

AIR WAR COLLEGE

AIR UNIVERSITY

**C-17A: OPERATION ENDURING FREEDOM
EMPLOYMENT/DEPLOYMENT: LESSONS OBSERVED**
(THIS AIN'T YOUR DADDY'S AIRLIFTER)

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by

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Table of Contents

Introduction	2
Background	3
Overview of C-17 Role in Operation ENDURING FREEDOM	8
Deployment Infrastructure	10
Aircraft Strengths	11
Terminal Avoidance Collision System	12
Short Austere Airfield Landing Capability	14
Maximum on Ground	14
Aircraft Weaknesses	16
Pinned Thrust Reversers	16
On Board Inert Gas Generating System	17
Logistical Support	17
Maintenance Package Shortfalls	18
Spares Routing	19
Personnel Issues	20
Combat Crew Communications Specialist	20
Ramp Coordinators	21
Night Vision Goggle Certification	22
Tactics, Techniques and Procedures	22
Mission Execution	23
Command and Control	23
Aircrew Composition	25
Operational Risk Management	25
Airfield Conditions	27
Conclusion	27

Introduction

*Rapid global mobility provides the virtual spine of our global engagement philosophy.
Without it, the United States would eventually degrade into a regional power.
We must maintain a complete or full degree of ability to position and sustain mobility forces and capabilities through air and space, across the range of military operations as required.*

**Air Force Task 5,
Rapid Global Mobility
Air Force Doctrine Document 1-1**

The China-Burma aerial supply line during World War II marked the beginning of airlift as a tenet of air doctrine. The architect of “The Hump” operation, Major General William Tunner, foresaw the enormous potential of airlifting troops and supplies directly to the combat zone. As early as 1944, he advocated the design and production of an aircraft capable of delivering large amounts of cargo into austere airfields.¹

Approximately 40 years later, the first operational ready C-17 rolled off the assembly line, and thus began the fulfillment of General Tunner’s vision.

This paper explores the first time deployment of a C-17 squadron to a forward operating base (FOB) during a major contingency, in this case, Operation ENDURING FREEDOM (OEF). It relates the unique challenges faced by the commanders and operators alike in devising and implementing new standard operating procedures to accomplish the unit’s assigned task. The purpose of the paper is to address the question: Should the construct and support of a deployed C-17 unit at a forward operating location mirror the deployment package of combat C-130 units? By analyzing real world C-17 employment and illustrating those concepts with examples from the most recent deployments in support of OEF, the thesis of this paper is that to fully maximize the capabilities of the C-17, its deployment package, when operating in an intratheater environment, should be based on the plans currently in place and used for C-130 units flying similar missions into hostile environments.

Background

Airlift doctrine, as applicable to the deployment/employment of the C-17, has undergone frequent change since the aircraft's introduction to the active fleet in 1991. The airframe itself is currently in block 13 production – the 13th major modification package done to the aircraft. The numerous modifications and additions to the aircraft have increased its capabilities and driven many of the changes to the deployment/employment doctrine for the C-17.

In its infancy, the C-17 was viewed primarily as a strategic asset that would complement the C-5 and replace the C-141 fleet.² Although designed to operate in both the geographical area outside the continental United States (CONUS) under the operational control of a combatant commander (intratheater), and as a common-user airlift asset, linking theaters around the globe to the continental United States and to other theaters (intertheater), the emphasis on its direct delivery capability created a blind spot among mobility planners.³ The C-17's direct delivery capability overshadowed its ability to deploy in a capacity similar to the C-130. The focus was on creating airlift doctrine and developing plans to exploit the C-17 capability to fly time sensitive cargo from a point of embarkation in the continental United States (CONUS), directly to commanders at forward operating bases.⁴

The combat delivery capability of the C-130 fleet, designated as C-130Es and C-130Hs, is used in a wide variety of wartime and peacetime missions. The units deploy from home station as complete, self-contained packages including maintenance and logistic support (mostly from in-place intratheater hubs). In wartime, the C-130 combat delivery aircraft primarily performs the intratheater portion of the airlift mission, leaving

the long-range intertheater transport mission to larger aircraft such as the C-5, C-17 and commercial heavy airlift aircraft. C-130s primarily provide rapid transportation of personnel and/or cargo for delivery by parachute to a designated drop zone, or by landing at austere locations within the conflict area. These aircraft are also the primary aeromedical evacuation aircraft in a conflict.⁵

Contingency operations during the 1990's were instrumental in changing the nature of C-17 employment. Prior to Operation JOINT ENDEAVOR in Bosnia, the C-17 was employed based on models in use for other strategic airlifters such as the C-5 and C-141. The C-17 flew intertheater and intratheater missions utilizing the "hub and spoke" system on which other heavy airlift aircraft relied.⁶ No consideration was given to the possibility of basing C-17s at small austere airfields (SAAF) to provide intratheater airlift. Operations in Bosnia showcased its capabilities and flexibility. The ability of the C-17 to fly into the muddy, small airfields available in the region, highlighted its unique dual use capability.⁷ The C-17 was effectively being employed in the role of a C-130, but carrying the loads of a C-5 - direct delivery had been achieved.

