INTERTHEATER AIRLIFT CHALLENGES OF OPERATION ENDURING FREEDOM

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Executive Summary:

Between Operations DESERT SHIELD/STORM in 1990-1991 and ENDURING FREEDOM in 2001-2002, the Air Force modernized its intertheater mobility. It acquired significant numbers of new C-17 aircraft, created Air Mobility Command to centralize control of long-range transports and tankers, launched an expeditionary force deployment system, modernized its materiel handling equipment, and improved its embarkation airlift schedules. Despite all of these strategic airlift improvements, Operation ENDURING FREEDOM faced challenges the Southwest Asia War did not, including lack of theater infrastructure, hostile fire in the theater, shortages of diplomatic clearances, and the absence of a preliminary operations plan that included intertheater airlift to Afghanistan. Strategic airlift problems that persisted through both conflicts included failures in automated planning systems, insufficient in-transit visibility, initial shortages of theater bases, overloaded staging bases, low mission-capability rates for older transports, and unnecessary airlift of cargo that could have gone by alternative means. Future air mobility managers would do well to address the persistence of these problems in their planning.

Operation	DESERT SHIELD/STORM	ENDURING FREEDOM
Dates	7 Aug 1990-19 Apr 1991	7 Oct 2001-
Destination	Saudi Arabia	Afghanistan
Distance	6,330 miles	7,000+ miles
# Missions	Almost 16,000	11,000+*
Passengers	500,000+	158,000+*
Short Tons	548,000	222,460*
Major aircraft used	C-5, C-141, KC-10, civil airliners	C-5, C-17, civil airliners
Key staging bases used	Ramstein AB, Germany; Rhein Main AB, Germany; Torrejon AB, Spain; Zaragoza AB, Spain	Moron AB, Spain; Ramstein AB, Germany; Rhein Main AB, Germany; Incirlik AB, Turkey; Sigonella NAS, Italy; Andersen AFB, Guam; Kadena, Okinawa; Diego Garcia
Key bases in theater	Primarily: Dharan, Riyadh, Al Jubail, King Fahd, Al Kharj (Saudi Arabia)	Kandahar, Afghanistan; Bagram, Afghanistan

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Section I. DESERT SHIELD/STORM airlift lessons applied in time for ENDURING FREEDOM

1. The Air Force needed the C-17.

The C-17 Globemaster III aircraft had not yet entered the Air Force operational inventory in time for Operations DESERT SHIELD/STORM in 1990 and 1991, but it was on the way. The Gulf War airlift validated the decision to acquire the new transport. It could carry larger and heavier loads than the C-141, which reduced the number of sorties needed to transport the same amount of cargo. The C-17 could also land on smaller and less developed airfields, increasing its ability to land in the theater. Finally, the C-17 was a more reliable airframe, primarily because it was new but also because it was technologically more advanced.[2]

2. The Air Force needed a single manager for transport and tanker operations.

Operations DESERT SHIELD/STORM demonstrated the need to combine transports and tankers, some of which could be used as transports and all of which could refuel transports, under a single command. In 1990 and 1991, transports belonged to Military Airlift Command (MAC) and tankers belonged to Strategic Air Command (SAC). The two commands had to work as a team, SAC lending MAC some of its KC-10s as transports. Creation of Air Mobility Command, in 1992, allowed the Air Force to respond more effectively to global transportation demands by placing tankers and air transport aircraft under one major command.[3]

3. An expeditionary force deployment system was desirable.

The experience of Operations DESERT SHIELD/STORM and other contingency operations in the 1990s convinced the Air Force leadership to institute a new system for rotating forces for duty overseas. The answer was the Air and Space Expeditionary Forces, in which the Air Force divided its deployable assets into several sets or "buckets" and rotated the assets every 90 days. The new system improved predictability for personnel and allowed units to better prepare for service overseas. Activation of expeditionary organizations for the purpose of contingency duty also solved problems associated with deployment and readiness. The expeditionary system was in place in time for ENDURING FREEDOM.[4]

