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# WHY A PHD IN MAINTENANCE?

by

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# Chapter 1

# Introduction

Why does the Air Force need to have officers with a PhD in Aircraft Maintenance? Aside from the fact that the Chief of Staff of the Air Force thinks it's a great idea, there may be other reasons. Before we can debate the necessity of a PhD in Maintenance, the Air Force first needs to figure out "what is a PhD in Maintenance?" Once you receive this PhD in Maintenance, what will that do for you? What things will be expected of you that were not expected of you before? The next hurdle to navigate is to determine how to earn a PhD in Maintenance. There's not a course catalogue at "Maintenance University" describing the academic program that will qualify you for a PhD in Maintenance. With all the technical training, academic schools, advanced courses, professional conferences, how much is enough? What type of training or experience is required? Do we need new schools, tougher schools, or longer schools to qualify for a PhD in Maintenance? Will the existing maintenance officer career progression need to change to ensure the proper job experiences along the way? Finally, following a look at all the previous questions, we'll be able to ask "why a PhD in Maintenance?" Why not a PhD in Logistics or Combat Support? What is so special about aircraft maintenance that it requires it's own PhD? Is there uniqueness to aircraft maintenance expertise that distinguishes it from other logistics disciplines?

General Jumper sees aircraft maintenance as a unique Air Force core competency requiring a separate set of skills clearly distinguishable from other logistics career fields.[1] This paper will look at defining the skills required for a PhD in Maintenance, how to earn a PhD in Maintenance, and finally validate the need for this specific competency as opposed to the over-arching skills of a logistics officer.

## Notes

[1] Gen John P. Jumper, chief of staff, US Air Force, E-mail, subject: CSAF Logistics Review (CLR)/Wing Organization Decisions, 22 Apr 02.

# Chapter 2

# Defining a PhD in Maintenance

A PhD in Maintenance is not an advanced degree accredited by the Southern Association of Schools and Colleges. Officers who reach this lofty status will not be referred to as "doctor." General Jumper coined the expression when he was the United States Air Forces in Europe commander in 1998. He was simply referring to an individual who was extremely well versed in aircraft maintenance and was in a position to use that experience. To best understand a definition of a PhD in Maintenance, we need to first take a look at General Jumper's vision for a PhD in Maintenance. Next, we'll see how aircraft maintenance as an Air Force Core Competency helps define a PhD in Maintenance. Finally, the skills required for an aircraft maintenance leader in the new Combat Wing Organization will further define the concept of a PhD in Maintenance.

## General Jumper's Vision for a PhD in Maintenance

General Jumper contends that "flying and fixing our weapons systems are essential skill sets."[2] Not only are they essential skills, but he believes they are the "two hardest things we do in the Air Force."[3] Therefore, to ensure we have these skill sets "each requires PhD-level expertise, proficiency, and leadership."[4] The Air Force currently doesn't have a process to develop officers to obtain PhD-level experience in Maintenance.

### How the Air Force Currently Makes Maintenance Officers

After receiving initial training as an aircraft maintenance officer, the first several years are spent specifically in a maintenance job receiving further on-the-job training and experience. However, following the first assignment or two, maintenance officers are pulled away to "career

broaden" into other logistics fields like supply or transportation. To stay in maintenance too long would make you a "stovepipe" maintenance officer and that would certainly be detrimental to your upward mobility. This makes perfect sense if the goal is to produce a logistics officer with experience in several logistics disciplines. However, if the vision is to create an individual with specific expertise in aircraft maintenance, the existing system fails.

**New Vision for Maintenance Officers**

General Jumper wants to produce a senior maintainer that all the squadron maintenance officers look up to as the expert maintainer. "I want that maintainer to be a colonel who out of a 20 to 24-year career has got about 14 or 15 years of experience working directly on the flight line."[5] This description fits the profile of a Deputy Commander for Maintenance found in the wing organization from 1978 to1991.[6] In fact, in helping to describe his vision for a PhD in Maintenance, General Jumper recalls his experiences with Colonel Tommy Richardson, a former Deputy Commander for Maintenance.[7] Colonel Richardson was a dedicated maintenance officer who gave up the opportunity to attend senior service school so he could continue to be a Deputy Commander for Maintenance. He was rarely at his desk, but could be found in his truck on the flight line. He had the ability to spot the slightest infractions of maintenance discipline and was quick to have the offender standing before his desk to explain his actions. General Jumper says that's how he learned maintenance. He would find Colonel Richardson on the flight line, kick out the lieutenants that were riding along with him being mentored, and watch and listen to the master. That's the vision General Jumper has for the senior maintainer holding a PhD in Maintenance. That's the maintainer he wants running the maintenance organizations of tomorrow. He wants all other maintainers to say "I want to be that maintainer some day."

General Jumper also looks at aircraft maintenance from a new perspective, that of an Air Force core competency. This perspective helps frame the definition of a PhD in Maintenance.

