



# A/TQ

AIRLIFT/TANKER QUARTERLY  
Volume 17 • Number 1 • Winter 2009

*Airlift/Tanker Quarterly* is published four times a year by the Airlift/Tanker Association, Ms. Carol Mauchline, Secretary, 1338 Pepperidge Drive, O'Fallon, Illinois 62269. Postage paid at Belleville, Illinois.

Subscription rate: \$40.00 per year. Change of address requires four weeks notice.

The Airlift/Tanker Association is a non-profit professional organization dedicated to providing a forum for people interested in improving the capability of U.S. air mobility forces. Membership in the Airlift/Tanker Association is \$40 annually or \$110 for three years. Full-time student membership is \$15 per year. Life membership is \$500. Corporate membership includes five individual memberships and is \$1500 per year. Membership dues include a subscription to *Airlift/Tanker Quarterly*, and are subject to change.

*Airlift/Tanker Quarterly* is published for the use of subscribers, officers, advisors and members of the Airlift/Tanker Association.

The appearance of articles or advertisements, including inserts, in *Airlift/Tanker Quarterly* does not constitute an endorsement by the Airlift/Tanker Association, the Air Mobility Command, the Department of the Air Force or the Department of Defense, of the viewpoints, products or services mentioned or advertised.

©2009. Articles appearing in this publication may not be reprinted, in any form, without prior written approval from the Airlift/Tanker Association.

*Airlift/Tanker Quarterly* is quarterly news cycle-dependent and is distributed as follows: Winter: January/February/March; Spring: April/May/June; Summer: July/August/September; Fall: October/November/December [actual distribution dates vary]. The copy deadline for submitted stories, articles, letters, etc., is as follows: Winter: December 30th; Spring: March 30th; Summer: June 30th; Fall [Convention Edition]: August 30th.

*Airlift/Tanker Quarterly* accepts advertising for the inside front and back covers for the Winter, Spring and Summer Editions; and for throughout the Fall Convention Edition.

#### EDITORIAL STAFF:

Gen. Walt Kross, USAF, Retired  
Chairman, Board of Officers

Mr. Collin R. Bakse  
Editor and Art Director

Ms. Dawn L. Bakse  
Editorial and Advertising Coordinator

Mr. Doug Lynch  
Business Manager

Col. Ronald E. Owens, USAF Retired  
Editorial Advisor

Col. Gregory Cook, USAF  
Public Affairs Coordinator

PRINTED IN U.S.A.

# CONTENTS...

## Association News

Chairman's Comments .....	2
President's Message.....	3
Secretary's Notes.....	3
Association Round-Up.....	4-7

## Cover Story

### From *the* Question Mark to *a* Question Mark

A Brief History of Aerial Refueling .....	8-12
---	------

### National Treasure:

Recognizing 40 Years of C-5 Galaxy Operations .....	14-19
---	-------

## Departments

Industry Highlights.....	20
Industry Partner Spotlight: Pratt & Whitney.....	21
Mobility Heritage & Heroes.....	22-23
Mobility News & Views.....	23
Association Contacts.....	24



ON THE COVER: Montage of images associated with the history of aerial refueling, including the flight of the "Question Mark" and a KC-135 refueling a KC-10, by Collin R. Bakse.

## Celebrating Synergy...

In late December, after several rounds of discussion and a considerable amount of word-smithing, the Board of Officers approved "Air Mobility: Delivering the Joint/Coalition Team to the Fight" as the theme for the 2009 Airlift/Tanker Association Convention & Symposium.

While working on the artwork for the convention logo, which is driven by the selected theme, it occurred to me that the theme was a celebration of "synergy" – defined as the interaction or cooperation of two or more groups or organizations to produce a combined effect greater than the sum of their separate effects.

Considering that the two main components of Air Mobility – airlift and aerial refueling – produce a combined effect much greater than either can generate individually, the definition of synergy can also be aptly applied to Air Mobility.

The reason I believe the theme is a "celebration" of synergy can be best understood by looking at the definitions of three of the main ideas cited in the theme: *Joint*, *Coalition* and *Team* –

*Joint*: Two or more organizations united in an activity or achievement. *Coalition*: An alliance for combined action. *Team*: A cooperative unit.

Each of these definitions embodies the concept of synergism to a certain degree, and combined, rise to the level of a celebration of synergy.

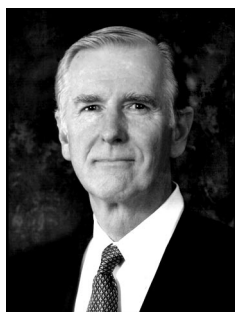
Combined with the definitions of the two remaining keywords used in the theme – *Delivering*: Transporting someone or something to the proper destination; and, *Fight*: A vigorous effort or contest undertaken to gain a particular goal – the theme embodies the Air Mobility mission in this time of international turmoil.

To further illustrate the synergism of this year's theme it should be noted that our Association Chairman, General Walter Kross (USAF ret), worked closely with General Arthur Lichte (USAF), commander of Air Mobility Command, to gain AMC's perspective on what the theme should convey, and the Board of Officers, as well as the Board of Advisors, participated earnestly in "tweaking" the final wording. Both Boards also participated in the creation of the convention logo by providing timely, useful feedback during the creative process.

Highlighted by the synergy of enthusiastic member camaraderie, active industry partner participation and stimulating seminar presentations, the 2009 A/TA Convention & Symposium will no doubt be another one for the record books!

Collin R. Bakse, editor

# Chairman's COMMENTS



Gen Walter Kross  
USAF, Ret

As our first 2009 issue of ATQ hits the winter streets, we find Anaheim 2008 behind us, and Nashville 2009 now in our sites.

The Year 2009 holds particular significance for air mobility professionals and the Airlift/Tanker Association. It marks the 60th anniversary of the victory of the Berlin Airlift, in May 1949. And just as significant, 2009 marks the 80th anniversary of the famous Question Mark flight, in January 1929, considered to be the breakthrough demonstration of air refueling's military feasibility. While Berlin was not the first airlift, and the Question Mark not the first air refueling—both events have become the historical cornerstones of their craft.