4. The distribution and quality of materiel handling equipment needed improvement.

During Operations DESERT SHIELD/STORM, Central Command did not release prepositioned materiel handling equipment for two weeks because the Military Airlift Command, with no detailed war plan implemented, could not specify the quantity and type needed by location. Even after arrival, some of this equipment, because of its age, broke down. Failure of unloading machinery slowed the airlift and caused a chain-

reaction delay in flights. Modernization of this equipment and more rapid transportation of it to the bases where it was most needed allowed ENDURING FREEDOM to proceed with less friction. Tactical Airlift Control Elements (TALCEs) had better equipment generally with which to unload aircraft at offload bases than their predecessors in 1990-1991. Although some materiel handling equipment remained in short supply at some theater bases, and maintenance problems with some of this equipment remained, the challenge was less in the later operation.[5]

5. Transports arrived at aerial ports of embarkation more quickly than deploying units could load them.

Another DESERT SHIELD/STORM airlift experience that profited the mobility managers of ENDURING FREEDOM was the rate at which deploying units can load large transports. In the earlier operation, transports often landed at onload locations more rapidly than they could be filled for departure. More planes coming in than going out produced backlogs and congested ramp space at those locations. The ENDURING FREEDOM airlift managers slowed down the flow to a more realistic pace.[6]

Section II. Airlift Problems of ENDURING FREEDOM that had not emerged during DESERT SHIELD/STORM

1. Theater bases lacked infrastructure.

Theater air bases initially lacked the infrastructure needed for efficient airlift. In Afghanistan, the large bases at Kandahar and Bagram had to be captured from enemy forces and then repaired from the effects of U.S. bombing before they could open to many airlift flights. Engineers had to deploy to repair or construct runways, ramps, and flight-control facilities, not only in Afghanistan, but at other bases in the theater. Numerous tactical airlift control elements (TALCEs) had to deploy, with construction and cargo handling equipment, fuel bladders, and command and control resources. Bare base operations were sometimes necessary. Although C-17s could land at smaller and less-developed airfields than earlier large transports, if they could not refuel at those airfields they had to carry more fuel, which limited their cargo loads and increased their dependence on aerial refueling.

Lack of infrastructure in the theater was less a problem during DESERT SHIELD/STORM in 1990-1991, partly because bases in the Arabian peninsula were more modern, enjoyed abundant fuel, and had not suffered combat damage. But even in that operation there were theater infrastructure problems. Refueling facilities were overloaded and fuel trucks broke down. Saudi Arabian and U.S. fuel connectors did not always match. Materiel-handling equipment at first was in short supply, or was so old that it, too, suffered maintenance problems. During Operation ENDURING FREEDOM, such equipment often had to be airlifted to the theater, but it was usually more modern and less likely to fail.[7]

2. Hostile ground fire restricted airlift operations.

The first airlift flights to Afghanistan could not land there because hostile forces controlled the ground. Afghanistan lacked a potent modern air force, so enemy interceptors were not much of a problem. Large numbers of man-portable antiaircraft missiles, some supplied by the United States to Afghan forces fighting Soviet forces in previous years, posed a greater threat. From 7 October to 21 December, 2001, C-17s based at Ramstein Air Base in Germany dropped thousands of humanitarian daily rations over Afghanistan. Because of the threat of surface-to-air missiles and antiaircraft artillery, the transports flew over the drop zones only at night, discharging their food packages from altitudes beyond 25,000 feet. The high night flights reduced the accuracy of the drops, increased damage to the cargo, and threatened the health of the crews. The opening of the cargo bays at such an altitude required loadmasters to wear oxygen masks and helmets. They suffered from rapid decompression of the aircraft cabins and extreme cold, as if they had been transported instantly to the top of Mount Everest.