## Maintenance as an Air Force Core Competency

AFDD 1dated 1 Sep 97 lists the Air Force core competencies. They include Air and Space Superiority, Global Attack, Rapid Global Mobility, Precision Engagement, Information Superiority, and Agile Combat Support. These competencies define what we do as an air force and are in direct support of our National Military Objectives. The Agile Combat Support competency contains the traditional logistics functions of supply, transportation, maintenance, contracting, and logistics plans, in addition to services, civil engineering, communications, medical and legal services, security, and personnel support functions. Seven core principles, six master processes, and 21 logistics tasks further distinguish Agile Combat Support. The actual elements of aircraft maintenance are found in several of the 21 logistics task. Its clear to see that aircraft maintenance doesn't standout as an all-important Air Force core competency in the current depiction of core competencies.

### General Jumper's Declaration

To highlight the need for a PhD in Maintenance, General Jumper declared "*maintenance of air and space weapons systems is a core competency of the United States Air Force*."[8] He justified this claim by pointing out the Air Force's aging aircraft fleet and the effects of years of resource shortfalls. Countering these two conditions will require "increased attention to the balance of sortie production and health of our fleets."[9] This is a new challenge for the maintainer. A much clearer focus and emphasis fall on maintenance to meet the mission. No longer will aircraft maintenance just be an aspect of logistics and the Agile Combat Support concept, but it will stand-alone and be accountable as an Air Force core competency. The

challenge of maintaining aging aircraft and meeting the high operations tempo of our aircraft fleet will rest on the backs of maintainers and their ability to use the resources available to them. No longer will the Operations Group commander be responsible for sortie production with the Logistics Group commander responsible for the health of the fleet. One maintainer, a Maintenance Group commander, will take on the entire responsibility for aircraft maintenance. The Air Force needs a career maintainer with a PhD in Maintenance to lead this effort.

**Air Staff Direction**

The Air Staff's Director of Maintenance, Brigadier General Anne Harrell, further defines maintenance as an Air Force core competency with three specific maintenance core competencies—air and space weapons systems maintenance; maintenance management; and contingency operations.[10]

**Air and Space Weapons Systems Maintenance.** The number one job of a maintainer is to ensure the weapons systems are maintained correctly. This means the individuals with their hands on the aircraft have got to be technically proficient to troubleshoot and perform the maintenance. In addition to the hands-on maintenance, the maintainer must be able to document the maintenance performed with clarity and accuracy. Proper supervision of these front-line maintainers is also inherent in this maintenance core competency to provide leadership and direction to the workforce.

**Maintenance Management.** There are several management skills and positions throughout the maintenance complex that support the front-line maintainer. These skills comprise a separate maintenance core competency. Scheduling maintenance, gathering maintenance data and providing analysis, monitoring and reporting maintenance actions, providing adequate training, and numerous other staff functions relating to managing the maintenance complex are essential

to the safe production of sorties while maintaining the health of the fleet. These functions also serve as a valuable conduit of information to senior leaders.

**Contingency Operations.** By all accounts, contingency operations are here to stay. Producing sorties and maintaining a healthy fleet require a completely different set of skills in a contingency environment. Maintainers must not only have the mindset of *working out of a suitcase*, but also know how to pack and what to pack in the suitcase. The art of "packing out" a maintenance unit usually fell to one or two individuals who always did it and many times were the only ones who could do it efficiently. These skills must now be shared with more and more maintainers. Aside from the physical "packing out," the entire maintenance unit operates from a different perspective. Sortie durations may be different from home station, the flying window may vary from normal operations, support equipment may be shared and not be as easily accessible, the "go to expert" for a specific maintenance repair may not be deployed, all these variables make for a new environment to operate within.

Maintainers need to master these maintenance core competencies to meet the challenges ahead. Likewise, these maintenance core competencies help define what it is to hold a PhD in Maintenance.

## New Skills Required in the Combat Wing Organization

General Jumper's vision for a PhD in Maintenance was put into place with the advent of the new Combat Wing Organization. He feels the level of proficiency to meet the demands of the Air Force is only possible if we allow our leaders to develop great depth in their specific fields. "It is for this reason that we will transition into a new Combat Wing Organization designed to fully develop commanders with specific functional expertise to fully plan and execute air and space power as part of expeditionary units."[11] General Jumper originally outlined his plan to

consolidate all of maintenance under one colonel during the December 1999 United States Air Forces in Europe Senior Leaders Maintenance Course.[12] His vision will now take effect. The new Combat Wing Organization will begin with initial operating capability 1 Oct 02 and achieve full operational capability by 30 Sep 03.[13] This organization establishes an Operations Group, Maintenance Group, Mission Support Group, and a Medical Group. For the first time since 1991, all of aircraft maintenance will be consolidated within one group, the Maintenance Group.

**Maintenance Group Objectives**

The objectives of the Maintenance Group can be rolled up into three themes.[14] First, it must execute the full spectrum of base-level air and space weapons systems maintenance and generation. This is a function previously split between the Operations and Logistics Groups. Next, it must produce combat capable sorties at designated rates. This demanding job was previously accomplished in the Operations Group under the leadership of an extremely experienced operator. Finally, the Maintenance Group must balance the operational demands against long-term fleet health. This objective was also split between the Operations and Logistics Groups and looks to be the most difficult task of all. It is further defined with the requirements to rapidly generate and recover air and space weapons and weapon systems; to provide and sustain operational presence world-wide; and sustain home station operations. This is where on-equipment and off-equipment maintenance come together, daily flying schedule and long-term fleet management merge, and home station and contingency operations are standardized.