Our Anaheim 2008 Convention and Symposium was quite successful and professionally rewarding. Blessed with perfect California weather for the entire week, nothing deterred us for focusing on and enjoying our theme of "Berlin, to Baghdad and Beyond." There were many highlights, but I was particularly struck by the Berlin Airlift seminar, attended by over 2,000 attendees.

Now we turn to Nashville 2009. In mid-November, we began our preparations with an Anaheim Hot Wash, with a "feathering in" of inputs from AMC. In late December, we nailed down our Convention and Symposium theme, again with AMC coordination. In January, we sent out our official invitations to our keynote speakers—pre-coordinated, of course. And this month, we held our Winter Board meeting, focusing on our Awards Program nominees and second-level detail Convention & Symposium planning. A/TA is an organization relying on totally committed volunteers executing continually refined processes.

Our 2009 theme is "Air Mobility: Delivering the Joint/Coalition Team to the Fight." This theme closely tracks AMC's recently refreshed vision, mission, and focus areas. It acknowledges that our members are on the Joint Team, carrying out valuable duties in support of two on-going armed conflicts and a series of emerging crises around the globe, and always remain ready to assist in humanitarian endeavors as we are needed. It is no accident that this year's theme also synchronizes with the directions our new Air Force Chief, General Schwartz, has signaled for USAF.

And so, as we launch into 2009, the members of the A/TA Board look forward to seeing you as we prepare for Nashville 2009 – as we conduct our preparations and association business in Orlando, Wright-Patterson AFB, McChord AFB (Mobility Rodeo Week), and Scott AFB. And, please mark your calendars for 29 October-1 November for this year's convening of Air Mobility professionals. Through the year, periodically check our website at [www.atalink.org](http://www.atalink.org) for emerging details as we march to Nashville.



**41ST ANNUAL A/TA CONVENTION & SYMPOSIUM**

**29 OCTOBER – 1 NOVEMBER 2009 • NASHVILLE, TENNESSEE**

# President's MESSAGE



**CMSgt Mark Smith**  
USAF, Ret

What a great convention in Anaheim, California! Salutes to all - especially to our many volunteers for providing your time to organize a great convention on the west coast. It is simply amazing to see our organization and conventions continue to grow as we maintain our trademark level of camaraderie and friendship. Our theme "From Berlin to Baghdad and Beyond" encourages us to reflect upon and honor our past, current and future warriors. Our Mobility Commanders, Generals Duncan McNabb and Arthur Lichte provided outstanding "state of the command" presentations at our convention. We gratefully appreciate your steady response to the "Global War on Terrorism" while also playing a leading role in providing humanitarian support around the globe. We support your dedication and vision as our mobility warriors mold the future.

I would like to congratulate our most recent A/TA Hall of Fame inductee, Major General (Ret) Bob Patterson and all of our 2008 award recipients. Your professionalism and contributions to air mobility are simply incredible. One award that is not highlighted in the convention issue of A/TQ (it's a surprise) is the President's Award. This award identifies and recognizes an A/TA member-volunteer who has contributed immeasurably to the overall success of the Airlift/Tanker Association. This year the award was presented to Colonel (Ret) Miles Wiley.

Miles Wiley provides assistance to the A/TA Board and convention management team in planning, scheduling and executing objectives to ensure a successful annual convention each year. Miles has assisted the Vice-President for Programs monitoring hotel and other contract negotiations relating to the convention since 1999. He has been a key trouble shooter for a myriad of convention activities - most notably hotel room negotiations and reservations. This important area impacts individual members, chapter relations and our industry partners. Miles has been one of the most active and loyal volunteers imaginable. He encounters an early "show time" and is always willing to extend his crew duty day to complete the mission. Miles knows how to get the job done with the eagerness to "make it happen." Colonel (Ret) Miles Wiley has exemplified the legacy of volunteerism in the Airlift/Tanker Association by selflessly giving his time to provide a memorable experience for our Air Mobility Warriors. Thanks and congratulations Miles!

Our 2009 A/TA Convention & Symposium theme is set - Air Mobility: Delivering the Joint/Coalition Team to the Fight. This theme represents what you do so well every day and Nashville, Tennessee is a great place to recognize and celebrate your efforts!

Lastly and most importantly, thanks to many of you who are deployed serving our great nation. We sincerely appreciate your service to air mobility and the sacrifices you and your families are making to protect our freedom. Our prayers and support are with you always. God bless you all.

*Cabin Report...Secure!*

**MARK YOUR CALENDARS!**  
**2009 A/TA Convention & Symposium**  
**29 October - 1 November**  
**Gaylord Opryland Hotel, Nashville, Tennessee**

## Secretary's Notes

Once again, the annual convention and symposium was an outstanding event. I hope that many of you had the opportunity to attend this year, and if you didn't that you will be able to attend next year. It is an excellent opportunity for education,

exchange, and enjoyment.

I have to admit that my personal favorite was the Berlin Airlift Panel. Tears welled in my eyes as I listened to some of the panel members relay their personal commitment and life

changes as a result of that operation. And as I sat there listening, I thought to myself that in 50-60 years from now, some of you may be sitting on a similar panel - maybe the Operation Enduring Freedom Panel or Operation Iraqi Freedom Panel - relaying similar tales of dedication and selflessness. And so my thanks to all of you who have served, are serving, and will serve.

We chartered two new chapters at this year's convention - the Flight Test Chapter at Edwards and the Special Operations Chapter at Hurlburt - and we extend a special welcome to those new Chapters. Their chaptering characterizes the significant expansion and success of the Airlift/Tanker Association. We are spreading our "wings" to peripheral missions outside the core mobility mission area.

I look forward to a new year of A/TA business and the opportunity to work with many of you.

