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AIRCRAFT ENGINE TECHNICAL TRAINING

BY

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Army aviation began with the requirement for an airplane that carried two people aloft for one hour at a speed of forty miles per hour. The Wright Brothers built an air machine of cloth, wire, pulleys, chains and wood to meet this requirement. Army aviation had begun, and with it the need for mechanics to maintain the equipment. Through Two World Wars, and conflicts in Vietnam and other areas of the world over the past 85 years, the need for trained engine mechanics continues as we review the origins and growth of aircraft engine technical training. The humble beginning, with Lt. Benjamin Foulis and nine enlisted mechanics paved the way for what is today one of many technical training schools in the United States Air Force. Chanute AFB was the birthplace for the majority of engine mechanics to have served the US Army and Air Force. From 1914 when the Signal Corps received its first dedicated enlisted mechanics, through World War II, Transitions from Propeller to Jet Aircraft, into Vietnam and beyond, the need for enlisted engine mechanics continues.

The Aviation section of the Army Signal Corps received its first enlisted maintenance personnel in 1914. The need was for people who could be immediately trained in aircraft maintenance. Therefore the initial cadre came from current army ranks with emphasis placed on skill versus waiting for recruits to complete basic training. Initial training centers weren't established until 1917 at Kelly Field Texas. During 1917-1918 time frame the Air Service increased in size to 1,800 airplanes. Training facilities moved from Kelly Field in 1921 to Chanute Field Illinois which for the first time, produced specialists rather than general aircraft mechanics.

Training at Chanute Field in the mechanics school emphasized a shift from generalized aircraft training to specialialty training for personnel in a number of fields. Included in this specialty training was specialized engine training which focused primarily

on power plant theories and maintenance. Given the choice between investing large amounts of time and money to train a few general mechanics, the Air Corps instead opted to provide quick specialized engine training, as was evident in Technical Regulations in effect at the time.

With the United States Army Air Corps Act of 1926 the War Department published Technical Regulation 1440-55 entitled AIR CORPS Aircraft Engines. This regulation stated that "all personnel concerned with the maintenance of the engine shall study the construction and peculiarities of each engine type in order to be capable of making a thorough inspection if necessary and of judging the performance of the engine before flight." (1:2) This regulation showed the significance the Air Corps placed on the skills of the enlisted personnel charged with maintaining aircraft engines. This approach sustained the Air Corps into the beginning of World War II.

When the Japanese bombed Pearl Harbor on December 7, 1941, the US Army Air Force had generalized and specialized power plant, and propeller courses at Chanute Field Illinois. " The complexity of modern aircraft of the time, required a multiplicity of skills for proper maintenance." (2:CF-307) The department of mechanics at Chanute Field in the Engine Division taught courses in advanced propellers and power plants to meet these skill requirements. The Propeller course which was " eight weeks in duration covered both adjustable and fixed pitch type propellers." (3:CF-1608) Power plant courses were also "eight weeks in duration covering a variety of aircraft engines, their accessories, operation and aircraft installation." (3:CF-1622) The length of the training courses required to teach basic skills were representative of required skills to maintain increasingly complex aircraft.

The best example of increasing aircraft complexity could be found in the B-17F . Of the 100 daily inspection requirements in the familiarization and inspection manual, eighty two pages of those instructions applied directly to the engine, propellers and related systems. These inspection were required to be accomplished on a daily basis, as well as every 25, 50, 100 and 200 flying hours. (4:256) Increasing aircraft complexity dictated

basic as well as advanced instruction be taught to mechanics. The basic and advanced training courses taught through the duration of world war II were specifically designed to meet the continuous requirement for qualified and skilled technicians despite emerging technology.

In the aftermath of world war II, the newly formed Air Force leaders sought to make the force a more powerful one utilizing emerging technology which was developed by the end of the war. Aircraft developments began to use both Jet and Propeller technology. The need for long range bombers , which were quickly produced saw the introduction of B-36 and B-50 aircraft in the late 1940's. Qualified reciprocating engine mechanics were available but, it took until 1951 for the Air Force to establish Jet engine technical training at Chanute AFB in Illinois and Amarillo AFB Texas in January 1952 to meet emerging requirements. During this interim period the Air Force utilized directed entry level On-The-Job training as the preferred method of cultivating Jet Engine Mechanics for the B-36 and Jet powered Fighters which were entering the Air Force inventory. (5: V) However the Air Force quickly realized that formalized instruction was required. A two step process was developed that established separate aircraft and engine schools at Chanute.