The threat of hostile fire continued after transports began to land in Afghanistan. At first airplanes arrived at Kandahar or at Bagram only at night with limited lighting. Crews had to wear night-vision goggles. These conditions increased the risk of accidents. Hostile fire had challenged Operation PROVIDE PROMISE in Bosnia between July 1992 and January 1996. Transports destined for Sarajevo had to alter schedules, make steep ascents and descents, unload with engines running, fly at night, or drop cargo from high altitudes to avoid damage or destruction from hostile ground troops in the airport area.[8] ENDURING FREEDOM airlift pilots used similar tactics. After the bases became secure enough for daylight flights, infrequent and irregular landings and takeoffs suppressed the risk but also limited delivery to levels below that predicted by automated planning systems.[9] Hostile fire had not challenged air mobility much during Operation DESERT SHIELD because there was no fighting around the aerial ports of embarkation in Saudi Arabia before January 1991.

3. Diplomatic restrictions extended flights and delayed deliveries.

If they had been obtainable, blanket diplomatic clearances would have allowed ENDURING FREEDOM's strategic airlift flights to be shorter and more direct. Airlifts the magnitude of ENDURING FREEDOM to the other side of the globe require diplomatic arrangements with many other nations for the use of bases in those countries and for overflight clearances. The operation suffered because other nations sometimes refused or limited such base use or clearances. The absence of such diplomatic approval required the Department of State, upon whom the Defense Department depended for diplomacy, to search for other nations that might grant such approval. Sometimes approval was granted at higher levels but not communicated sufficiently to lower levels of command. Other times, the location of a staging base had to be changed. Some nations limited the number of flights that could takeoff or land in their territory or the number of aircraft that could be on the ground at one time. These political obstacles forced planners to devise convoluted routes, extending mission times and exposing airlifters to greater risks from weather or terrain. At the very least, they delayed the delivery of personnel or cargo to the theater.[10]

This was not a new problem. During Operation NICKEL GRASS in 1973, many European nations denied the United States overflight approval or the use of their airfields for the delivery of war materiel to Israel. Transports were forced to weave their way around these countries and stay as much as possible over the Mediterranean Sea, using Lajes Field in the Azores as a staging base in the Atlantic between the United States and Europe. Fortunately, Portugal allowed use of that field for the 1973 emergency. In 1986, during Operation ELDORADO CANYON, France and Spain denied permission for U.S. combat aircraft on the way from England to Libya to fly over their territories. This denial forced the raiders to fly in a great arc around Europe, increasing their round-trip distance by almost 6,000 miles and forcing greater reliance on refuelers. During Operations DESERT SHIELD/STORM, the United States enjoyed greater international support for its war on Iraq, but diplomatic clearance paperwork consumed many man-hours, requiring heavy dependence on reserve augmentees. Lack of sufficient diplomatic clearances impaired the airlift and will likely remain a challenge to airlifters of the future, especially in regions of instability.[11]

4. A previously written operations plan would have provided a head start.

When terrorist attacks struck the United States on September 11, 2001, neither Air Mobility Command nor Central Command had a detailed off-the-shelf plan for airlift to Afghanistan. Leaders had not counted on the need to invade Afghanistan to replace the Taliban government that sheltered leaders of the Al Queda international terrorist network. Failure to have a prepared plan from which to work contributed to inaccuracies in the Time-Phased Force Deployment Data, which were somewhat unrealistic. Operations DESERT SHIELD/STORM had also lacked a finished operations plan, but the draft of such a plan was already circulating for approval. That draft had provided initial planners of the airlift a head start in scheduling the airflow.[12]

Section III. Airlift Problems Common to DESERT SHIELD/STORM and ENDURING FREEDOM.