Carol



**Carol Mauchline**

**When did you last update  
your membership info?**

**It's Easy!**

**Simply go to**

**[www.atalink.org](http://www.atalink.org) -**

**Click "Membership"**

**and scroll down to near the  
bottom of the page -**

**Click the link "check your  
membership status" -**

**Log-in using your first name,  
last name and SSN final 4 -**

**Update your info!**

**That's It!**





## Association ROUND-UP

### Industry Partners JBT AeroTech and DRS Technologies Raise Funds for the A/TA Education Fund during 2008 Convention & Symposium in Anaheim, California

Over the last few years JBT AeroTech (formerly FMC Technologies) has devised ways to raise funds for the A/TA Education



Gen Arthur Lichte, AMC commander, playing "Load the Loader" at JBT AeroTech's booth during the 2008 A/TA Convention. The General's bean bag toss was picture perfect – "nothin' but loader." (A/TA photo by Collin Bakse).

Fund during the Association's National Convention and Symposium – basketball shoots, slot car racing, book signings, etc. – and their efforts have paid off big.



A/TA President Mark Smith (R) accepts a \$6,102.00 check from JBT AeroTech's Show Manager Andy Wilson (L). JBT raised the funds during the 2008 Convention through "Load the Loader, a bean bag toss game, and the sale of "The Berlin Candy Bomber" and "Mercedes and the Chocolate Pilot" book sales autographed by author and A/TA Hall of Famer Gail Halvorsen. The \$6,102.00 donation will be added to the Association's Education Fund. (Photo courtesy JBT AeroTech).

At the 2008 convention in Anaheim, CA, attendees lined up to play "Load the Loader" and toss bean bags for a chance to win a "bomber" jacket autographed by Berlin Airlift hero Col (ret) Gail Halvorsen and to get copies of the books "The Candy Bomber" and "Mercedes and the Chocolate Pilot" (also autographed by the famous A/TA Hall of Famer). JBT matched the amount raised and sent a check for \$6,102 to the Association earmarked for the Education Fund.

DRS Technologies held a drawing for a beautifully framed painting created by Maggie the Elephant, embellished with several challenge coins. The popular event resulted in DRS Technologies being able to present a check to the Association's education fund for \$6,000. The company presented a check for that amount to the Association at the Convention.

The Board of Officers and membership extend a sincere "Thank You!" to JBT AeroTech and DRS Technologies for their support of the Association and the education fund and look forward to their next fun and innovative fund-raising ideas.



A drawing for a chance to win an original painting by "Maggie the Elephant" held by A/TA Industry Partner DRS Technologies during the 2008 A/TA Convention in Anaheim, CA, netted \$6,000 for the Association's scholarship fund. DRS Technologies Field Service Supervisor, Mr. Kevin Williams, presented a check for that amount to A/TA president, CMSgt (ret) Mark Smith, at the convention. (A/TA photo by Collin Bakse).

## Capital Chapter

### Capital Chapter Raises \$9,000 for Snowball Express

In 2007, the A/TA National Capital Chapter began to focus its efforts on raising money for Snowball Express, an all-volunteer, non-profit organization whose mission is to help create new memories and a few days of joy for children who have recently lost an active duty parent to the Global War on Terror.

That year members from the National Capital Chapter presented a \$10,000 check to Mr. Roy White, Chairman of Snowball Express, at the A/TA Convention & Symposium in Nashville, TN. The Chapter raised the money from golf tournaments held in 2007, with help from industry partners including: Atlas, Boeing, Booz Allen and Hamilton, EADS, General Dynamics, General Electric, Honeywell, Lockheed Martin, Northrop Grumman, Raytheon, Rolls Royce, and Smith Aerospace.

At last year's Convention in Anaheim, CA, the chapter followed up with another \$9,000 raised through a golf tournament held at Andrews AFB, MD! Capital Chapter president, Col Kevin Kilb, and Mr. George Sturgill, from Lockheed Martin, representing the Chapter's Industry Partners, presented the check to Ms. Patricia Marshall and Mr. Roy White of Snowball Express. A/TA Chairman, Gen (ret) Walt Kross, and A/TA president CMSgt (ret) Mark Smith, were on hand for the presentation.

To learn more about The Snowball Express please visit: [www.snowballexpress.org](http://www.snowballexpress.org).



Capital Chapter president, Col Kevin Kilb, second from left, presents a check for \$9,000 to Snowball Express representatives, Mr. Roy White and Ms. Patricia Marshall, at the 2008 A/TA Convention & Symposium. Also present for the presentation were Mr. George Sturgill from Lockheed Martin, left, A/TA Chairman, Gen (ret) Walter Kross, second from right, and CMSgt (ret) Mark Smith, A/TA President, far right. (A/TA photo by Collin Bakse).

# Canadian Forces Newspaper "The Contact" Praises A/TA Symposium

The following story appeared in the November 21, 2008 edition of "The Contact," a newspaper serving 8 Wing, Canadian Forces Base, Trenton, Ontario, Canada –

## 8 Wing/CFB Trenton Personnel Attend Symposium Put On By the US Air Mobility Force

by Major James McPhee, CFAWC

The 2008 40th Annual Airlift/Tanker Association (ATA) Convention and Symposium was held earlier this month in Anaheim, California.

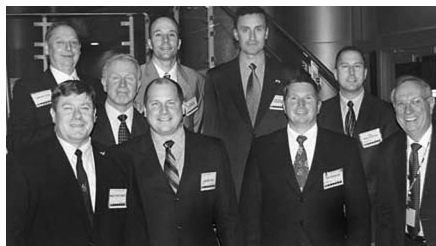
In attendance were Lieutenant-Colonel Jim Kinnear, currently serving a tour in the USA at the US Air Force Air Mobility Command Headquarters of Scott Air Force Base, and Maj Jim McPhee, currently with the Canadian Aerospace Warfare Centre in Trenton. The two were among some 4,500-5,000 other Airlift/Air Tanker Association members. This being the largest symposium that the US Air Mobility Force puts on annually, was one of the most impressive, educational, and well-run conferences either of the two Canadian attendees has ever seen.

