -- the pilot! This was to change drastically as aircraft became increasingly complex and a number of different specialties grew within aircraft maintenance. After 1932, basic training assumed a more physical flavor with

increased attention to physical fitness, soldiering, and drill. The length of training at that point was 138 hours over a six-week period. (2:4) Training requirements were again revised with the ever-increasing possibility that America would enter the war. Mobilization Training Program No. 1-1, published in December 1940, set the policy on recruit training in what was by then the Army Air Corps. (2:7) This policy provided for three types of training for new recruits; (1) basic training; (2) technical training; and (3) unit training.

The first step of training (basic) was initially a three-week course containing 132 hours.(2:18) This training include instruction in the following:

<u>Subjects</u>	<u>Hours</u>
Issuance Clothing and Equipment	4
Articles of War	2
Military Courtesy	1
Sex Hygiene	1
Hygiene and Sanitation	1
First Aid	1
Care and Display of Equipment	6
Interior Guard Duty	3
Defense for Chemical Attack	6
Dismounted Drill/Physical Training	88
Pistol Marksmanship	8
Vaccination and Immunization	3
Classification and Trade Testing	7
total -	132

The initial four to six days were spent processing recruits through lectures, tests, films, and other procedures.(2:67) Recruits also received an orientation speech from their commanding officer or other commissioned personnel. A directive from Basic Training Center (BTC) No. 7 at Atlantic City, NJ stated, "All recruits are entitled to a well-presented talk by their squadron commanding officer. This should be given on the first or second day of arrival, in the form of a welcome, and should include an explanation of the

training about to be given.”(2:67) The AAF adjusted the length and curriculum of basic training several times throughout the war and eventually settled at six weeks.

The War Department authorized the AAF to establish 21 replacement (basic) training centers (BTC's). The first opened at Jefferson Barracks in 1940. The AAF eventually opened 12 basic training centers in the following locations:

1. Jefferson Barracks, MO
2. Keesler Field, MS
3. Sheppard Field, TX
4. Miami Beach, FL
5. Kearns, UT
6. St. Petersburg, FL (moved to Lincoln, NE - 1943)
7. Atlantic City, NJ
8. Fresno, CA (moved to Buckley Field, CO - 1943)
9. Greensboro, NC
10. Seymour-Johnson Field, NC
11. Gulfport, MS
12. Amarillo, TX

The AAF activated and de-activated these basic training centers as the number of recruits rose and then fell as the war progressed. Four centers survived until the end of the war: Buckley Field, Amarillo Army Air Field, Sheppard Field, and Keesler Field.(7:529)

The unique thing about the Miami, St. Petersburg, and Atlantic City sites is that recruits were housed in hotels requisitioned for AAF use. The activation of the BTCs matched the ebb and flow of recruits. AAF recruits numbered about 21,000 in December 1941, rose to a peak of 185,795 by February 1943, and diminished to 16,509 in December 1944.(2:73)

It is noteworthy that basic training varied according to AAF needs. The need to create a large pool of mechanics affected the length and type of training received. Martin Mitchell, 95th Bomb Group, stated in a post-war memoir, "I received only a total of nine hours (one day) basic training before I was sent to Chanute Field, Illinois where the airplane mechanics school was located." (10:181) The needs of the service certainly

affected the length of his training and for countless others. However, the training became somewhat standardized as the pipeline of recruits began to meet manpower requirements. Then, as now, the person playing the largest role in basic training was the drill instructor.

My first memory of the Air Force was meeting my basic training Military Training Instructor, Sergeant Joe Horton. Sergeant Horton undoubtedly would have been as successful in World War II as he was as in 1978. He met the requirements listed in the Army Air Forces Historical Studies: No. 49. This after-war report stated, "...drill instructors were the most important group of permanent party men at a post. They not only gave recruits prescribed instructions, but also, through their normal behavior and attitudes in daily contacts, played a large role in conditioning the new men to Army life."(2:58) The report went on to say, "Sympathetic, fair, understanding, and capable drill instructors quickly won the respect of their men, most of whom were cooperative." These drill instructors had their hands full. The AAF considered the best instructor-trainee ratio to be 1:25. However, they rarely met this goal and saw it grow to as high as 1:196 at Jefferson Barracks.(2:60) So, as is apparent, drill instructors had an enormous role in training new recruits.