During the Task Force Hawk operation in 1996, while supporting ground troops in Bosnia, the C-17 saw for the first time actual operations into a SAAF directly supporting the field commander. No longer was intertheater airlift dependent upon improved airfields. C-17s were deployed to Germany and flew around the clock missions, delivering vital equipment to the deployed army unit in Tirana, Albania.⁸ The performance of the Air Force C-17 was one of the great success stories of Operation ALLIED FORCE. The planes flew half of the strategic airlift missions required during the operation.⁹ In the end, over 500 C-17 sorties were flown, moving over 22,000 tons of

equipment and personnel.¹⁰ Its capability to land on small airfields and accommodate rapid offloading of cargo was particularly important. The aircraft blurred the lines between tactical and strategic airlift. The old definitions no longer applied. Air Mobility Command (AMC) planners began to focus more on integrating both its strategic and tactical roles.

It is of interest to note that General Chuck Horner, the Coalition Forces Air Component Commander during Operation DESERT STORM, first mentioned the obsolescence of the old “strategic and tactical” way of thinking during Operation DESERT SHIELD/STORM. He expressed a need to depart from the old “in the box” way of thinking when employing air assets. He believed that, “The use of the words ‘strategic’ and ‘tactical’ are a heritage from previous wars, where in general strategic attacks were directed at an enemy’s heartland, and tactical operations were directed at his military forces in the field or at sea...I don’t understand tactical or strategic. The words have now become meaningless and dysfunctional. In fact, in modern military speech, they are more often used to divide people and frustrate efforts than to illuminate and facilitate...There is also a service biased crowd that like to think of the USAF as made up of strategic or tactical elements – I call such people airheaded airmen. They don’t realize that air can and will do whatever is necessary to get the job done....in talking about air plans or air operations, I keep as far from these words as I can. Airpower is essentially very simple: aircraft can range very quickly over very wide areas...close to home or very far away. Nothing more. Nothing less.”¹¹ General Horner’s comments drove home the need to think “outside the box” and fully exploit the capabilities of the C-17 by

incorporating new employment options that arose out of real world operations such as Operation ALLIED FORCE.

To incorporate the capabilities of the C-17, Air Mobility Command began to change terminology when referring to employment of the aircraft as in either an intertheater or intratheater role.¹² The labels were different but the result was the same; the aircraft was still thought of as a weapon system to be employed in one of two roles. Airlift doctrine of the 1990s and into the 21st century, relied heavily on the intertheater or intratheater employment philosophy.¹³ Commanders and operators have long argued for recognition of the C-17's ability to be used in both roles simultaneously, via direct delivery, and deployed for intratheater airlift at forward locations. However, doctrine was slow to catch up with the role that operators intrinsically knew the C-17 could play in future operations.

The ability of the C-17 to “directly deliver” cargo and troops to the field commander is the hallmark of the aircraft. Traditionally, AMC has utilized its large airlifters by flying them to aerial ports within the United States, picking up passengers and/or cargo, then flying intercontinental distances to a staging location, for instance, Europe. Once there, the cargo is down loaded and moved to its final destination in theater, via surface transportation or by smaller aircraft. The C-17 effectively takes middle management out of the logistic train (see figure 1).¹⁴ This system eliminates cargo transfers at staging areas, allows the aircraft to carry equipment directly to forward

areas, reduces enroute support requirements, and speeds delivery time.¹⁵

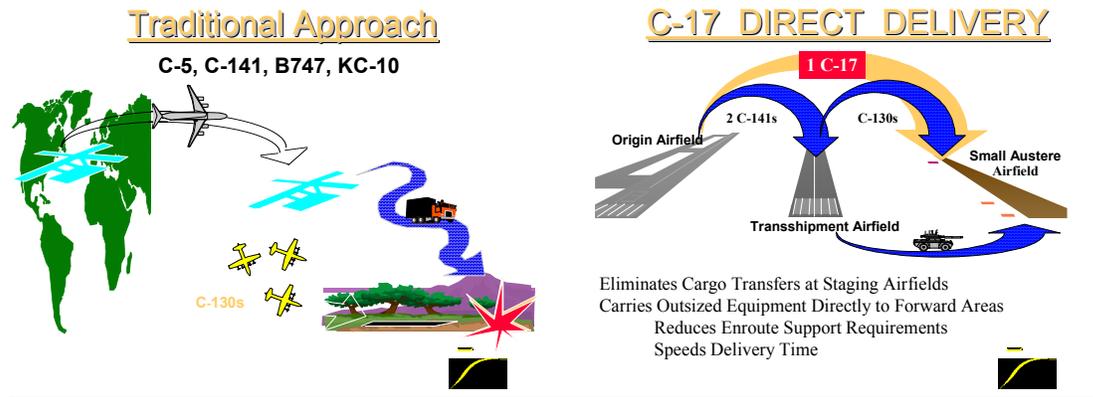


Figure 1

Again, it was a real world event that proved the value and flexibility of the C-17 and drove changes in deployment/employment methods. OEF began in the fall of 2001. Immediately, the C-17 was called upon to provide the heavy airlift required to bring troops and their equipment to the FOBs in Afghanistan. The condition of the airfields in that country necessitated a heavy reliance on the C-17 to fulfill the airlift requirements for outfitting and resupplying U.S. and coalition forces on the ground. In all cases, the C-17 was the only aircraft in the inventory that could provide both heavy airlift of outsized cargo and land on short, battle-damaged runways. The C-5 could carry the outsized cargo, but was not capable of landing on the bombed out airstrips in Afghanistan. The C-130 could land on the shorter runways, but was limited to much smaller cargo loads. For the first time in a combat situation, there existed an aircraft that could depart from a CONUS base and fly troops and supplies directly into the combat zone supporting a combat unit engaged with the enemy.