The Airlift/Tanker Association comes from a proud and long history. It is dedicated to providing a forum for US and allies alike to ensure that forces have the air mobility capability required to implement national security strategy. Truly international in scope, with members and chapters throughout the world, the association is strong and continues to grow beyond anyone's imagination. Membership includes active duty, reserve, guard, retired, and both officers and enlisted, as well as civilian and industry supporters of the air mobility mission. Association benefits and programs include a quarterly magazine; annual national conventions; educational programs, seminars and symposiums; college scholarships; awards; and heritage programs that recognize outstanding contributors to air mobility, both past and present.

This year LCol Kinnear and Maj McPhee were very fortunate to have attended the 40th annual convention and take part in the myriad of professional development

opportunities that were presented. From the extremely professional and relevant lectures ranging in topics from fuel management, leadership principles, and current operations within Afghanistan, to the unparalleled opportunities to meet and discuss the various systems of the future with the hundreds of industry supporters.

The symposium was truly one of the



**Great Lakes Chapter members in attendance at the conference included the following: Front row: BGen Michael Peplinski, 127th Wing/CC, Maj James McPhee, LCol James Kinnear, MGen (Ret'd) John Miller. Back row: CMSgt (Ret'd) James Wilton, A/TA Board of Advisors, Mayor Rigoberto Eduardo Arriagada, Chilean Air Force, Maj Jason Cousine, USMILGP CHILE, Comandante Rafael Alonso Carrere, Chilean Air Force, Capt Joseph Winchester, Great Lakes Chapter President. (Courtesy Photo).**

best opportunities for anyone with an Air Mobility background to participate in. Some of the "take aways" from the symposium included future study of the Special Airborne Mission Installation & Response System (SABIR), a system that has been looked at for both search and rescue as well as tactical application with respect to the Hercules E,H, and J fleets to increase visibility in the rear door area of the aircraft. Further

data on fuel management software programs to encompass all fleets, LINK communications systems, as well as electronic flight bags and engineering solutions for legacy Hercules will also continue to be explored.

Both officers echo the fact that by working closely with our allies our ability to study systems, determine the need and application has become much easier through the common lessons learned and communicated at conferences such as this one. In fact, much of the information and contacts gained for the new Joint Precision Air Drop capability (JPADS) that will be employed in theatre by the end of February 2009 was garnered through participation at similar events.

The networking, education, and opportunity to discuss issues that affect both our country's air mobility fleets is second to none at the Airlift/Air Tanker Association. The importance of this conference is reflected in the audience of some 4500 – 5000 personnel from all ranks to include no less than 40 General Officers in attendance (some 123 stars) and including the Secretary of the Air Force himself.

For both Canadian officers, this was an eye-opening experience, the hospitality afforded them by their southern brethren was second to none, forging a long-term commitment to and appreciation for the association with eyes towards next year to include Canadian ranks from Flag Officer down for participation.

For anyone further interested in the Airlift/Air Tanker Association, please do not hesitate to visit its website, <http://www.atalink.org> or contact Maj Jim McPhee at the Canadian Aerospace Warfare Centre (CFAWC) at 8 Wing/Trenton.

## A/TA National Board Keeps 2008 Convention Registration Fees In Place for 2009

In an action aimed at helping A/TA members during the country's current financial situation, the National Board, at its Winter Board Meeting in Orlando, Florida, voted to keep the registration fees for the Association's 2009 Convention & Symposium the same as those charged for the 2008 event.

The decision was broadened to also include the Golf Tournament fee, Aerospace

Industry Show booth space fees and A/TQ advertising rate fees.

Convention registration information and forms will appear soon on the Association website: [www.atalink.org](http://www.atalink.org); and in the Spring edition of A/TQ. The 2009 A/TA Convention & Symposium is scheduled for 29 October - 1 November, at the Gaylord Opryland Resort & Convention Center, in Nashville, Tennessee.

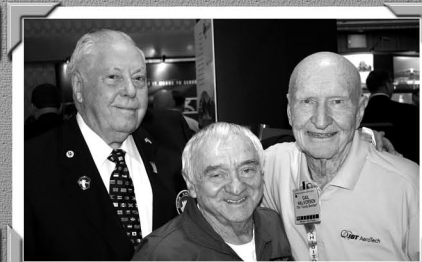
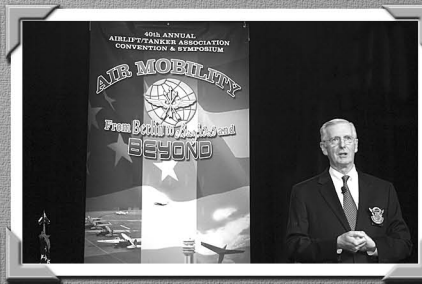
## MARK YOUR CALENDARS!

**2009 A/TA  
Convention & Symposium  
29 October - 1 November**

**Gaylord Opry Land Hotel,  
Nashville, Tennessee**



# *A Look Back: 2008 A/FA Convention & Symposium Anaheim, California*









# Cover STORY

## From the Question Mark to A BRIEF HISTORY OF AERIAL REFUELING a Question Mark

### Emphasizing the Importance of the Aerial Refueling Mission

In keeping with Air Mobility Command's determination to feature the Aerial Refueling mission as an underlying theme throughout 2009, A/TQ will be publishing an on-going history of aerial refueling throughout the year. This endeavor will feature a "brief" history of aerial refueling being generated under the auspices of Mr. Ellery D. Wallwork at the Air Mobility Command History Office, beginning with this edition of the magazine and continuing into future editions. To further highlight the aerial refueling mission, each section of the history will be accompanied with articles about current aerial refueling operations.