1. Automated planning systems were poorly applied.

During Operation ENDURING FREEDOM, automated planning systems failed to match airflow supply with demand. This had been also been a problem during Operations DESERT SHIELD/STORM. In both operations, the Time-Phased Force Deployment Data (TPFDD) and the Joint Operations Planning and Execution System (JOPES) were not very useful, partly because initial operational plans were not detailed or practical enough. In addition, personnel failed to input data as quickly or as accurately as needed to match airflow schedules with changing requirements. During DESERT SHIELD/STORM, planners did not expect deploying units to take so long in the loading of transports. In ENDURING FREEDOM, the need to shift cargo from C-5s to C-17s at intermediate staging bases threw off the TPFDD schedule. Weather and the need for maintenance on some aircraft delayed flights, resulting in the arrival of transports in the theater out of sequence. The need to transport more personnel and cargo than originally planned resulted in postponement of the deployment completion date.[13]

2. In-transit visibility (ability to locate transports or loads) was insufficient.

The lack of in-transit visibility, or the ability to know exactly where each transport and its personnel or cargo were at a given moment, hindered Operation ENDURING FREEDOM's airlift, although not as much as during the earlier DESERT SHIELD/STORM airlift. Telephone calls, e-mails, and faxes helped make up for inaccuracies in schedules for both operations. During ENDURING FREEDOM, 29 separate systems fed the Global Transportation Network (GTN), and some of these had no direct or automated feeds. Manual transcription and entry of data sometimes resulted in poor documentation of airlift loads. More than 2,500 sites fed data into the system, which sometimes received two million transactions per day. The U.S. Transportation Command's formation of a data integrity team to check information accuracy and analyze the missions and Air Mobility Command's deployment of teams to set up advanced systems to track the cargo contributed to significant visibility improvements during the first few months of the operation. Different services sometimes used different methods for labeling cargo or relied on incompatible hardware, resulting in accounting errors. In ENDURING FREEDOM, commercial airlift delivered cargo promptly according to commercial tracking systems, but those systems sometimes failed to link with the U.S. Transportation Command's own tracking systems that would have allowed a clearer picture of where everything was. The transfer of cargo from C-5s and commercial aircraft to C-17s at intermediate staging bases for delivery to the theater confused cargo trackers, partly because not all of a C-5s cargo could fit on a single C-17. Items that arrived together at the staging bases on one flight would arrive in the theater on different flights and at different times.[14]

3. Not enough theater bases were available.

When Operation ENDURING FREEDOM began on 7 October 2001, Afghanistan was under the control of a hostile Taliban government. No bases in that country were initially available for airlift flights. The number of bases available around Afghanistan was also extremely limited at first. Even after opening, airfields at Kandahar and Bagram were incapable of handling large quantities of cargo and troops arriving daily. ENDURING FREEDOM faced the same airlift problem that Maj. Gen. Vernon J. Kondra had described for Operations DESERT SHIELD/STORM. He likened the airflow problem to a hose with a four-foot opening at one end and a four-inch nozzle at the other. More was going in than coming out, leading to a backlog and congestion within the hose. The very limited number of key offload bases in both operations overloaded facilities and increased vulnerability.

Airlift forces had no staging base in the theater where crews could rest. The extremely long initial ENDURING FREEDOM food drop missions, sometimes taking more than thirty hours, required each C-17 to carry three rather than two pilots so that they could rotate rest periods. Opening bases in Afghanistan provided no relief for transport crews because they had to takeoff as soon as their cargo was unloaded. Pilots left their engines running and kept their seats. The round-trip flights from the staging

bases to Afghanistan and back drained the aircrews physically, mentally, and emotionally.[15]

4. Intermediate staging bases were overloaded.

Staging bases were crucial in the strategic airlift to Afghanistan, since not enough C-17s or refueling aircraft were available to airlift personnel and equipment all the way from the aerial ports of embarkation to the theater. C-5s and large commercial airliners under contract moved troops, equipment, and supplies to the staging bases, to be transferred to C-17s for delivery to Afghanistan and countries in the theater. The need to handle vastly increased numbers of wide-bodied aircraft and crews and the transfer of their cargo sometimes overloaded the bases' ramp space and billeting and messing facilities. Two air bridges were constructed, one eastward using Moron Air Base in Spain, Rhein-Main and Ramstein air bases in Germany and Incirlik Air Base in Turkey, and one westward using Andersen Air Base on Guam in the Pacific Ocean and Diego Garcia in the Indian Ocean. Besides providing a place to transfer cargo from larger to smaller airplanes, these bases allowed ground refueling of aircraft, crew changes, and aircraft repairs. Flight delays at these bases, often caused by weather or maintenance problems, contributed to problems of saturated ramp space and overburdened personnel facilities. In Germany, weather and airfield restrictions were greater problems than in Spain or Guam.