Overview of C-17 Role in Operation Enduring Freedom

We have learned and must not forget that from now on air transport is an essential element of airpower, in fact of all national power.

General Henry H. "Hap" Arnold, 1945

Operation ENDURING FREEDOM is an ongoing operation and the C-17 has played a crucial role from the very beginning. The war began with a bombing campaign to neutralize the Taliban's ability to counterstrike. During this phase of the war, national security strategy called for supporting the welfare of the citizens of Afghanistan. The chosen course of action was to airdrop meals over the country. The C-17 was employed to fulfill the Humanitarian Relief Operation, known as "HUMRO". When HUMRO missions began, the air strikes in Afghanistan were still in full swing. Crews were required to airdrop at high altitudes, complete two air refuelings, and endure twenty-six hour flight times in order to complete their mission safely. A new delivery system (using a large cardboard container) was developed for this operation, to drop the rations in a safe, efficient and effective manner.¹⁶ These tactics were new and untried in combat, but worked well.

After the initial bombing campaign, the ground war began. U.S. Central Command (CENTCOM) was charged with prosecuting the war. CENTCOM required the immediate airlift of troops and supplies to the region in and around the Afghanistan Area of Responsibility (AOR); however, the old Russian airfields in Afghanistan were riddled with craters, debris, expended artillery casings, and were breaking up due to neglect.¹⁷ The C-17 was the only airlift aircraft that could carry outsized equipment, such as the Army's Apache helicopter, and land on the rough, short runways. It quickly became the airlifter of choice to fulfill CENTCOM's airlift requirements.

Due to the constraints on airlift operations caused by the condition of the airfields in Afghanistan, CENTCOM planners realized that they would need greater C-17 availability for intratheater airlift. Mirroring the massive airlift conducted during Operation DESERT SHIELD/STORM, the huge quantities of supplies needed for long sustained periods of combat were brought into the AOR primarily by the U.S. Navy aboard surface vessels. It became necessary to establish C-17 bases at forward operating locations near the ports. These airfields created the ability to offload equipment and supplies from ships located in local ports, transfer the cargo to forward operating bases, load it onto C-17s, and deliver it to troops within the Afghanistan AOR.¹⁸ That decision was a turning point in the employment options regarding the C-17. Never before had a “heavy” airlift asset been deployed to a forwarding operating base in direct support of combat operations.

The first C-17 unit to deploy in such a capacity was the 7th Expeditionary Airlift Squadron (EAS) from the 62nd Airlift Wing at McChord Air Force Base, Washington. The 7 EAS was tasked not only with providing airlift into the combat zone, but without any precedent for this type of deployment, it had to set up, organize, equip, and manage the assets required to accomplish that task.¹⁹ C-130 units have deployed entire units to forward operating bases for many years. They deploy as an integral unit with all the necessary components in place to carry out operations. In contrast, the 7 EAS was deployed with a mix of aircrews from various CONUS locations and hubs in Europe, and operated with a mix of support services from a variety of sources.²⁰ The lessons observed from the 7th's deployment deserve careful consideration and review in shaping future airlift operations. It is largely the experience of the command personnel and the

crews deployed with the 7 EAS, as well as the C-17 units deployed to major hubs in Germany and Turkey (17 EAS), that provide the background and data which support this paper. The author acknowledges that this paper is largely based on the opinions and viewpoints of operators in the field.

Deployment Infrastructure

We must be the world's premier deployer.

**General John Shalikashvili
Joint Vision 2010, Focused Logistics**

The initial employment plan put in place at the outset of OEF called for utilizing the “hub and spoke” system to manage the airlift missions flying in direct support of operations into the AOR. Hubs were established in Frankfurt, Germany; Moron, Spain; Ramstein, Germany; and Incirlik, Turkey. Cargo was flown intertheater from the CONUS to these hubs via C-17s, C-5s and some commercial aircraft.²¹

Operations in Afghanistan expanded as United States forces spread throughout the country in search of al-Qaida fighters. The need for large quantities of supplies and equipment and the long-term nature of the engagement dictated the use of naval supply ships. Countries in the Middle East supporting the War on Terrorism, gave permission to use their ports as offload points. To date, one-third of the cargo transported into the AOR has been moved via ship. These countries also permitted the use of airbases on their soil from which Air Force transports could haul the supplies into Afghanistan.²²

Utilizing the hub and spoke system in place, supplies needed by troops in Afghanistan were flown in via a C-17 or C-130. Initially C-17s were based at Moron Air Base, Spain and Rhein Main Air Base, Germany. While Rhein Main worked well as the hub for Europe, Moron did not work as well due to its distance from Afghanistan, the

lack of an adequate supply line, and the complex diplomatic clearances involved.

Working with AMC, the Tanker Airlift Control Center (TACC), and CENTCOM, it was determined that the C-17 could best be utilized at a more forward location, taking advantage of the unique capabilities of the aircraft.²³

Placing a heavy airlift operation in the forward operating area allowed for a more rapid airlift bridge between the ports in the Middle East and the bases in Afghanistan. At the time the decision was made to move C-17s closer to the fight, the airfields available for use had very little support facilities. Except for a few tents and a small Wing Air Operations Center (WOC), the entire base had to be built from the ground up. A Tanker Airlift Control Element (TALCE) had been sent ahead of the deployment to setup most of the equipment needed to start operations.²⁴ The TALCE brought in and set up equipment such as computers, telephones and a basic command post. The Air Mobility Command Strategic Plan included no provisions for such a scenario. During the first weeks of deployment to the FOB, command personnel spent the majority of their time supervising the completion of the base infrastructure. This was a first for a C-17 unit.