*"Air refueling operations continue to be amazing aerial feats, especially for people who witness the process for the first time. As mobility Airmen, we consider it simply part of what we do but, in reality, it is quite remarkable to have two aircraft meeting less than 50 feet apart at more than 20,000 feet above the ground traveling at speeds close to 400 miles per hour while a tanker replenishes another aircraft with the fuel necessary to continue the mission.*

The amazement is even greater when one considers the first major air refueling operation happened 80 years ago when the Question Mark, a tri-engined Fokker C-2 aircraft with a crew of five, climbed into the southern California sky Jan. 1, 1929. Over the next seven days, the crew kept the aircraft airborne through air refueling from two, three-manned crews operating Douglas C-1 single-engine transports that had been transformed into tankers with the addition of two 150-gallon tanks to offload fuel.

Combined, those historic tankers made 43 take-offs and landings to deliver 5,660 gallons of fuel, 245 gallons of engine oil, storage batteries, spare parts, tools, food, clothing and mail during the Question Mark's 150-hour and 40-minute operation.

Today's tanker fleet continues to play the vital role of sustaining operations. The tanker underwrites our nation's ability to project power; the aircraft extends our reach to deliver the clenched fist of US power to our adversaries, or the open hand of assistance to people in need. Without tankers, our combat aircraft cannot reach their targets. Without tankers, our resupply aircraft and humanitarian



relief materials cannot always reach their destinations. Without tankers, we cannot move our wounded warriors non-stop from the battlefield to the US for the medical care they need.

As a nation, we're overdue on building new tankers. We must make delivery of this capability a high priority for our nation. We simply must get on with it. We're working hard to ensure Air Mobility Command is ready when the next effort begins to choose the industry partner to build our next-generation tanker.

I can understand how the group of Airmen felt at the beginning of the New Year 80 years ago. Their thoughts were likely focused on how to not only successfully demonstrate the air-refueling capability, but also make people aware of its potential significant military contributions.

Today, the question isn't how critical is the tanker to our warfighters and our national security. We know the need for a tanker is critical; it's a capability our nation simply cannot do without..."

—Gen. Arthur J. Lichte  
Commander, Air Mobility Command  
December 2008



## A Concept Raises a Question

The first documented stratagem for in-flight refueling came from a Russian aviator named Alexander de Seversky, when, at the age of 23 in 1917, he proposed a method for extending flight – one plane carrying extra fuel could deliver it to another using a hose. Later, while working as an aeronautical engineer for the U.S. War Department he was awarded the world's first patent for air-to-air refueling, which proposed to provide "large fuel tankers...to supply fuel to pursuit ships while in flight." An innovative concept for sure, but one which raised a profound question – *"Is aerial refueling actually operationally practical?"*

## A BRIEF HISTORY OF AERIAL REFUELING – PART I

by Ellery D. Wallwork, AMC History Office

### "Flight of the 'Question Mark'"

On January 1, 1929, a tri-engined Fokker C-2 aircraft with a crew of five climbed into the southern California sky. This aircraft, dubbed the "Question Mark," was not history's first air refueling mission, but it played a crucial role in the beginning of air refueling efforts and the development of the U.S. Army Air Corps.

The flight, born from the ingenuity of Airmen through their experiences in World War I, lasted from January 1-7, 1929; a total of 150 hours and 40 minutes. The crew flew a 110-mile racetrack from Santa Monica, Calif., to San Diego, Calif. They also flew over the New Year's Day Rose Bowl football game. During the flight, they made 43 contacts with the tanker aircraft. Each contact lasted about 7.5 minutes, with the aircraft about 15 to 20 feet apart. Day-time contacts took place at an altitude between 2,000 and 3,000 feet, and the 10 night-time contacts took place between 5,000 and 7,000 feet.

The receiving aircraft, the Question Mark, a Fokker C-2, was a high-winged monoplane with two 96-gallon wing tanks supplemented by two 150-gallon tanks installed in the cabin. The two refueling aircraft were Douglas C-1 single-engine bi-planes with two 150-gallon tanks for offloading and a refueling hose passed through a hatch cut in the floor.

All told, the Question Mark received 5,700 gallons of fuel. During the contacts, the tanker crews also passed oil, food, water and other miscellaneous items, by means of a rope. Neither the Question Mark nor the two refuelers were equipped with radios because of the radios weight and unreliability. The crews maintained communications via notes dropped to the ground, hand and flashlight signals, and written messages displayed by ground panels and both planes.

The Question Mark's crew consisted of Maj. Carl Spatz (he later changed the spelling to Spaatz), Captain Ira Eaker, Lieutenant Elwood Quesada, Lt. Harry Halverson, and Staff Sgt. Roy Hooe. The crews of the tankers were Capt. Roy Hoyt and Lts. Aubrey Strickland and Irwin Woodring in the No. 1 aircraft, and Lts. Odas Moon, Joseph G. Hopkins and Andrew F. Salter were in the No. 2 aircraft. Capt. Hugh Elmendorf was in charge of ground operations and logistics for the mission.

Air refueling was still considered by many to be a modern marvel, and it had humble beginnings. The first attempts were in 1921 with the employment of five-gallon gas cans when a U.S. Navy

lieutenant, in the back of a Huff-Daland HD-4, used a grappling hook to snag a gas can from a float in the Potomac River. In another attempt, a wing walker with a gas can strapped to his back, climbed from an airborne Lincoln Standard to a Curtiss JN-4 to pour gas into the aircraft's tank.

While these two publicity stunts deserve mention, the first air-to-air refueling using a gravity-flow hose occurred in 1923. Earlier that year, the Army Air Service had equipped two de Havilland DH-4Bs with in-flight hoses. After installation, testing and preparation, the Army Air Service was ready to put it to use. On June 27, one of the DH-4s flew a six-hour-and-38-minute flight that included two air refuelings.

However, the early days of air refueling weren't without danger. Navy Lieutenant P. T. Wagner, the pilot of the refueler was killed during testing in 1923 when the refueling hose became entangled in the right wings of the two aircraft.

At that time, the Army's budget was very limited, and the aviation branch in particular, had not recovered from the 1919 demobilization. The tests in 1923 attempted to show the practicality of air refueling with a flight demonstration that consisted of a 37.25 hour long record-setting 3,293 mile distance record set in August, and again with a border-to-border flight from Lamas, Wash., to Tijuana, Mexico, in October.