**Maintenance Group Commander Role**

The Maintenance Group commander is expected to be the role model to maintainers just as the Operations Group commander is to the operators.[15] The specific responsibilities of the

Maintenance Group commander are outlined in a recently revised AFI 21-101, *Aerospace Equipment Maintenance Management.* The commander is "responsible for aerospace equipment maintenance required to ensure balance between sortie production and fleet management."[16] The instruction goes on for six pages describing the specific responsibilities of the Maintenance Group commander. The key responsibilities that help define a PhD in Maintenance focus on Quality Assurance, Maintenance Operations Center, Maintenance Plans, Scheduling and Documentation, and Wing Weapons Manager.

**Quality Assurance.** One of the pillars of aircraft maintenance is an effective quality assurance program. In the previous wing organization, the quality assurance program was divided between the Operations and Logistics Groups. Now, the Maintenance Group commander will lead a combined Quality Assurance office. Senior maintenance leaders haven't been exposed to a combined Quality Assurance office since 1991 and now they will be running one.

**Maintenance Operations Center.** Likewise, the Maintenance Operations Center used to be known as the eyes and ears of the Deputy Commander for Maintenance, but became a wing-level organization with the Objective Wing in 1991. According to AFI 21-101, *Aerospace Equipment Maintenance Management*, it's chartered to "monitor and coordinate sortie production, maintenance production, and execution of the flying and maintenance schedules, and maintain visibility of fleet health indicators."[17] In the past, the significance of the Maintenance Operations Center dwindled, as it became a mere subset of the command post. Now the Maintenance Operations Center will once again be a valuable tool for the Maintenance Group commander and represents a new area of required expertise.

**Maintenance Plans, Scheduling, and Documentation.** This section now transfers from the Operations Group to the Maintenance Group. It is at the heart of balancing the daily flying

schedule and the maintenance schedule, while focusing on the long-term health of the fleet. The Maintenance Plans, Scheduling, and Documentation section maintains historical maintenance data within the maintenance information system and use this data to develop wing maintenance plans. Of particular importance is the management of the Programmed Depot Maintenance that actually gives up possession of aircraft for extended off-station depot maintenance.

**Wing Weapons Manager.** Finally, the Wing Weapons Manager also moves from the Operations Group to working directly for the Maintenance Group commander. The responsibility for compliance, continuity, and standardization for all weapons loading and armament systems matters now rests in the Maintenance Group. The previous organization had the responsibility for weapons loading in the Operations Group, with armament systems in the Logistics Group.

The building blocks of the Combat Wing Organization, the Maintenance Group and the role of the Maintenance Group commander, are underlined by a "back to basics" maintenance philosophy outlined in the revised AFI 21-101, Aerospace Equipment Maintenance Management. The summary of changes in AFI 21-101 state, "The entire document reflects a 'back to basics' compliance-oriented maintenance philosophy and supports the Combat Wing Organization."[18] All combined, these new skills work together to provide a composite definition of a PhD in Maintenance. When added to General Jumper's vision of the PhD in Maintenance and the role of maintenance as an Air Force core competency, it's easy to picture a colonel taking on the full responsibility for maintenance and standing up a new Maintenance Group. The real challenge comes in determining how to "grow" such an individual.

Notes

[2] Gen John P. Jumper, chief of staff, US Air Force, Chief's Sight Picture, subject: Combat Wing Organization, 28 May 02.
[3] Jumper, Chief's Sight Picture, 28 May 02.
[4] Jumper, Chief's Sight Picture, 28 May 02.

## Notes

[5] Leigh Anne Bierstine, "Chief of staff expands on wing reorganization," *Air Force Link*, 2 May 02.
[6] Gen John P. Jumper, chief of staff, US Air Force, address to the Air Force Association National Convention, Washington D.C., 17 Sep 02.
[7] Jumper, address to the Air Force Association National Convention, 17 Sep 02.
[8] Jumper, CSAF Logistics Review (CLR)/Wing Organization Decisions, 22 Apr 02.
[9] Jumper, CSAF Logistics Review (CLR)/Wing Organization Decisions, 22 Apr 02.
[10] Lt Col Lorraine Souza, AF/ILMM, briefing, subject: CSAF Logistics Review and the Combat Wing Organization, 13 Aug 02.
[11] Jumper, Chief's Sight Picture, 28 May 02.
[12] Gen John P. Jumper, chief of staff, US Air Force, notes: USAFE SLMC, Ramstein AB, GE, Dec 99.
[13] Jumper, CSAF Logistics Review (CLR)/Wing Organization Decisions, 22 Apr 02.
[14] Souza, CSAF Logistics Review and the Combat Wing Organization, 13 Aug 02.
[15] Jumper, Chief's Sight Picture, 28 May 02.
[16] Air Force Instruction (AFI) 21-101, Aerospace Equipment Maintenance Management, 1 Oct 02, 30.
[17] AFI 21-101,138.
[18] AFI 21-101, 1.