Chanute established separate courses for propeller mechanics, two specific courses for reciprocating engines mechanics, and four specific jet engine courses in June 1951. The intended student load through the school was 463 students in training every training cycle or thirty five academic days. (6:36-40) At Amarillo AFB, the Air Force established Jet Aircraft and Engine Mechanics Schools on 3 Jan 1952 for B-47 and Jet Fighter aircraft.(7:1) Attendance at these general courses was a prerequisite for entry into advanced and specialized mechanics courses. (8:5) These graduates along with 431X1 aircraft mechanics from current Air Force units were selected to attend Jet Engine Mechanics schools in J-47, J-48, J-33, and J-35 engines. A separate Jet Engine Air Force Specialty Course was established for engine operation and adjustments Air Force Specialty

Code 433x3, Block Test Mechanics Course for Test Cells. (10:37) This AFSC added to the current block of engine related specialties in Reciprocating engines, Jet Engines, and Propellers. This approach would support the Air Force into its involvement in South Vietnam.

During the Vietnam conflict it was found that World War II vintage propeller aircraft were more effective than Jet Aircraft in supporting ground forces.(13:3) With the use of A-1s, B-26, O-1s and T-28 aircraft the Air Force now had a revived requirement for Reciprocating engine mechanics. (14:7,8) Training continued at Chanute for this career field which had been fast approaching extinction. Also Jet Engine and Turboprop mechanics were combined into a single career field at this time as turboprops were considered jet engines in their own right, and the technical training courses reflected this philosophy change. Propellers however, still are being maintained by a separate AFSC. This specialty structure gave the Air Force a large pool of mechanics to rely on for Vietnam rotations, but also hurt technical proficiency on some engines as personnel transferred back and forth between prop driven transports and jet fighters and bombers.

As United States involvement in South Vietnam began to escalate, the Air Force found itself with a shortage of engine mechanic trainees. Now during the height of the Vietnam war build-up, the Air Force had requirements for trained personnel that were outpacing the ability of Air Training Command (ATC) to produce them. Operations at Amarillo were increased to three shifts to accommodate the introduction of 792 students through the five various blocks of instruction. As the need for students increased it occurred to ACT that the large infusion of students would result in some degradation of the quality of training in some instruction blocks. This need for qualified technicians was already taking a toll on stateside maintenance units. (11:1)

One additional drain Vietnam was placing on the aircraft engine career field was a critical shortage in stateside units of qualified engine mechanics. Due to a lack of a formalized transition training program for mechanics like the one for air crew members. By

the time stateside wings got new mechanics in, got them upgraded and made them fully combat capable five level mechanics, then off they'd go to Vietnam for their one year tours. (12:97) As much as the Vietnam conflict built the jet engine mechanics career field, the changes were not over as the end of the war brought the end of the draft.

With the move towards the all volunteer force, Aerospace propulsion specialists emerged as the new title for the Jet engine career field. (15:2) The Airman classification system drove the content of technical training courses. The propulsion career field was so broad that ATC was forced to conduct "representative training." Training on principles, theories and equipment thought to be similar or representative of one or more pieces of equipment. This resulted in airman arriving having never seen or received training on the systems they were expected to maintain. By October 1987, Chantute began turning out graduates for specific engine types under a four level training concept which taught Jet Engine basic principles, then allowed some students to go on to engine specific training on more advanced systems such as the F-100 for the F-15/F-16 aircraft. The introduction of this approach to engine technical training had brought the career field full circle. The same specialized and specific engine type training that was prevalent in the 1950s had been resurrected by 1990 to provide more specialized engine mechanics due to increased aircraft complexity.