Basic training also served as a location to determine the classification of recruits for further training. Approximately 65 percent of AAF recruits received technical training as aircraft mechanics.(1:11) By now, due to specialization, the term "aircraft mechanic" applied only to individuals maintaining airframes, aircraft engines, and accessories that were an integral part of the plane. This included specialists on propellers, hydraulic and electrical systems, carburetors, and power plants.(1:2) Previously, all AAF enlisted personnel were generically termed aircraft mechanics. The AAF used the Army General

Classification Test (AGCT) to select individuals for technical training. A minimum score of 100 (later lowered to 85) was required for entry into aircraft mechanic training. Initially, all AAF recruits had to be High School graduates providing the AAF with a well-educated force for that era. The service would also relax this requirement later in the war as the pool of available manpower diminished. After classification and basic training, the recruit was ready for technical training.

The next milestone on the road to become an aircraft mechanic was technical training. Following classification in basic training, individuals attended technical training in one of a number of ways. Potential mechanics received training through AAF technical schools, civilian technical schools, factory schools, or airline schools. The preferable training was at an AAF training center, although, except for airline training, all met their purposes to train aircraft mechanics.

Regardless of classification, all future mechanics attended the basic aircraft maintenance course.(1:20) This level of training familiarized personnel with aircraft features and contained what we would know today as organizational maintenance, such as, servicing, towing, and general maintenance. In the AAF, unlike today, all aircraft mechanics received this training. This level of training was known in the AAF as first echelon maintenance. The basic aircraft mechanic course lasted approximately eight weeks and initially taught only at Chanute Field. Later, as planes became more complex, training became more specific in nature and the AAF spread the basic course to various locations. For instance, Amarillo received the B-17 basic aircraft mechanic school, Keesler (B-24), Sheppard (medium-bombardment aircraft), Seymour-Johnson (light-bombardment), and Gulfport (cargo planes).(1:28) Although it is a little vague, my research led me to believe

that fighter/pursuit aircraft mechanics received their training at Sheppard and Chanute and, later, at factory schools. For example, Merle Olmstead, crew chief with the 357th Fighter Group, wrote in his memoirs, *A View From the Flightline*, that he received training at Sheppard and, later, at the Burbank plant of Lockheed Aircraft.(12:103) As a crew chief, Merle Olmstead was trained for first echelon maintenance.

The Army Air Forces had four echelons of maintenance during World War II. The first three echelons would be known today as *organizational and field-level maintenance*. The fourth would be depot-like in nature.(8:603) Second, third, and fourth echelon training was offered in eight courses: (1) Aircraft Machinists, (2) Aircraft Welders, (3) Aircraft Metal Workers, (4) Power Plant Specialists, (5) Propeller Specialist, (6) Hydraulic Specialists, (7) Electrical Specialists, and (8) Instrument Specialists. These courses were an answer to the specialties that emerged during the war. For the purpose of this paper, I will focus on the training of only one of these specialties -- the Aircraft Metal Worker, or sheet metal worker.

I choose to highlight the sheet metal workers course because that is the career field in which I've spent the majority of my Air Force career. So, as you might surmise, it is near and dear to my heart. The object of the sheet metal course was to train personnel to repair damage to the metal skin, radiators, and fuel tanks of AAF aircraft caused by enemy gunfire or accidents in flight.(1:49) The location of training depended upon the maintenance echelon to which a mechanic was assigned. Training methods and length of training varied during the war before settling at around 78 training days in 1944. The curriculum in 1944 was as follows:(1:53)

- | | |
|----------------------|---------|
| I. Basic Instruction | 12 days |
| II. Basic Metal Work | 18 days |

III. Heat Treating	3 days
IV. Self-Sealing Fuel Tanks	6 days
V. Aircraft Metal Work I	15 days
VI. Aircraft Metal Work II	24 days