# Chapter 3

# Earning a PhD in Maintenance

The Air Force will almost have to start from scratch in laying out requirements for a PhD in Maintenance. Currently, after completing the Aircraft Maintenance Officer Course, the graduate is entitled to wear the Basic Aircraft Maintenance Badge. The Senior Aircraft Maintenance Badge results from 7 years service in a logistics job. This is followed by the Master Aircraft Maintenance Badge upon completion of 15 years in a logistics job. These requirements were never intended to produce a maintainer worthy of a PhD in Maintenance. So, what does it take to earn a PhD in Maintenance? When General Jumper revealed his plan for the Combat Wing Organization, several maintenance leaders sprang into action to develop a systematic approach for obtaining a PhD in Maintenance. Brigadier General Harrell's vision was to, "Build a World Class maintenance officer training program and you'll develop World Class maintenance officers."[19] Her premise for this maintenance officer training would be to develop them as leaders and officers first; make them technically proficient; have them be managerially astute; direct them to be experts in flight line, munitions, and support shop processes; and educate them to be sortie producers in garrison and deployed.

To accomplish this vision, the Air Force must look specifically at the current training available and see how it might be altered to help build a PhD in Maintenance. The Air Force should also explore new schools that may be better suited to produce a PhD in Maintenance. Finally, the career path that best supports a PhD in Maintenance is probably not the one currently in place, so a new path needs to be thought through and revised.

## Current Training Available Supporting a PhD in Maintenance

The Aircraft Maintenance Officer Course (AMOC) and Munitions Maintenance Officer Course (MMOC) certainly stand out as the starting block toward a PhD in Maintenance, but there are several courses previously viewed as optional that can help build the maintainer of the future. Most wings have a Maintenance Officer Training Program that acclimates the individual to the local environment and Aircraft Familiarization Courses giving general systems information on the aircraft assigned to that particular wing. The Air Force Institute of Technology (AFIT) offers several "logistics" courses. The major commands have varying version of the Senior Leaders Maintenance Course. There are numerous other courses focusing on maintenance skills that can help distinguish between a graduate-level and PhD-level maintainer. The challenge is to better utilize these existing training opportunities to build the stepping-stones for a PhD in Air Force Maintenance.

**AMOC/MMOC**

For the maintenance officer, the 70-day AMOC is the only formal training currently required. Likewise, the munitions or missile maintenance officer is only required to attend the 40-day MMOC. Even though these are basic entry-level courses designed to provide a fundamental expertise, they do expand upon the overall "logistics" career fields. Brigadier General Harrell's push is to, "strengthen curriculum and get tough on content."[20] The primary concern here is to stay focused on maintenance or munitions, but not on all the logistics career fields. In the past, to succeed a maintainer had to career broaden into another logistics discipline (supply, transportation, or plans) to truly become a logistician. This produced a tendency to preview all the logistics career fields at every opportunity, including the lowest levels, to some day produce a well-rounded logistician. The intent is to focus the AMOC/MMOC curriculum even further

into “Combat Air Forces and Mobility Air Forces specific material, Total Force and EAF concepts, observation of several maintenance tasks, and shifted attention of munitions management from behind the fence to flight line needs.”[21] This will allow more time for practical hands-on application for a specific type of weapons systems.

Aside from revising the curriculum, Brigadier General Harrell is attempting to change the negative perception of instructor duty. Her plan is to, “put our best behind the podium.”[22] This requires commanders pushing instructor duty, hiring the best, and taking care of them. These are all necessary ingredients to creating a premier training program.

**Wing Maintenance Officer Training Programs**

Most every flying wing has some sort of Maintenance Officer Training Program designed to give newly arrived maintainers an orientation. These programs can range from a couple of days to a couple of months and comprise merely a walking tour of the maintenance complex to hands-on operations of aerospace ground equipment. Since the individual’s participation in this program precludes their primary job, they are sometimes seen as an expensive investment in training that could be better spent for on-the-job training. As a result, any orientation program is accomplished as quickly as possible and the bulk of training comes about from the “fire hose” of day-to-day operations. This was often seen as the preferred solution since the Maintenance Officer Training Program was run at the squadron level in the Logistics Group and many of the students were in the Operations Group. With the Combat Wing Organization, all the maintenance officers will be in the Maintenance Group giving the Maintenance Group commander the opportunity to shape the local training content and duration.

**Aircraft Familiarization Courses**

Field Training Detachments at the wing-level offer aircraft familiarization for the particular weapons systems at each wing. These courses are optional and like the Maintenance Officers Training Program, they are an investment in time away from the primary duty. To prepare a maintainer for a PhD in Maintenance, these courses have to be strengthened and made mandatory. There's no substitute for first-hand knowledge of the weapons system and the aircraft familiarization courses provide the foundation for this knowledge.

**Air Force Institute of Technology**

The Air Force Institute of Technology, School of Systems and Logistics, offers several formal courses helpful in achieving a PhD in Maintenance. Like the previous training opportunities mentioned, these courses are all optional. Courses range from Introduction to Logistics, Combat Logistics, Strategic Logistics Management, to the top-level Logistics Executive Development Seminar. Even though the primary focus of these courses is a broader "logistics" view as opposed to specific maintenance expertise, they still teach advanced skills required for a PhD in Maintenance.