Aircraft Strengths

The United States depends on a flexible and responsive global transportation system that can get American and allied forces to a theater in a timely and decisive manner.

Air and Space Power in the New Millennium

The C-17 brings an incredible capability to the fight such as, armor plating around crew areas, protection against small arms and anti-aircraft artillery, a missile warning system and automatic flare dispensing system, automatic fuel tank inerting system, redundant aircraft components and systems, in-flight reversible engines, high precision integrated GPS and mission computer navigation capabilities, and a Heads Up Display

(HUD). For the first time, a commander in the field can request specific equipment or troops and one aircraft can provide the airlift from the original point of embarkation directly to the field commander in a timely and efficient manner. This capability can be the determining factor in the successful execution of military operations. The fast paced nature of modern combat necessitates an equally quick reactive resupply line. The C-17 is as good as it gets!

The airland and airdrop missions flown by C-17 crews in support of OEF have brought to light some significant strengths and weaknesses of the airframe itself. Three crucial strengths that weighed heavily in the successful completion of these missions were the Traffic Collision Avoidance System (TCAS), the ability to land on unimproved short airstrips, and the backing capability of the C-17.

Traffic Avoidance Collision System

Combat environments are inherently cluttered and chaotic. One of the greatest hazards facing aircrews operating in the AOR was the risk of mid-air collision. The C-17's on-board Traffic Collision Avoidance System (TCAS) was instrumental in preventing two near misses early in the campaign. TCAS is integrated into other systems in an aircraft cockpit. It consists of hardware and software that together provide a set of electronic eyes so that the pilot can "see" the traffic situation in the vicinity of the aircraft. The instrument sounds an alarm when it determines that another aircraft will pass too closely.²⁵ The Rules of Engagement established for mobility aircraft in the AOR were simply: see and avoid.²⁶ Clear guidance from the Commander, U.S. Transportation Command (CINCTRANS) was for aircrews to avoid penetration of cloud decks in the AOR. However, in the heat of battle, motivated aircrews determined to complete

missions pushed the envelope and created potential hazards. Additionally, commercial air traffic significantly increased the risk of mid-air collisions during marginal visual flight rules (VFR). One such incident involved a civilian 747 flying over the AOR (in violation of set guidance) and a C-17 crew avoiding weather and in an established holding pattern waiting to complete their mission.²⁷

The lack of traffic separation by the Airborne Warning and Control System (AWACs) was addressed to the Director of Mobility Forces (DIRMOBFOR) at CENTCOM. Mobility aircraft were routinely given secondary priority. Discussions between the 7 EAS Commander and the DIRMOBFOR resulted in an understanding to place priority on meeting designated slot times (basically an arrival/departure reservation), which was critical to safety. The resultant emphasis on slot times created a domino effect, speeding up loading operations. The Air Terminal Operations Center (ATOC) was directed to refrain from delaying missions due to late passengers or pallets. In addition, a domino effect on multi-slot missions, those missions that had multiple landing times within the AOR, created Tactical Crew Duty Times that were held at no more than 18 hours. Issues with late changes to slot times, along with launching in marginal weather, significantly increased the risk by creating situations where multiple aircraft would “freelance” to complete their mission. The slot times and track separation effectiveness was marginalized with multiple aircraft competing for the same arrival times. TCAS was instrumental in avoiding catastrophe in two other hazardous air traffic reports (HATRs) involving C-17s. The TCAS system painted a clearer picture of uncontrolled airspace in the AOR.²⁸

Short Austere Airfield Landing Capability

Although the C-17 was designed to land on short unimproved runways, conditions in Afghanistan pushed this capability to the limit. In the early stages of the operation, the airfields in Afghanistan were riddled with craters and strewn with chunks of concrete caused by the allied bombing campaign. The wear and tear on the fleet of aircraft resulted in three tire replacements per day, when usually on any given day one tire for this many aircraft was usual.²⁹ This was a significant number considering the unit was comprised of only six aircraft.

Afghanistan is a landlocked country. Without the C-17, the insertion of troops and supplies would have to be accomplished exclusively with a combination of airdrop missions and surface routing. Airdrop missions are limited by size and type of cargo. It is an expensive and less efficient means of delivering supplies. For example, the average cost of delivering a meal ready to eat (MRE) package utilizing the airdrop delivery mode during HUMRO operations via C-17, was \$7.00 per package. To date, over two million packets have been delivered. The ground delivery cost was reduced to 15 cents per package.³⁰ Ground delivery can be very time consuming and cumbersome. It is the ability of the C-17 to deliver cargo into austere environments that drove the decision to deploy the C-17 at a forward location to perform the timely and efficient delivery of cargo.