Between the budgetary constraints and the lack of an actual application, the air refueling testing slowly ground to a halt. The Nov. 18 accident caused the Air Service to stop it altogether.

The idea for the Question Mark flight started with Lt. Quesada. Years later, General (retired) Quesada recalled that the mission was actually an incidental thought rather than a planned objective.

Additionally, by 1928, Belgium had restarted air refueling experiments, picking up where other countries had left off. In the process, the Belgians set a new record of 60 hours and 7 minutes aloft. Also in 1928, a German aircraft,

The Bremen, attempted to fly across the Atlantic.

However, it was forced to land in a barren area of Labrador. When the German government requested help from the U.S. State Department, the Army Air Corps accepted the task. Major Gen. James Fechet, head of the Air Corps, led a flight team which consisted of Quesada and Capt. Eaker. Despite poor weather and periods of heavy ground fog, they found The Bremen and her crew safe and sound. Quesada said he was surprised when Captain Eaker "decided to go over the ground fog. I said, my God, what are we going to do if we get caught up here. So then I began to think, my God, wouldn't it be nice if we had a gas station. We could just pull in to a gas station and fill up with gas again."

Captain Eaker took that idea a step further and began organizing the effort for a prolonged refueling technique, with a demonstration that would attract a lot of attention for the Air Corps.

The Question Mark's mission portended little militarily. Based on the success of this air refueling mission, the Army Air Corps scheduled a formal demonstration in the spring of 1929 as part of an Army war game maneuver.

During the demonstration, a Keystone B-3A bomber was to fly, accompanied by a Douglas tanker, from Dayton, Ohio, on a simulated bombing mission over New York City's harbor, and then return. Refueling was to occur over Washington, D.C., during both parts of the mission. However, a network of thunderstorms



The "Question Mark" crew (L to R) Major Carl Spatz (later Spaatz), Captain Ira Eaker, 1st Lieutenant Harry Halvorson, 2nd Lieutenant Pete Quesada and Staff Sergeant Roy Hooe. General (USAF ret) Carl "Tooey" Spaatz; Lt Gen (USAF ret) Ira E. Eaker; and, MSgt (USAF ret) Roy W. Hooe have all been inducted into the Airlift/Tanker Association Hall of Fame. (USAF photo).

between Ohio and Washington caused the aircraft to become separated.

Icing conditions forced the tanker to make an emergency landing in Uniontown, Penn., where it lodged itself in the mud. The bomber successfully pressed on to New York City and returned to Washington without the tanker's support.

With this disappointment, the U.S. Army Department shelved the idea of air refueling for another 12 years.

Still, in its primary objective, the Question Mark was a huge success.

"It got tremendous public attention, which is exactly what [we] had in mind," said General Quesada. "The Question Mark had no noble purpose. It wasn't going to create an operational procedure that would plunge the Air Force into a great superior power that would make it unnecessary to have an Army or a Navy. The purpose was to attract attention. I think it would be somewhat abusive not to recognize that."

In fact, it captured the public's imagination. American aviators were enthralled with the concept of air refueling. By May 26, 1929, a pair of commercial pilots in Texas, using a reconditioned Ryan Brougham monoplane, broke the Question Mark's record with 172 hours and 32 minutes in the air.

For the next several years, the record continued to be extended. It also sparked more interest among British aviators. One of them, Flight Lt. Richard Atcherly, invented one of the first formal air refueling systems.

### The 1930s: A Lag, But Not the End of Aerial Refueling

After the success of the Question Mark's January 1929 aerial refueling flight, and the operational shortcomings of the spring 1929 Army war-game maneuver, the U.S. Army Air Corps spent little time thinking about aerial refueling. This was not to say that nothing was done with the air refueling concept through the 1930s, but most was accomplished thanks to civilian aviators. The Question Mark also rekindled Britain's interest in air refueling.

From 1930 until 1937, the Royal Air Establishment at Farnborough conducted a series of air refueling experiments. The Royal Air Force looked at air refueling not so much as a way to extend an



**The Martin B-10 was the fastest and most heavily armed bomber at the time (1934). It had a gross weight of 14,731 pounds, a four-man crew, and was powered with two Wright 740 hp engines capable of a top speed of 212 mph. (USAF photo courtesy of AMC History Office).**

aircraft's reach, but more to help lighten take-off weights to reduce wear and tear on the aircraft and grass airfields. They also looked at it as a way to supplement the narrow bomber size restrictions being considered by the League of Nations -- less fuel on take-off, meant more bombs could be loaded on the aircraft.

These experiments began with the Question Mark's techniques (improved by U.S. barnstorming efforts) of the dangle-and-grab

method. To accomplish this, the tanker aircraft would feed out a hose that someone in the receiving aircraft reached out and grabbed.

In September 1934, Flight Lieutenant Richard Atcherly introduced his newly patented looped-hose aerial refueling system.

This new technique put most of the operational effort on the tanker crew. Both the tanker and receiver trailed cables with grapnels on the ends. The receiver flew a straight line, while the tanker crossed its path from behind allowing the grapnels to catch. The receiver then reeled in the cables, along with a hose from the tanker. Once the two aircraft were connected with about 300 feet of hose, the tanker pilot would then maneuver to a higher position and let gravity take care of rest.

These experiments continued until 1937, but by then, even the Royal Air Force had decided that air refueling offered a limited application at best. Aircraft technology had surpassed any perceived need for air refueling. Before this date, the standard aircraft were bi-planes (although monoplanes had started becoming more frequent) using "doped" linen fabric and fixed landing gear, with only a little consideration given to aerodynamics.

By 1933, two American corporations built the first all-metal, low-wing monoplanes -- the Douglas DC-1 and the Martin B-10 bomber. These aircraft, each about 17,000 pounds, had retractable landing gear, cowled engines, and high-lift devices to improve take-offs. They also used the new controllable pitch propeller. These advances didn't do much for payloads, but they doubled the DC-1's and B-10's airspeed and operating range over their contemporary aircraft.