**Senior Leaders Maintenance Course**

Most major commands have a Senior Leaders Maintenance Course originally designed to help those with little maintenance experience lead in a maintenance community. As a result, the focus was not always on graduate-level skills, but more foundational skills. Brigadier General Harrell's initiative is to "baseline the Senior Leaders Maintenance Course for all MAJCOMs."[23] Doing this will establish a standardized expectation for senior leaders and provide the training opportunity to acquire those skills.

### Additional Maintenance-Oriented Training

Training opportunities like the Aircraft Mishap Investigation Course, Jet Engine Mishap Investigation Course, Weapons Safety Manager Course, Contingency Wartime Planning Course, and the Air Force Combat Ammunitions Center courses provide advance skills in the maintenance arena. These courses are all optional. To earn a PhD in Maintenance a combination of these courses will need to become mandatory. Each course provides a unique perspective on maintenance that builds a better maintenance officer and helps distinguish a graduate-level maintainer from the sought after PhD-level maintainer.

## New Training Opportunities

The requirement to develop a PhD in Maintenance can't be met within the existing framework of formal training. To fill the gap, several new initiatives are in consideration or stages of development. The Air Force Maintenance Advisory Group is considering the formulation of a program similar to what the operations community uses for advancement in proficiency. The approach centers on a building block concept of competencies. This will produce several new training opportunities to possibly include a "Weapons School" type course for maintenance officers.

### New On-the-Job Training Structure

The core of maintenance training in the enlisted career fields centers on a thoroughly developed and documented on-the-job training (OJT) program. This is not the case for maintenance officer training. Most training would be classified as OJT, but it is more experienced-based or sometimes referred to as a "baptism by fire." The maintenance officer doesn't have a detailed training record outlining everything required for upgrade or task qualification complete with start/finish dates like enlisted maintainers. As a result, the only

criterion to be a "fully qualified" maintenance officer is a diploma from AMOC. There is no distinction between a 3-level, 5-level, 7-level, or 9-level for a maintenance officer. No one is advocating applying the same proficiency level system used by the enlisted force, but the operations community uses a proficiency-based system to distinguish experience.

**Operators' Perspective on OJT.** Operators in a fighter squadron move up from wingman, to 2-ship flight lead, to 4-ship flight lead, to instructor rating based upon experience and ability. Likewise, operators in an airlift squadron progress from co-pilot, to first pilot, to aircraft commander, to instructor pilot based upon similar criteria. These programs are steeped in academics, ground testing, and flight evaluation. The training is thoroughly documented and monitored by senior leaders in the squadron.

**Maintenance Officer Derivation on OJT.** Maintainers can adapt the operators' style of qualification training to distinguish between experience-levels. New training initiatives are already in development to standardize OJT requirements for entry-level maintainers.[24] Similarly, plans are in work to test entry-level maintainers on the fundamentals of AFI 21-101, *Aerospace Equipment Maintenance Management*, AFI 21-201, *Management and Maintenance of Non-Nuclear Munitions*, and several related Technical Orders.[25]

**New Formal Training for Maintainers**

The most visible new training initiative is the development of a Maintenance Intermediate Course. This course will be mandatory training for all maintainers during the 4 to 11 year period.[26] It would serve as a standard level of training for all maintainers and would fit the mold of the operations community's building block of competency approach. Building a completely new course from scratch will take a tremendous amount of effort, but underscores the need to develop a more defined maintenance officer proficiency certification process. According to the

course developers, "the course will fill a void in the existing maintenance officer training and education system by addressing the key combat support functions and processes that, when fully understood, will allow the maintenance officer to successfully apply effects-based logistics in an expeditionary setting."[27]

A formal "PhD-level" course is still in consideration for maintainers in much the same format as the Weapons School for operators. A Corona Fall 2000 Conference tasking was to develop an integration plan to incorporate logistics officer training at the USAF Weapons School, Nellis AFB, NV. The intent is to create highly skilled operational logisticians competent in mobilization, deployment, bed down, sustainment, combat employment, redeployment, reconstitution, and command and control.[28] Since the time of the original tasking, the Air Force has developed a new 2-track system for logistics officers made up of Aircraft/Munitions/Missile Maintenance (21B) and Logistics Readiness (21R).[29] As a result, it's not clear which direction this course will go. Lieutenant General Michael Zettler, the Deputy Chief of Staff for Installations and Logistics, wants to pursue a PhD-level course for Logistics Readiness Officers, but is still determining if a requirement exists for a specialized PhD-level course for maintenance officers.[30] As it stands now, this would be a highly competitive advanced program for a limited number of maintenance officers with less than 9 years in service.[31] This would help a few select younger officers work towards a PhD in Maintenance, but would do little to prepare more senior officers thrust into the role of the Maintenance Group commander.

## Career Progression

To produce a Maintenance Group commander that can fulfill the qualifications demands a career progression designed around *training*, *education*, and *experience.* The Chief of Staff Logistics Review Board of Advisors directed the establishment of training and experience

"gates" for logistics officers. The objective would be to "strengthen accession, field, and follow-on training and develop a maintenance officer certification process."[32] The result is an evolving Maintenance Officer Development (MOD) Concept of Operations (CONOPS) broken into three specific categories: entry, intermediate, and advanced.