Maximum on Ground

The use of small austere airfields is limited by the small amount of ramp space available for parking and working aircraft. The unique backing capability of the C-17 significantly increased the maximum on ground (MOG) number of aircraft. MOG

becomes extremely important when trying to throughput as much cargo as possible in a short amount of time or when large aircraft are involved. Operation ALLIED FORCE is a case in point. The C-17 had a MOG of two aircraft at any given time. Twenty-four hour operations into the airfield allowed for an extraordinary amount of cargo, all of the required cargo for TASK FORCE HAWK, to be delivered; albeit it took 500 plus sorties to successfully achieve the mission.³¹

While the 7 EAS was deployed to the FOB, it was co-located with a C-130 unit. Managing up to six C-17s, four C-130s, and the occasional Russian IL-124 in a confined area would be impossible without the ground maneuverability of the C-17.³² The diagram below (figure 2) illustrates the dramatic MOG increase of the C-17 compared with the C-5.³³

C-17 Compared to C-5 MOG

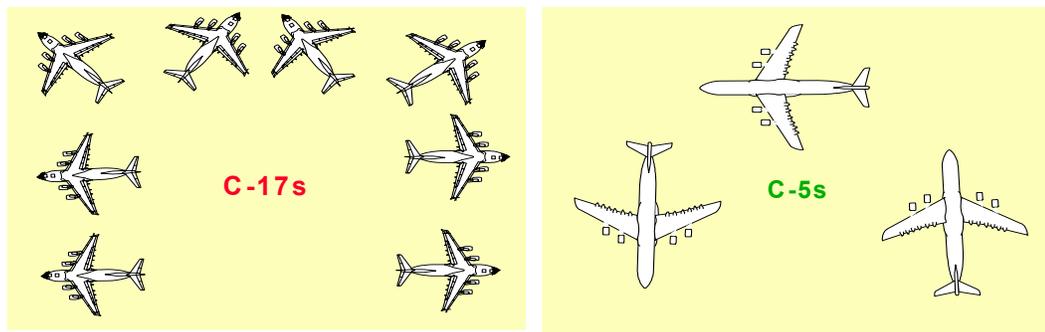


Figure 2

Aircraft Weaknesses

Often it is the non-lethal application of air mobility that contributes most effectively towards achieving national security objectives.

Air Force Doctrine Statement 2-6, 21 November 1997

No aircraft has ever been employed in a combat environment without the eventual recognition of some deficiency and the C-17 is no different. Early missions in support of OEF tested the durability and maintainability of the aircraft. The deployment of the 7 EAS in the War on Terrorism, created new maintenance issues brought on by local environmental conditions, weather conditions, and the high operations tempo. These issues must be resolved if the C-17 is to operate for sustained periods in austere environments.

Pinned Thrust Reversers

Foremost among the issues faced by maintainers and aircrews alike was the preponderance of pinned thrust reversers. The issue was not so much a maintenance issue as it was an engineering defect. The C-17 fleet was plagued with a rash of faulty blocker valves within the engine, causing the deployment of the reverser to fail. The problem had a significant impact on small field operations. At any given time, forty to sixty percent of the fleet had two thrust reversers pinned.³⁴ When flying into airfields with shortened, wet runways, pinned thrust reversers were the difference between mission success or failure. Additionally, aircraft with pinned reversers are not capable of backing up even if not fully loaded. Without its backing capability the advantages of the C-17 are greatly reduced. Boeing, the manufacturer of the C-17, is currently in the process of replacing the faulty parts and the fix should increase reliability rates in the future.

On Board Inert Gas Generating System (OBIGGS)

OBIGGS was designed to decrease the chance of a wing fire or explosion should the C-17 take any kind of munition through the wing by replacing the oxygenated air in the wing with nitrogen (inert) gas. AMC requires OBIGGS for combat operations, but waivers were granted for some areas outside of Afghanistan. On many aircraft, no matter how many parts were changed, the OBIGGS would fail. In one case, the maintainers were forced to wait nearly two weeks for an OBIGGS controller.³⁵ Over the course of the 7 EAS deployment, several controllers were lost in the supply system and one arrived badly damaged due to improper packaging.

Logistics Support

Logistics directly support all air mobility operations. Aircraft maintenance activities keep aircraft in operational condition by inspecting, repairing and servicing airplanes before and after flight operations.

Air Mobility Strategic Plan 2002

Similar to other major airlift campaigns, OEF airlift operations are constrained by the availability and quality of the logistics support system. No war can be fought without an efficient and effective logistics system. Resupply and maintenance are the lifelines of combat forces. C-17s were initially deployed to major hubs in Europe with established maintenance facilities on location. Cracks in the logistics supply line appeared when the C-17 was deployed to a FOB. Maintenance package shortfalls, the lack of assigned logistics detachments available for deployment with C-17 units, and difficulties with spares routing to austere environments, affected the mission capable rate of sorties into the AOR from the FOB. The command structure along with detailed interaction with the TACC, helped to alleviate many of these shortcomings. The deployed maintenance unit reported directly to the 7 EAS Commander, which provided for a working relationship

that was ideal from the operational point of view. The operations officer, maintenance officer, and the senior enlisted advisor, worked hand-in-hand on a daily basis, allowing for rapid and coordinated decisions.³⁶

Maintenance Package Shortfalls

Due to the lack of experience with deploying a C-17 unit to a forward austere location, the maintenance supply kit deployed with the 7 EAS was grossly inadequate for meeting the requirements necessitated by the unit's mission use rate. This left the unit dependent upon a supply system that was not designed to support a heavy airlift unit at such a forward location. Critical mission grounding parts were often not available in time to get a mission off the ground. Delivery time of these parts ranged from days to several weeks.³⁷ The frustration caused by losing multiple combat missions for one small part played a major role in mission effectiveness and in turn lowered aircrew morale.