British commercial interests, however, soon returned to the idea of air refueling. Companies began looking at "flying boats" to connect the widespread British Empire, and they hoped air refueling would improve their operation.

Sir Alan Cobham and Flight Refueling Limited, or FRL, further refined the looped-hose system. In 1939, from Aug. 5 to Sept. 30, Imperial Airways took advantage of the first commercial air refueling operations. The company flew Short S.30 flying boats for weekly mail service flights between Southampton, England, and New York City. FRL used two obsolete Handley Page HP.54 Harrow bombers as tankers -- one at Gander, Newfoundland, and the other at Rineana, Ireland. These air refueling operations were not intended to extend the flight times, but to allow the flying boats to take off with minimal fuel and more mail. Imperial Airways flew 15 of these transatlantic missions before the outbreak of World War II.

### World War II - Testing the Potential for Operational Aerial Refueling

World War II offered many examples of how air refueling could be used. For example, Britain depended on shipping to stay alive, and aircraft technology provided only limited support. Bomber operational ranges early in the war meant they were not very useful in helping to suppress the German submarine threat. Still, in wartime, many innovations are examined and tested. During World War II, air refueling was among them.

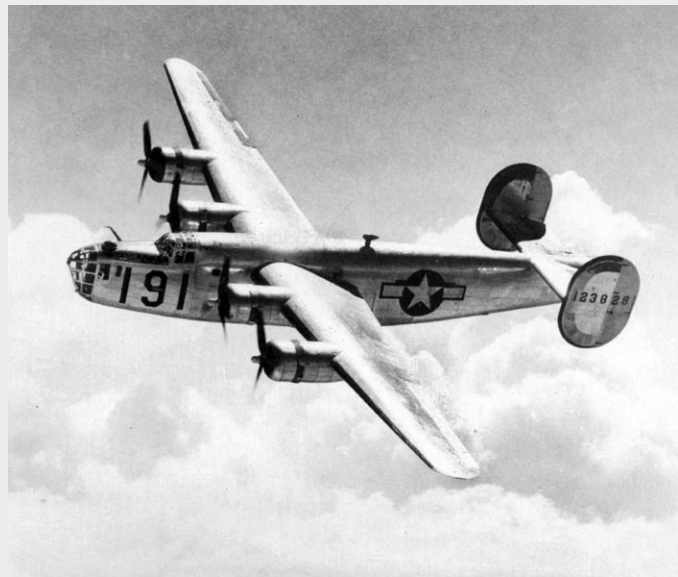
Just after Pearl Harbor, the U.S. Army Air Forces began working on an air refueling solution. With the help of Hugh Johnson, the man who had been in charge of FRL's Gander operations, they studied three primary concepts. First, planners looked at launching B-17 Flying Fortresses from Midway Island against Japan, with the idea of using modified B-24 Liberators as tankers. Second, they considered using B-24s from Hawaii with tanker support from U.S. Navy seaplanes. The third concept called for B-17s to tow fuel-laden gliders to serve as tankers.

Testing -- using a variation of the looped-hose method -- began in the summer of 1943 at Eglin Field, Fla. A B-17E served as the receiver and a modified B-24D as the tanker. The successful tests



extended the B-17's range (with three tons of bombs) from 1,000 to 1,500 miles.

The problem now was how would the country's taxed manufacturers build the equipment for squadrons of B-24 tankers and B-17 receivers? Added to this dilemma was the time required for the aircraft modifications and crew training. Additionally, by mid-1943, Boeing began rolling out the B-29 Superfortress. The B-29 had a combat radius of 1,500 miles and carried twice the bomb load of the B-17.



**The Convair B-24 Liberator was a heavy bomber powered by four Pratt & Whitney 1,200 horsepower engines. It had a gross weight of 65,000 pounds, a 10-man crew, and a top speed of 300 mph. In addition to being used as a bomber, B-24s also served a variety of other functions, including an experimental air refueling tanker and cargo airlifter. (USAF photo courtesy of AMC History Office).**

In 1944, the U.S. Army Air Forces began studying the feasibility of equipping B-29s with an air refueling capability. The engineers at Wright Field, Ohio, determined it was possible to modify the aircraft, but the 1,500-gallon capacity of a B-24 tanker only extended the B-29's range by 830 miles. At the same time, the British developed plans to convert 600 Lancaster bombers to serve as tankers in the Pacific, serving 600 Lincoln bombers. However, before any air refueling plans to support the bombing mission reached fruition, Allied forces began seizing islands within striking distance of Japan.

The U.S. Army Air Forces also looked at a possible refueling method for smaller fighter aircraft. A contractor, All American Aviation, equipped and tested a specially modified P-38 Lightning and a B-24 tanker. In the test, the B-24 suspended an external fuel tank on a cable. The P-38 was to catch that cable, securing it into a device mounted on the forward fuselage. The fighter would then descend to the tank which was to lodge into the securing device while the cable broke away. A nitrogen bottle fired to force the fuel into the fighter before ejector springs released the tank. The tests proved highly unsuccessful, and in March 1945, the Army Air Forces cancelled the method as unsound.

While air refueling was not used operationally, World War II led the U.S. Army Air Forces to examine its potential. These studies and the testing of new equipment showed what air refueling could offer to future contingency operations.

By 1947, when the Department of the Air Force became a separate service, these wartime studies and the continued post-war testing ensured air refueling would soon serve as a critical component of modern air power.

*To be continued in the Spring 2009 Edition of A/TQ*

## Refueling Warriors: 2nd ARS Brings McGuire KC-10s to the Fight

by Airman 1st Class Bekah Phy, 305th Air Mobility Wing PA

At 181 feet in length, with a 165-foot wingspan and the ability to reach 619 mph, the KC-10 is one capable aircraft. From providing in-flight refueling to U.S. aircraft and coalition forces in Operations Desert Shield and Storm to moving thousands of tons of cargo and thousands of troops in support of the massive Persian Gulf buildup, the KC-10 has an impressive resume.