Sheet metal workers selected to perform fourth echelon (depot) maintenance were primarily trained by civilian mechanics schools. These schools were conducted by companies and schools, such as, Boeing Aircraft, Emry-Riddle School, and the Curtiss-Wright Technical Institute. Workers trained at these schools were later assigned to large depots like Burtonwood (8:662) in England or to mobile repair units. They primarily performed repairs beyond the scope of those accomplished on the flightline by first or second echelon mechanics. Regardless of the training location, the sheet metal worker was an important member of the aircraft mechanic community.

By end of the war almost 1,400,000 AAF personnel received technical training of some type.(11:175) These figures compare to a total of 2,282,259 people in the AAF by wars end.(11:161) Aircraft maintainers and other ground support personnel comprised the majority of the AAF. After technical training, AAF members were ready to join their operational squadron for further unit training.

Most aircraft mechanics transferred to a flying squadron following technical training. By now, most were in the pay grade of Corporal, or Technician, fifth grade and pulled down a whopping \$66 per month in base pay.(5:2) Of course, the AAF had to promote a great number of people to fill supervisory roles so that would have been just a median pay grade for that time. It should also be noted that not all technical school graduates went to operational units. Some were assigned to depots, mobile repair units, or became technical school instructors themselves. Those sent to operational units usually joined their outfit

prior to deployment to receive further familiarization training. For example, Merle Olmstead joined the 357th Fighter Group at Hamilton Field, California and later transferred with that group to Tonopah, Nevada.(12:103-104) Unit training provided aircraft mechanics the opportunity to hone their skills before deployment to an operational theater and allowed the AAF to further verify its classification system.

Much like the Air Force today, the AAF recognized the disadvantages of improperly, or malassigned personnel. The Army Air Forces Historical Studies: No. 76 stated, “A malassigned technician overseas was a detriment to combat operations and an unwarranted consumer of supplies difficult to transport.”(4:191) In other words, proficient ground crew personnel provided the AAF more bang for its buck. This final “fleshing out” prepared the mechanic and his unit for deployment to an operational theater.

For the sake of clarity and brevity, I'll focus my discussion of deployment on aircraft mechanics stationed in the European Theater of Operations and the 8th Air Force. Most troops deployed overseas via transoceanic voyages. For example, Martin Mitchell, crew chief in the 95th Bomb Group deployed to England via the RMS *Queen Elizabeth* in May 1943.(10:81) His unit, along with about 13,000 other personnel, had to worry about boredom, seasickness, German U-boats, and enemy aircraft. Not exactly the leisurely cruise we would normally associate with the *Queen Elizabeth*.

Aircraft mechanics deployed to England generally lived in Nissen huts with 14-16 men. They learned to hate the cold, damp English winter weather while working on aircraft outdoors.(12:97) I can empathize with this feeling having worked on the flightline at RAF Mildenhall. However, being in England put them in a location that provided them

a common language and where their presence was appreciated. This gave them a break from the pace and rigors of the flightline.

Aircraft maintenance, then as now, was a dangerous business requiring strict attention to detail. To illustrate the danger, the 95th Bomb Group lost an entire ground crew when a B-17 blew up on the ground at Alconbury, England.(10:15) In all, nineteen men were killed and four other B-17s destroyed. Clifford Cole, member of the 95th, reminisced, "Here, in a second, went the lives, the efforts, and the careful schooling of some of the Air Corps' most vital assets, the men on the line. They can get more planes, but dedicated, trained maintenance personnel were irreplaceable."(10:14) Flightline actions were, and remain, potentially dangerous and it was recognized that people were the most irreplaceable assets in the service.