**Entry Level (0-3 years)**

The road to a PhD in Maintenance begins with training. Graduation from AMOC or MMOC is the first phase of training, followed by a more thoroughly defined OJT program as previously outlined. Education required at the entry level is attendance at a wing-level aircraft familiarization course. The experience gate is a little harder to define. First, successfully complete 3 years in an aircraft/munitions/missile maintenance core AFSC. More specifically, spend at least 18 months in an aircraft maintenance flight, munitions section, repair shop, quality assurance branch, or wholesale logistics.

**Intermediate Level (4-11 years)**

The new Maintenance Intermediate Course highlights the training phase of the intermediate level. It would be mandatory for all maintainers to attend this course. Additionally, munitions maintenance officers must attend the Air Force Combat Ammunition Center course. Several options would be available for education at this level. The requirement is to complete three courses prior to the 11-year mark. Four specific AFIT Logistics Courses (032, 131, 262, 299), DAU Logistics Course, DAU Acquisitions Course, Aircraft Maintenance Investigation Course, Jet Engine Mishap Investigation Course, Weapons Safety Manager Course, or Contingency Wartime Planning Course all qualify as one of the three required courses. Another option would be to obtain an AFIT Graduate Degree. The AFIT degree would satisfy all education requirements at the intermediate level. The requirements for experience at the intermediate level

allow room for a special duty assignment or position outside of the core AFSC. The gate is to successfully complete 6 years in a 21A or 21M position. In addition, fill a position as a maintenance supervisor; lead an Aircraft Maintenance Flight, Munitions Flight, or Maintenance Operations Flight; work maintenance at an Air Logistics Center; serve on a major command, numbered Air Force, or Air Staff; or teach as an AMOC or MMOC instructor. Until all the requirements for training, education, and experience are met at the intermediate level, you are not eligible to compete for squadron command.

**Advanced Level (12- 15 years)**

Currently, there is no training requirement at the advanced level. Education at the advanced level is reduced to completing one of the AFIT Logistics Courses (260, 399, 499) or one of the DAU Logistics Courses (203, 204, 205). Opportunities continue for special duty assignments with the requirement to have 9 years of experience in a core maintenance AFSC. In conjunction with the 9 years of experience, the requirement is to hold any two of the following positions: command/staff, depot/acquisition, joint logistics duty, deputy Maintenance Group commander, other logistics, or AMOC/MMOC instructor. Similarly, you must complete all these advanced level requirements to compete for a group-level command.

**Documenting Progression**

To provide the proper visibility into each officer's development, the Air Staff Maintenance Directorate is drafting a plan to implement a Field Maintenance Officer Development Record. The purpose is to package a complete record of the officer's education and training history, provide a clear picture of the officer's background, and improve selection and placement for assignment.[33] The approval of the outlined MOD CONOPS will put the maintenance career field

well on the way to showing the proper progression for obtaining a PhD in Maintenance. However, some may still wonder why we even need a PhD in Maintenance.

## Notes

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[31] Wetekam, Logistics Officer Weapons School Training, Feb 01.
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# Chapter 4

# Validating a Need for a PhD in Maintenance vs. a PhD in Logistics

What's wrong with a "logistics" officer having a general knowledge of several logistics disciplines being in charge of maintenance? Hasn't this worked in the past? Validating the need for a PhD in Maintenance requires a closer look at what's changed. Is there something specific that's generating the change in thinking? The uniqueness of the maintenance career field as well as the newly formed logistics readiness career field provides support for two separate PhDs. Finally, the requirement for PhD-level maintainers above the wing level further validates the need for a PhD in Maintenance.

## What's Changed?

Several trends are occurring in the Air Force today that give senior leaders concern. Leading the list of concerns would be the effects of maintaining an aging fleet on our combat readiness while sustaining a high operations tempo. As the Non-Mission Capable for Maintenance rate continues to increase, the Air Force must look for ways to get more out of each airframe. In addition, the long-term effects of the Objective Wing organization are becoming apparent in the quality of maintenance being performed.

### Effects of an Aging Fleet

Probably the strongest case for the concept of a PhD in Maintenance centers around maintaining an aging fleet. According to the Air Force Posture Statement 2002, the average aircraft age in our fleet was 17 years in 1991. This rate has steadily increased to 23 years in 2001. Based on future acquisitions, the Air Force is looking at a fleet average age of 24 years in 2006 and up to 28 years in 2016.[34] General Jumper asks the question, "If we are to continue to

deal with aging weapons systems, are we growing the right kind of focused maintainer to deal with these problems?"[35] General Jumper would contend that the Air Force is not growing the proper maintainer capable of sustaining an aging fleet. His new wing organization, with the advent of the Maintenance Group, is his solution for developing a maintainer with a PhD education in Maintenance. A steady decline in maintenance indicators over the past 10 years sparks the need for a change. Total Non-Mission Capable for Maintenance rates, a major leading indicator for fleet health, have increased from 7.6 percent in 1991to 18.1 percent in 2001.[36] Complicating the effects of an aging fleet is the high operations tempo sustained throughout the Air Force. Not only are the calendar years advancing on the aircraft fleet, but the actual airframe flying hours are accelerating well beyond the anticipated rates. This brings about a fleet comprised of "tired iron" and further validates the need for a PhD-level maintainer to manage the fleet.