Overloaded intermediate staging bases also hindered the DESERT SHIELD/STORM airlift, which depended more on an eastward air bridge to southwest Asia. The 1990-1991 operation relied primarily on four staging bases, two in Germany and two in Spain. Flight delays at these bases, partly because of accelerated arrivals, maintenance problems, and weather, produced a chain reaction that slowed down arrivals of troops and cargo in the theater.[16]

5. Not enough airlift aircraft were available.

Shortages of quality airlift aircraft reduced the potential efficiency of strategic airlift during Operation ENDURING FREEDOM. By the end of December 2001, the Air Force had acquired only 80 of the C-17s it needed to replace the C-141s that were being eased out of the inventory. The limited number of Globemaster IIIs did not allow many to fly directly from the United States to the theater, forcing reliance on C-5s, commercial flights, and staging bases. So many C-5s and C-17s were committed to the Afghan airlift that few were available for emergencies or channel flights in other parts of the world. If war had broken out elsewhere, demands for airlift aircraft might have exceeded Air Mobility Command's ability to deliver. Fortunately, commercial carriers in the wake of the September 11 attacks had many more airliners than they could use and readily offered them for contract flights. For this reason, a call-up of the Civil Reserve Airlift Fleet (CRAF) was not needed. A decrease in the number of airliners because of a declining airline industry and fewer airline producers could reduce the number of commercial aircraft available in the future.[17]

The same problem of not enough airlift aircraft faced the earlier Operations DESERT SHIELD/STORM. In 1990, Military Airlift Command was able to call up Air

Force Reserve and Air National Guard transports to supplement its organic fleet of C-5s and C-141s, but they were not enough. For the first time, the CRAF was activated. Two stages of this call-up of civilian airliners allowed the Air Force to meet the increased demand. Airlines were hard pressed to meet their own demands, such as the transportation of passengers during the December 1990 holiday season. Military Airlift Command also acquired temporarily the use of twenty KC-10 tankers from the Strategic Airlift Command for use as transports. Even with the use of these additional aircraft, the Air Force contracted with foreign airlines for more airplanes.[18] Large future airlifts are also likely to demand more transport aircraft than the Air Force can supply.

6. Some airlift aircraft types were unreliable.

Operation ENDURING FREEDOM demonstrated the need to acquire more C-17s, modernize the C-5s, and completely retire the C-141s. DESERT SHIELD/STORM's airlift had demonstrated the need to replace the C-141 Starlifter with the C-17 Globemaster III, which could carry larger and heavier cargo and land on and takeoff from smaller and less-developed airfields. The newer aircraft was also much more reliable than the older ones. Although wing cracks that had plagued the C-141 fleet before ENDURING FREEDOM had largely been repaired, in some cases they remained, forcing reduction of a number of C-141 loads. Many were not mission-capable and languished in hangars awaiting repairs. Although the Air Force had replaced many of the C-141s by 2001, there were still not enough in the inventory to allow retirement of all the Starlifters. The limited number of C-17s at the time of ENDURING FREEDOM forced the Air Force to use the bulk of its C-5 fleet to carry cargo from the United States to staging bases for delivery to the theater. By 2001, the C-5 had replaced the C-141 as the airlift problem aircraft. C-5s still furnished about half of Air Mobility Command's strategic airlift capability in 2001. By the end of that year, C-5s had moved almost half of ENDURING FREEDOM's cargo and 30 percent of its passengers. A C-5 could carry twice as many standard cargo pallets as the C-17. It could open at both ends for quicker loading and unloading and it could "kneel" on the runway for easier handling of cargo. Although it was still an indispensable part of the airlift feet, the aircraft's mission capable rate for the year 2001 was less than 60 percent. Suffering maintenance problems, C-5s sometimes occupied scarce space awaiting repairs at staging bases. Some airlift flights transported C-5 parts to keep the big birds in operation. C-5 flight delays produced C-17 flight delays. C-17 flights from the staging bases to the theater were cancelled or postponed if C-5 flights had not arrived with the cargo they were expected to move. The Air Force had plans to modernize the C-5 fleet, equipping the Galaxies with new engines and new avionics, but those improvements had not yet been made.[19]