The initial maintenance package at the base consisted of three ISU-90s (self contained maintenance kits) filled with approximately 250 pieces. This type of maintenance package was designed to support three to four C-17s for two to three weeks, allowing for no replenishment of stock.³⁸ A maintenance package of that size reflects a temporary approach to maintenance and does not adequately provide for the long-term deployment of an entire C-17 unit, essentially operating as a home base operation flying five to eight missions each day.

Contrasting the maintenance package available for the C-17 with the package deployed for the co-located C-130 unit, the difference between the employment doctrine of the two aircraft becomes glaringly obvious. Despite the proven ability of the C-17 to

fly intratheater airlift, no plans had been put in place to utilize the experience and knowledge garnered from previous C-130 deployments to design and place a similar C-17 forward deployed unit. Most of the deployment options regarding equipment, command structure, and personnel were made at the wing and squadron level. Each C-17 squadron does have a Unit Type Code (UTC) to build against; however, this UTC was tailored to a twelve aircraft squadron, not a five to eight aircraft unit and did not include a maintenance support UTC.

Spares Routing

Non-stop operations and environmental conditions at the forward deployed location caused a significant increase in the number of maintenance issues. One in five aircraft was regularly non-mission capable while awaiting spare parts. Unfortunately, unlike the C-130 units there was no Concept of Operations (CONOPs) to define the routing of spare parts to a C-17 unit operating in an intratheater environment. Historically, AMC used an established network of hub locations in the Pacific and Europe for spare parts routing. That system supports the intertheater role of the C-17, but is not effective when a unit is deployed intratheater in austere locations. The 7 EAS was forced to rely primarily on supply support from its home base in the CONUS.

Eventually a system evolved that provided priority support for parts affecting mission capability (MICAP) rates, for instance, tires. Non-MICAP requirements for items such as spares package replenishments, normal stock replenishments, and high use stock replenishments, received little priority.³⁹ Replenishment of spares is essential to the prevention of future MICAP situations. The need for a supply support CONOPs that can sustain a C-17 operation in austere locations over a long period of time is critical to

fully utilizing the capabilities of the C-17. To resolve the problem in the short term, a weekly C-17 mission was approved by AMC to bring parts and crew replacements to each location. This “rotator” mission became extremely valuable to operations at the forward location.

Personnel Issues

We have learned and must not forget that from now on air transport is an essential element of air power, in fact, of all national power. We must have an air transport organization in being, capable of tremendous expansion.

Gen Henry H. “Hap” Arnold, 1945

C-17 operations are largely dependent upon the availability of mission essential personnel and the proper aircrew training. The addition of combat crew communication specialists and an increase in the number of ramp coordinators proved to be invaluable in the successful execution of missions. Aircrew training issues involving night vision goggle certification, and improved tactical training, all required on-site resolution and formal course training at the home unit.

Combat Crew Communication Specialists

A prime example of the UTC that was overlooked was the crew communications specialist. Secure communication was not a luxury within the AOR – it was a necessity. Secure communication capabilities were absolutely critical to safe passage and friend/foe recognition within the AOR. Secure communications and secure codes allowed aircraft to communicate with airfields inside the AOR for proper arrival and departure sequencing.⁴⁰ The addition of combat crew communication (CCC) specialists to the deployed unit was essential. Communication specialists expedite and assist with the loading and maintenance of secure communication equipment. Airlift doctrine has never called for the addition of CCC specialists to a deployed airlift unit.

During the initial employment, crews had mixed information about current secure codes between the Special Instructions (SPINs) and what the Air Mobility Division (AMD) at CENTCOM was relaying. Crews had clear communications without the correct codes, but with reduced safety and security. Codes became a major issue when C-130 and C-17 crews were given a different set of codes. When arriving in theater, C-17 crews were unable to conduct secure communications with air traffic control and resorted to open UHF/VHF radios.⁴¹ Deployed communications personnel resolved all of the communication issues and established a clear need for communications experts to deploy with C-17 units, as is the procedure for tanker and C-130 units. Tanker units have CCC specialists included in their Unit Manning Document (UMD) and UTC. As the C-17 is used more frequently in an intratheater role, the presence of CCC specialists is critical to successful mission completion.

Ramp Coordinators

The ability of the C-17 to back up and maneuver in a relatively small space increased the complexity of ramp coordination. The mix of C-130 and C-17 aircraft added to the difficulty of efficient ramp utilization. Four ramp coordinators, drawn from C-17 loadmaster manning, were added to unit personnel.⁴² The ramp coordinators were crucial to the timely and efficient movement of cargo.

Ramp coordinators managed and supervised the complex movement of cargo and pre-loaded virtually all aircraft on a daily basis. As the on-scene supervisors, they were priceless when it came to mission execution. Working with the ATOC and the Army planners, the ramp coordinators usually were able to turn aircraft in under one hour after

refueling. They eliminated problems brought on by short notice changes in operational requirements and reduced the stress on aerial port personnel and operations.