**Long-Term Effects of the Objective Wing**

The Objective Wing came into existence in 1991 and by 1995 problems were beginning to develop. In Jul 1995, the ACC commander, General Ralston, sent a letter to all ACC units describing some adverse maintenance trends in the command.[37] He sited failure to use technical data, safety violations, overdue training, documentation errors, and scheduling issues as continuing problems. General Ralston cites the number one explanation for the climate that may be wearing at the underpinnings of sound maintenance was the Objective Wing. He accuses the Objective Wing as deleting the central staff function that provided day-to-day oversight and guidance to maintenance organizations. "We no longer have the experienced colonel and maintenance staff which focused every day on the basic fundamentals and health of the fleet.**"**[38]

**General Jumper's Pre-Objective Wing Perspective.** General Jumper's experience as the 33rd Tactical Fighter Wing commander composed of the 58th, 59th, and 60th Tactical Fighter Squadrons was prior to the Objective Wing reorganization and provided a storybook picture of the operations and maintenance relationship. The 58th Tactical Fighter Squadron was the first F-15 squadron to receive the new Pratt and Whitney –220 engines. The 59th Tactical Fighter Squadron was the first F-15 squadron to receive the new advanced APG-70 radar set. General Jumper actually delivered aircraft 85-127,the first APG-70 radar equipped aircraft, from the factory to the wing. Finally, the 60th Tactical Fighter Squadron was the first F-15 squadron to receive the highly improved avionics upgrade, multi-staged improvement program (MSIP) aircraft. At the same time, Aircraft Maintenance Unit Officers in Charge were briefing General Jumper daily on maintenance indicators. Most all of the maintenance indicators were well above standard. The maintenance officers had the added benefit of briefing the Deputy Commander for Maintenance daily prior to briefing the wing commander. All in all, General Jumper's experience as a wing commander would be difficult to match in any Objective Wing after 1991.

**Objective Wing Improvements.** The Air Force attempted to improve the Objective Wing by assigning a lieutenant colonel maintenance officer as the Deputy Operations Group Commander for Maintenance, but with little effect on the negative trend in maintenance indicators. Later the Air Force dictated the wing commander receive a daily briefing focusing on specific operations and maintenance indicators. This too had little effect on the overall health of the fleet. The absence of a colonel with PhD-level experience with complete responsibility for the maintenance community was too much to overcome. General Jumper is quick to point out, "our operators have not flunked maintenance—we aren't fixing something that's broke, we are making it better."[39]

## Uniqueness of a PhD in Maintenance

Singling out maintenance from the other logistics disciplines should in no way slight the significance of all other logistics career fields. According to Chief Master Sergeant John Drew, the senior maintainer working with the RAND Corporation on AEF strategic planning, the primary focus on maintenance came about due to a sense of urgency.[40] Improvements need to be made throughout the logistics arena to increase the efficiency of the AEF.

### PhD in Maintenance, First Importance

The first importance went to improving aircraft maintenance because of the nature of the mission. There is no substitute for a broke airplane. It is not a matter of efficiency, it's a matter of go and no go. When the aircraft is broke, brute force won't work to fix it. There are possible work-arounds that might lack efficiency when it comes to load planning, types of transportation, and establishing supply lines. Aircraft maintenance, on the other hand, is a unique capability with few shortcuts. For this reason, the urgency was placed on finding ways to maintain an aging fleet while sustaining a high operations tempo. Without extra money for aircraft parts, without extra money for manpower, realigning all of maintenance under a single career maintainer was seen as the first best option to improve the health of the fleet. Without a healthy fleet the AEF concept folds.

### Lessons from Operation ALLIED FORCE

Operation ALLIED FORCE taught maintainers many lessons about deploying a healthy fleet.[41] Several stories emerged about aircraft arriving in theater without sufficient phase hours to be useful. Likewise, there were several cases of aircraft arriving with overdue scheduled maintenance. These incidents, coupled with several accounts of not having the proper tools and equipment, led to questions concerning the capability to deploy and maintain a healthy fleet.

General Jumper saw the effects of these problems first-hand as the United States Air Forces in Europe commander. The corrective action in his mind pointed to the need for a PhD-level maintainer in charge of sortie production as well as fleet health.

**Why Not Both?**

The necessity for a PhD in Maintenance doesn't preclude the necessity for a PhD in Logistics. In fact, Chief Drew believes the PhD in Logistics will be the next priority in improving the AEF.[42] Lieutenant General Zettler has already decided that the Air Force needs a specialized PhD-level course for Logistics Readiness Officers.[43] Plans are underway at the Air Staff to determine the courses required, identify target populations, and recommend a location. General Jumper has expressed his concern as well, "if the trends of the last decade continue to dictate that we deploy rapidly into tent cities on bare or ill-prepared bases, are we growing the kind of support personnel who understand all that is needed to pick up a unit, get it there, and sustain it?"[44]

The Fall Corona 2001 Conference established a 1 Nov 02 deadline for combining the logistics plans, supply, and transportation career fields into a newly developed logistics readiness career field.[45] These logistics readiness officers will be an integral part of the Mission Support Group in the new Combat Wing Organization. This group has the overwhelming responsibility for merging force protection, load planning, communications, in-transet visibility, reception, contracting, bare base, munitions and fuels site planning, personnel readiness, and contingency bed down. General Jumper realizes that, "We are just beginning to develop this skill set."[46] The skills of a logistics readiness officer are unique and demanding enough in their own right without adding the weight of maintenance. Likewise, the career progression to best build a Mission

Support Group commander will put increased demands on the logistics readiness officers further validating the need for both a PhD in Maintenance and a PhD in Logistics.