7. Too much cargo went by air.

If more air munitions had been deployed on pre-positioned ships or at land bases in or near the theater during ENDURING FREEDOM, the number of hazardous airlift flights could have been reduced. Increasing forward-deployed precision-guided munition stockpiles would release more airlift assets for the transportation of other cargo. At one point, the base at Diego Garcia nearly ran out of munitions for the warplanes it was

sending to Afghanistan. The need to airlift such weapons to Diego Garcia for accelerated combat air operations from that Indian Ocean island demanded more airlift resources and increased risks. At some of the staging bases, the temporary storing of hazardous cargo or its transfer from one aircraft to another was a problem. Regulations required that such cargo be stored at certain distances from buildings, for example. Another pre-positioned ship or two could have eliminated this problem. One such ship could carry enough munitions to fill 400 C-130s.[20]

This problem was not new. During Operations DESERT SHIELD/STORM, too much cargo also went by air and too little by sea. Much cargo had been marked at a higher priority than it deserved, as if it required rapid transportation by air. To solve this problem, air transportation officials remarked some of the cargo. To allow for the rapid "overnight" transportation of truly high-priority items, U.S. Transportation Command authorized creation of a Desert Express airlift. At first this involved one special C-141 flight per day, but this was later expanded to two.[21]

Summary:

DESERT SHIELD/STORM intertheater airlift challenges provided important lessons the Air Force applied in time for ENDURING FREEDOM. In the decade between 1991 and 2001, the Air Force **added C-17s** to its inventory, established Air Mobility Command to be the **single manager** for transports and tankers, set up **expeditionary forces** designed specifically for deployments, improved the quality and distribution of its **materiel handling equipment**, and designed more **realistic** embarkation **schedules**.

ENDURING FREEDOM faced challenges not encountered in DESERT SHIELD/STORM, such as the lack of **infrastructure** in the theater, especially for refueling aircraft. To lessen the threat of **hostile fire**, airlift managers resorted to high-altitude drops, night operations, flares, steep takeoffs and landing patterns, rapid unloading, and irregular daylight schedules. Failure to obtain enough **diplomatic clearances** resulted in longer, more indirect, and riskier routes and less use of certain bases. No preliminary **operations plan** for a major airlift to Afghanistan forced planners to build almost from scratch.

DESERT SHIELD/STORM and ENDURING FREEDOM shared other challenges. Both suffered from poorly applied **automated planning systems** and lacked sufficient **in-transit visibility**, or the ability to see more clearly where crews, transports, and payloads were at any given time. More standard automated systems and better training of personnel to use those systems should help provide greater use of the Joint Operations Planning and Execution System (JOPES) and the Time-Phased Force Deployment Data (TPFDD). Neither airlift had enough **theater bases** at first, and **intermediate staging bases** became overloaded**.** Airlifts to southwestern and central Asia required numerous foreign bases, both for staging and for embarkation. Those bases also needed liberal ramp and runway space and adequate facilities for housing, dining, maintenance, refueling, and cargo storage. **Older airlift aircraft** malfunctioned in both operations, requiring their replacement or modification. Finally, **too much cargo went**

by air. Considerable amounts of freight airlifted for DESERT SHIELD/STORM and ENDURING FREEDOM could have gone by sea, releasing airlift resources for higher priority items. The same kinds of challenges will no doubt confront future airlift managers.

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