Battle damage sustained by B-17s was enormous. For instance, a Bomber Command study covering the period from 21 October 1942 - 31 March 1943 reported that 588 aircraft had suffered battle damage and 512 (87%) were repaired by the command itself.(8:623) This may not seem like a lot, but this was only one theater and one command dealing only with bombers. It did not include different types of aircraft or bombers which had been destroyed. To repair these aircraft, first and second echelon mechanics at base-level were assisted by mobile repair units (third echelon) comprised of 16-19 specialists equipped with a truck, a jeep, and two trailers. These trailers were stocked with tools, equipment, and supplies needed to perform on-the-spot repairs. By the end of 1943, the 8th Air Force had fifty mobile repair units in operation to repair an ever growing number of aircraft in the ETO.(8:624) In June of 1942, the AAF had 1,841 aircraft in the theater. By May 1944, there were over 10,500 airplanes in Europe.

Significantly, in the last half of 1943, 5,330 aircraft had received damage requiring extensive repair.(8:664) Proudly, the sheet metal worker was at the forefront of those actions, although, then as now, the flightline required a team effort. Aircraft mechanics, as a whole, played an enormous, though largely obscure, role in winning the war. The Army Air Forces Historical Studies: No. 26, noted, "In popular imagination it is the members of the aircrews -- particularly the pilots -- who are the heroes of aerial warfare. Yet everyone familiar with the reality of the situation -- especially pilots and their crew members -- realizes his dependence upon the glamorless airplane mechanic, the lowly grease monkey."(1:1)

Aircraft mechanics (maintainers) played, and continue to play, an enormous role in the success of flying operations. The grease monkey will continue to labor largely unnoticed to ensure aircraft are ready to fly. We, as mechanics, should be proud of our efforts and of those who trust us enough to step into aircraft and fly them! We should also take pride in the accomplishments of those of who preceded us, like the mechanics of the Army Air Forces. I have provided only a very brief glimpse of the evolution of an AAF aircraft mechanic. I discussed how and where AAF mechanics attended basic training. I also touched upon the various ways in which technical training was conducted and the AAF classification system. I followed that with a look at how unit training prepared aircraft mechanics for deployment. Finally, there was a microscopic glance at the efforts and lives of aircraft mechanics deployed to the European Theater of Operations. I encourage others, particularly fellow maintainers, to build upon my efforts and help enlarge our enlisted heritage. Remember, *Pilots without maintenance are just pedestrians with sunglasses and a cool jacket!*

BIBLIOGRAPHY

1. Army Air Forces Historical Studies, No. 26. *Individual Training in Aircraft Maintenance in the AAF*. K101-26 (Nov 46), in USAF Collection, AFHRA.
2. Army Air Forces Historical Studies, No. 49. *Basic Military Training in the AAF, 1939-1944*. K101-49 (Nov 46), in USAF Collection, AFHRA.
3. Army Air Forces Historical Studies, No. 51. *The Maintenance of Army Aircraft in the United States*. K101-51 (Aug 46), in USAF Collection, AFHRA.
4. Air Force Historical Study, No. 76. *Classification and Assignment of Enlisted Men in the Army Air Arm 1917-1945*. K101-76 (1953), in USAF Collection, AFHRA.
5. Technical Manual 14-502, *Pay and Allowances of Enlisted Personnel*. War Department (1943), in USAF Collection, AFHRA
6. Technical Order 30-50A-1, *Maintenance Engineering Flight Test*. AAF Air Service Command (Sept 1943), in USAF Collection, AFHRA.
7. Craven, Wesley and Cate, James L. *The Army Air Forces in World War II, Vol I*. Chicago, Chicago Press, 1955.
8. Craven and Cate. *The Army Air Forces in World War II: Torch to Pointblank, Volume II*. Chicago, Chicago Press, 1955.
9. Craven and Cate. *The Army Air Forces in World War II: Men and Planes, Volume VI*. Chicago, Chicago Press, 1955.
10. Hawkins, Ian. *B-17s Over Berlin*. Washington, D.C., Brassey's, 1990.
11. Nalty, Bernard C. *With Courage: The U.S. Army Air Forces in World War II*. Washington, D.C., Air Force History and Museum Program, 1994.
12. Olmstead, Merle. "The View Form the Flightline" *Journal-American Aviation Historical Society*, pp 94-108, Summer Edition, 1991.