## PhD in Maintenance Skills Required Outside of the Wing

The focus on a PhD in Maintenance has centered on the need for a single expert maintainer responsible for the entire maintenance community at the wing-level. However, the demand for a PhD in Maintenance doesn't stop at the wing. Air Logistics Centers, major commands, and the Air/Joint Staff all require the expertise of a maintainer with a PhD in Maintenance.

### Air Logistics Centers and Product Centers

In 2002, for the first time, senior material management positions in Air Force Material Command were boarded with the Air Force Command Selection Board. The board that selects the next group and wing commander candidates now also selects the material leader group and material leader wing candidates. These positions are critical to the leadership of the Air Logistics Centers and Product Centers and are considered group and wing commander equivalents. Currently there are approximately 50 positions that require specific PhD-level maintenance experience.[47]

### Major Command Headquarters

Likewise, the major command headquarters have requirements for career maintainers. Each major command staff has a maintenance directorate distinguished from the other logistics disciplines. In the past, these positions were filled by logisticians with significant maintenance experience, but the existing career progression couldn't produce what was actually preferred—a PhD-level maintainer. The Air Force has over 30 positions best suited for career maintainers.[48]

**Air and Joint Staffs**

As is the case with the major command headquarters, the Air and Joint Staff has specific positions for maintenance-experienced individuals. These positions total approximately 10 slots.[49] All officers assigned in these positions certainly have maintenance experience, but the existing system didn't allow them to spend their entire career in the maintenance field. That will now change. In addition to the policy positions in the maintenance directorate, several other positions throughout the Air and Joint Staff require PhD-level maintenance expertise. Programming and budget, as well as policy, will now benefit from a career maintainer on the staff.

Notes

[34] *Air Force Posture Statement 2002,* Office of the Secretary of the Air Force, Readiness 15.
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# Chapter 5

# Summary

So, what has brought on the necessity for a PhD in Maintenance? Certainly General Jumper's vision of the Air Force and the Combat Wing Organization plays into the need. Creating a wing structure with an entire group dedicated to sortie production and fleet health takes the Air Force back to a time when maintainers were strictly maintainers and not broad logisticians. In addition, General Jumper now distinguishes aircraft maintenance as an Air Force core competency. He makes the distinction between aircraft maintenance and all the other logistics disciplines that comprise the Agile Combat Support concept. To further establish aircraft maintenance as an Air Force core competency and to ensure the capabilities exist to support this competency, the Air Staff's Director of Maintenance outlined the three maintenance core competencies of Air and Space Weapons Systems Maintenance, Maintenance Management, and Contingency Operations. These competencies can be more readily obtained in the new Combat Wing Organization. Aligning all of maintenance under the new Maintenance Group and giving the commander the added tools of Quality Assurance, Maintenance Operations Center, Maintenance Plans Scheduling and Documentation, along with the Wing Weapons Manager help ensure the Air Force maintenance core competency. Likewise, these ideas work together to define just what it means to have a PhD in Maintenance.

Earning a PhD in Maintenance requires a new look at how we train maintainers. Current training needs to focus more on aircraft specific application, while many courses viewed previously as optional need to have more emphasis. New training is also required to ensure the Air Force can produce a maintainer with a PhD in Maintenance. Formalizing OJT and the

development of a Maintenance Intermediate Course will move the Air Force in the right direction. Finally, a structured and documented career progression for maintainers with specific requirements on experience, training, and education will put the necessary skills in the hands of future maintenance leaders.

Validating the need for a PhD in Maintenance over the need for a PhD in Logistics may meet with resistance at first. Maintenance received first importance over other logistics disciplines due to a combination of the Air Force's aging fleet and high operations tempo. Maintaining a balance of sortie production while ensuring the health of the fleet has become the greatest logistical challenge. Based on General Jumper's command experience before and during the Objective Wing years, his solution lies in the Combat Wing Organization with a PhD-level maintainer leading both efforts. The final answer doesn't lie solely within aircraft maintenance. Plans to develop a PhD-level logistics readiness officer are already in work. The uniqueness of a PhD in Maintenance in no way slights the significance of other logistics disciplines. Only a critical sense of urgency placed the PhD in Maintenance as the priority above other logistic competencies. The wing won't be the only organization to benefit from maintainers with a PhD in Maintenance. Air Logistics Centers, Product Centers, major command headquarters, and the Air and Joint Staffs all have positions requiring PhD-level maintainers. Up until now these positions were filled with logisticians with some maintenance experience. Now the effects of a career maintainer will reach into policy, programming, and budgeting at all levels of the Air Force.

Has the time come for the pendulum to swing back towards the specialist's perspective? With down sizing, lower budgets, and a move towards becoming generalists, some things proceed with

little difficulty--but not in aircraft maintenance. With our aging fleet and increased reliance upon air power, aircraft maintenance is one area where the Air Force needs the PhD in charge.

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