As the force downsizes in the 1990's, propulsion specialist inspect, remove, repair, service, test and modify turbojet, turbojet missile, turboprops, Turboshafts (Helicopter engines), Small Gas Turbines (Aerospace Ground Equipment), and Turbofan Engines, and Propellers. These specialist require not only knowledge in jet engine theories, but also in mechanical, hydromechanical and electrical principles. They are also required to know oil analysis procedures, wearmetal criteria, using and interpreting wiring diagrams, blueprints, and technical publications. (16:A22 43/44) All these qualifications are taught today as part of engine technical training at Chanute AFB.

From the Army Air Corps, through World war II, into Vietnam and the present day Chanute has long been the gateway to the Air Force for many past and present propulsion specialist. Closure of Chanute AFB at the end of 1992 ended 71 years of engine technical training at one of the Air Forces oldest training installations when engine technical training was moved to Sheppard AFB Texas, were engine mechanics continued to be trained for todays Air Force. For all of the history written at Chanute, engine maintenance has been a part of flying since a December afternoon in 1903. Whether repairing a damaged propeller or checking pressure levels in a modern jet engine, engine maintenance personnel have been essential to any flying operation. Some tools have changed little; others are on the cutting edge of technology. The goal however, remains the same: to keep them flying. (18:96)

BIBLIOGRAPHY

1. War Department Technical Regulations TR 1440-55 *"Air Corps Aircraft Engines."* June 30, 1927

2. History of Chaute Field, *"Department of Mechanics ."* 7 December 1941 - 1 January 1943, Volume 2, Chanute Field Illinois

3. History of Chaute Field, *"Department of Mechanics ."* 7 December 1941 - 1 January 1943, Volume 5, Chanute Field Illinois

4. Familiarization and Inspection of the B-17F Airplane, *"Index for Daily Inspections."* 1944, Boeing Aircraft Company, Seattle Washington.

5. Selected Measures of Proficiency for B-29 Mechanics, *"Studies No. 2 and 3 HRRL Report No. 28."* March 1952, Human Resources Research Laboritories Wright Patterson AFB Ohio.

6. Sowers, Max W. 2Lt, USAF, *"History of the 3345th Technical Training Group."* 1 October 1951 - 31 December 1951, Chanute AFB Illinois

7. Edison, Mary E. 2nd Lt., USAF, *"Historical Data of the 3320th Technical Training Wing."* 1 April 1952 through 30 June 1952, Amarillo AFB, Texas

8. Edison, Mary E. 2nd Lt., USAF, *"Historical Data of the 3320th Technical Training Wing."* 1 April 1952 through 30 June 1952, Volume VI Amarillo AFB, Texas

9. Studies in the productivity of Aircraft Maintenance Crews, *"Prospectus of a Program of Research."* November 1952, Human Resources Research Laboritories Wright Patterson AFB Ohio.

10. Sowers, Max W. 2Lt, USAF, *"History of the 3345th Technical Training Group."* 1 January 1952 - 31 March 1952, Chanute AFB Illinois

11. Project Coronet Harvest ABR 43230-xxx, *"Tentative Training Plan Amarillo Technical Training Center."* 3 October 1963.

12. HAsdorf, James C., Interview with Maj Gen James R. Hildreth. Spring Hope, North Carolina, 27-28 October 1987, USAF Oral History Program, USAF Historical Research Center, Maxwell AFB, Alabama.

13. Extension Course Institute, *"History of U.S. Airpower, Changing Fortunes, Vietnam and Strategic Eclipse."* Air University, Course 50, Volume 4 Maxwell AFB Alabama

14. Edenfield, John N. Jr., Major, USAF, " Aircraft Maintenance Specialty Classification: Aircraft Specialist versus System Specialist." Published Report 83-0635, Air Command and Staff College, Maxwell AFB, Alabama

15. Richardson, Tommy L. Colonel, USAF, " The Classification and Utilization of Enlisted Personnel in Aircraft Maintenance Career Fields." Research Report AU-AWC-84-181, Air War College, Maxwell AFB, Alabama.

16. Department of the Air Force AFR 39-1, *"Aerospace Propulsion Specialist."* 15 March 1991.

17. *A History of Chanute Technical Training Center: Four Level Training Initiative.*, Volume I 1 January - 31 December 1987 Chanute AFB Illinois.

18. Air Force Association, *"Just Fix It."* Air Force Magazine, April 1994, Vol 77, No. 5, Arlington Virginia 1994