Night Vision Goggle Certification

Night vision goggle (NVG) use quickly became a critical tool in intratheater C-17 operations. Threat conditions in the AOR necessitated that operations be run largely at night onto unlit runways with a width of ninety feet. Prior to deployment, formal unit training programs and wing policy did not exist for NVG certification. When AMC committed the C-17 to night operations in the AOR, it was determined that all crews would be trained in NVG tactics and use. However, conflicting guidance and parochial attitudes towards lights out operations had delayed upgrade training prior to OEF. As with any new technology, the bottom line was sound judgment and risk mitigation. Crew certification was an EAS requirement at a field requiring the use of NVGs. NVG use for jump seat crew members, usually a third pilot, on non-NVG trained crews, was strongly encouraged as it aided with weather, terrain avoidance, traffic deconfliction, threat identification, and especially with field identification.⁴³

Tactics Techniques and Procedures

Aircrews prior to OEF received tactical training that reflected the conditions in which the C-17 had historically operated. Tactical training centered around C-17 operations in its dual intertheater and intratheater role. Missions in support of OEF required crews to fly into short austere airfields that had little or no lighting. The conditions created a confusing and hazardous environment for the aircrews flying into the AOR primarily due to the lack of initial NVG training. Enemy threat conditions also required spiral up-down flying techniques and procedures (see figure 3).⁴⁴ A focus on

tactics was critical in the highly demanding combat environment. The addition of permanent tactics personnel as part of the UTC, provided on-site expertise.

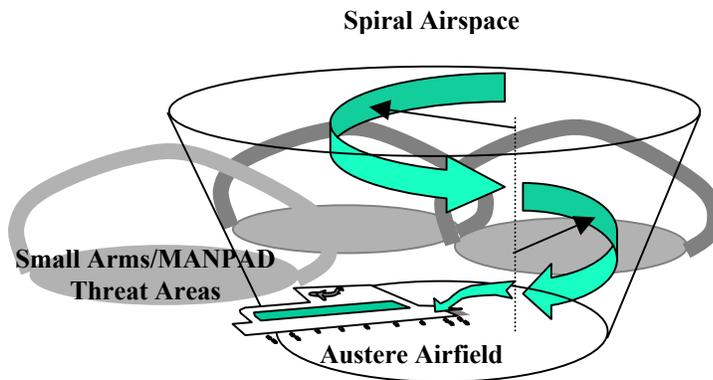


Figure 3

C-17 crews practiced what had been smartly incorporated into formal training at the unit levels. In almost all scenarios, the crews flew as they had trained with the exception of low-level flight operations. C-17 crews are taught to go as low as the threat dictates and no apparent threat precluded the crews from flying below the specified corridor altitudes in the AOR, especially with extremely high terrain and night flights.

Mission Execution

The ability to move our forces rapidly and in the right configuration is key to their effectiveness. Most importantly, the greater their mobility, the greater their protection.

National Defense Panel Report
December 1997

Command and Control

Once in place, the 7 EAS assumed responsibility for maintenance, command and control, operational support functions, and the TACC stage operation. Additionally, the 7 EAS commander was designated as the Operations Group Commander, responsible for all operational issues involving the C-17s, C-130s and WOC flight operations.⁴⁵

The historical reliance on hubs in the Pacific and Europe for C-17 operations meant that no predetermined command structure was in place for a C-17 unit operating

out of a forward austere location. For several weeks, the 7th's chain of command was unclear and the unit reported to multiple commanders. The squadron was comprised mostly of McChord AFB personnel (15th Air Force), operating in 21st Air Force geography, executing TACC and CENTCOM missions; all of which added to the confusion.⁴⁶ Everyone wanted a “piece of the pie.”

After numerous discussions between AMC, 15th and 21st Air Force and the DIRMOBFOR, the 7 EAS was aligned under the 437th Air Expeditionary Group (AEG), reporting to an 0-6 group commander, in Frankfurt, Germany.⁴⁷ The geographic separation from the group commander in Germany limited the effectiveness of the command structure, but did provide in theater assistance to resolve issues at higher levels of command.

Defining the chain of command did not eliminate complications that arose from dealing with multiple commanders. Issues such as crew currency waivers were handled by the deployed group commander along with the various home group commanders in the CONUS. Considering that crews were a mix from both McChord and Charleston, the unit was forced to deal with three group commanders to resolve many issues. Rarely was there agreement among the three concerning waivers due to the operations tempo causing the delay of critical decisions, and frustrating the ability of the unit to execute the mission. Once it was determined that operational control of the crews remained with the home wing, it became easier to work with each individual crew.

Aircrew Composition

The C-17 force is comprised of relatively young pilots, with little or no combat experience. The challenging tactical environment in which OEF missions are flown

dictates careful consideration in building aircrews.

Crews were normally rotated from the CONUS on a 30-45 day cycle. New crews arriving at the forward location were given familiarization missions prior to flying their first mission into the AOR. Experience levels of individual pilots were taken into consideration. NVG trained crews were particularly top heavy in experience and the number of NVG qualified crews increased in number as the throughput in the training pipeline increased.⁴⁸

Operational Risk Management (ORM) Issues

Reducing potential hazards, known as ORM, when flying is a persistent challenge. All aircraft commanders were instructed to use the ORM model (see figure 4) to mitigate potential hazards on all missions.⁴⁹ The C-17 and its crews have never operated under similar conditions and new ORM issues arose daily in the early days of the operation. The standard mission involved a 22-hour crew duty day, multiple sorties, challenging tactical events, air refueling, uncontrolled airspace, poorly conditioned airfields, difficult weather conditions, and the use of NVGs. Creative solutions were quickly found to mitigate the various hazards, such as decreasing the number of enroute stops, adding a third pilot and second loadmaster, and ensuring the weather was truly VFR prior to departure.⁵⁰

Critical to the process of resolving ORM issues was leadership involvement. The commander and director of operations attended 100 percent of the aircraft commander pre and post-mission briefs. Information gleaned from the briefs was used to establish clear and consistent standards through the use of ORM worksheets and the creation of a

mission brochure. Command staff regularly flew missions into the AOR to monitor conditions and evaluate the effectiveness of the new standards and procedures.⁵¹

Operational Risk Management

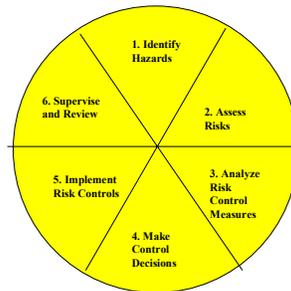


Figure 4

Mission preparation was a high priority. Crews were expected to thoroughly prepare prior to mission execution. An on-site mission library with a complete set of tactical books was established for crew indoctrination, training, and preparation. Show times at the WOC were set at 30 minutes after alerting the crews to maximize preparation times. Intelligence and tactics personnel were made available 24 hours a day.⁵²

The high operations tempo and difficult flying conditions required careful attention to crew duty day issues. Crews were extremely motivated and eager to fly. To ensure that they received adequate rest and that stress levels were kept to a minimum, several policies were instituted. A two-to-one crew ratio was maintained to prevent fatigue. C-17 missions flown out of the forward location required long tactical days and consisted of short legs. The combination allowed for little time to rest during the mission. Goals were set to provide one day on, one day off schedules for the aircrews.⁵³ This allowed for recovery from the cumulative effect of the long sustained operations.

Airfield Conditions

Due to severe Foreign Object Damage (FOD) potential to the engines, crews were always guarded, especially in the AOR. Several key issues at these locations caused great concern. Among these were chunks of runway from damaged and deteriorating sections, helicopters blowing debris during landing and takeoff, and animals on the runway. As previously noted, on average a minimum of three tire changes per day could be expected. Other contributing factors were the unavailability of assault zone markings and the reduced Aircraft Loads (ACL) due to increased landing distance requirements.⁵⁴

Conclusion

“For the first time in the history of war, this country has fought in a land-locked area where every single thing going in and coming out has gone by air. Food, water, ammunition, troops were all transported by air, and that’s really incredible.”

Secretary of the Air Force, 11 Apr 2002

Airlift operations in support of OEF are once again highlighting the enormous role that airlift plays in pursuit of national security objectives. Figure 5 contains airlift mission history data for various contingency operations.⁵⁵ It illustrates the C-17s effect on the movement of cargo. To date, OEF missions represent approximately 10 percent of the number of missions flown during Operation DESERT SHIELD/STORM, yet airlift had moved more than 50% of the cargo hauled during Operation DESERT SHIELD/STORM. The substantially fewer number of missions it took to move comparable amounts of cargo into forward operating locations is primarily due to the capabilities of the C-17, which Operation DESERT SHIELD/STORM had none.

AIRLIFT MISSION HISTORY

<u>Operation</u>	<u>Year</u>	<u>Missions</u>	<u>Troops</u>	<u>Cargo</u>	<u>Fly Time</u>
OPERATION VITTLES	'48 '49	277,569	227,655	1,783,572	586,872
DESERT SHIELD/STORM	'90 '91	87,606	499,627	526,277	657,073
<u>ENDURING FREEDOM</u>	<u>'01-'02</u>	<u>8,696</u>	<u>225,913</u>	<u>307,455</u>	<u>191,312</u>
RESTORE HOPE	'92 '94	4,350	90,251	70,578	70,578
KOSOVO	'99	2,022	32,111	54,000	22,788
JOINT ENDEAVOR	'95 '96	1,852	9,458	30,869	52,534
UPHOLD DEMOCRACY	'94	1,620	40,263	21,168	14,889
SUPPORT HOPE	'94	871	8,163	16,171	16,849
PHOENIX SCORPION I/II	'97 '98	738	19,423	14,051	14,512



Figure 5

The ongoing deployment of C-17s to austere forward operating locations is indicative of the success with deploying C-17 units in an intratheater capacity. The adaptation of C-130 type deployment profiles into the 7 EAS structure allowed for the successful completion of the unit's tasking. Without it, the EAS would have been at the mercy of the system, unable to meet mission requirements. Air Force Doctrine Document (AFDD) 2-6.1 states that mission requirements define how each airframe is used.⁵⁶ Mission requirements directed by CENTCOM's planning staff has redefined the use of the C-17. It is required to perform a variety of tasks incongruent with past missions. Consequently, Joint, Air Force and AMC airlift doctrine should reflect these new requirements. The groundwork has been laid for the development of plans to fully utilize the concept of forward deployment for C-17 units. Complete integration of this concept into airlift doctrine will allow for rapid future deployment/employment of the C-17 force.

Air Force Chief of Staff, General John Jumper, in a recent memorandum to all Air Force personnel, emphasized the importance of the expeditionary culture and the fundamental understanding that we organize, deploy, and employ, using organizational principles based on doctrine, not ad hoc command arrangements. "...In normal circumstances doctrine is the best way to proceed and if we must deviate, there should be a clear and compelling operational reason."⁵⁷ The evolving nature of airlift dictates that the reverse be equally applicable. Lessons learned (observed) from Operation ENDURING FREEDOM should be thoroughly studied and evaluated for inclusion in airlift doctrine. The structure of C-130 unit deployments should be incorporated into future deployment plans for C-17 units. It is a model that has worked for many decades. The nature of warfare is dynamic and constantly changing; therefore, doctrine should be developed in a parallel manner in order to keep pace with the lessons learned from success and failure during combat operations.

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