In addition to Desert Shield and Storm, KC-10s have played a prominent role in the on-going Global War on Terrorism since September 11, 2001. The KC-10 has flown more than 350 missions guarding U.S. skies as a part of Operation Noble Eagle. During Operations Enduring Freedom and Iraqi Freedom, KC-10s have flown more than 4,200 missions (in the past year alone) delivering critical air-refueling support to numerous joint and coalition receiver aircraft.

These are just a few accomplishments of the KC-10, and McGuire's 2nd Air Refueling Squadron has played a major role in these operations since 1991.

"I've been stationed at McGuire for three years, and I've deployed four times," said Capt. Mike Charles, 2nd ARS. "I'm a KC-10 pilot trained to fly the (305th Air Mobility Wing's) air-refueling mission...and we stay quite busy."

Captain Charles explained that the 2nd ARS has maintained a continuous presence in the Middle East since 1991. The KC-10 unit currently in operation -- the 908th Expeditionary Air Refueling Squadron -- is the largest KC-10 squadron in the Air Force, which is made up of crews from McGuire and Travis AFB, Calif.

"Our goal is to provide timely gas to the airborne war fighter - we take off, fly the war planner's tasking, and return to the same location, generally," he said. "Our level of involvement has stayed relatively constant."



**Staff Sgt. Luis Merino, 2nd Air Refueling Squadron KC-10 flight engineer, runs pre-flight checks prior to a mission while deployed in 2008. The 2nd ARS has maintained a continuous presence in the Middle East since 1991, providing fuel to aircraft in support of the Global War on Terrorism. (U.S. Air Force photo)**

The 2nd ARS directly supports Operations Iraqi Freedom and Enduring Freedom. Most assets are typically dedicated to one theater, but the KC-10 has the ability to support both because of the high capacity of fuel it is able to carry, the captain said.

During a series of recent missions, KC-10s and the 2nd ARS played a large role in providing fuel to aircraft protecting ground assets while building the Kajaki Dam in Afghanistan. Air support was required to escort a large convoy transporting parts for the dam through hostile areas in the country. Orbiting above the convoy, among others, were F-15s, F-16s and AV-8s; the KC-10s

refueled the aircraft protecting the convoy and its troops.

"We knew we were supporting the Kajaki Dam convoy, and we were keenly aware of the project's significance," Captain Charles said. "We were providing airborne weapons platforms, such as the B-1 and A-10, with time-critical fuel, but we knew there was an even greater reason for that mission."

In a letter to his unit, Lt. Col. Timothy MacGregor, 2nd ARS commander, praised his Airmen for their accomplishments during the Kajaki missions.

"...What you are doing absolutely makes a difference in the lives of millions of people, whether U.S. forces, coalition forces, or the populations of the countries we are serving and working in."

"The work you did provided aerial protection for forces building and guarding the Kajaki hydroelectric plant, and the nearly two million people who will receive its electricity are a testament to your excellence and accomplishments...your success in accomplishing worldwide combat operations is absolutely unmatched, unquestioned and invaluable."

Captain Charles explained that, along with anything else, there are some sacrifices that come with being deployed and accomplishing these missions. The 2nd ARS is not part of a typical Air Expeditionary Force since they are in constant rotation; however, groups of aircrew frequently deploy about every three to four months for at least 75 days, he said.

"I'm not married, but I do miss my family a great deal when I'm deployed...I can imagine it's tough for a lot of my team, too, but we take care of each other really well - our support network is really strong," Captain Charles said. "I'm glad to say most, if not all, 2nd ARS Airmen are extremely proud to do the mission, proud to fly the KC-10 into combat, and when they return and see their families' smiling faces - it makes it that much more rewarding."

Other 2nd ARS team members seem to agree: It's tough leaving home, but it's for a mission, and their team's camaraderie helps get them through.

"There is some stress, of course, with deploying and leaving your family, but it's about completing our mission," said Tech. Sgt. Chris Stroup, 2nd ARS boom operator. "We're saving lives on the ground every time we fly, and I get to see the coolest things being at 25,000 feet and offloading 90,000 pounds of fuel."

"And, our crew becomes a family (at home and while deployed), he said. "We spend 12 hours in a jet every other day with the same crew - we get along really well, hang out together, work together and look out for each other. We're a tight-knit little family."

Despite being so busy with constant deployments, the 2nd ARS still shoulders the 305th AMW's mission while at home station - and maintains a close-knit relationship. They support Air Force-level global missions; including distinguished visitors, cargo, fighter and bomber movements in addition to Strategic Command support and local training flights.

"We're so heavily involved with so many different mission sets, yet our unit still embraces the value of family. Our squadron leadership really does a fantastic job of keeping us on track and looking out for us through it all," Captain Charles said. "I'm very thankful we have them leading us through the tough times."

## KC-135 Crew Airlifts Wounded from Afghanistan

by Tech. Sgt. Jason Schaap, 931st Air Refueling Group PA

A few Airmen from the 931st Air Refueling Group spent their Super Bowl weekend resting from a 12-day aeromedical evacuation mission in Afghanistan.

Eight reservists from the 931st manned a specially equipped

KC-135 Stratotanker that made four back-to-back trips to Bagram Airfield, Afghanistan, to pick up wounded and sick troops for evacuation to Ramstein Air Base, Germany.

"It was a long mission," said Staff Sgt. Trevor Derenthal, a crew chief assigned to the 931st Aircraft Maintenance Squadron.

Lt. Col. Tyoshi "T" Tung, a KC-135 pilot assigned to the 18th Air Refueling Squadron was the senior-ranking 931st member during the mission. It usually took around 21 hours for his crew to prepare, leave Ramstein, fly to Afghanistan, return to Ramstein and finish the job, he said. Twenty-four hours of mandatory crew rest later, they would make the trip all over again.

"There wasn't much time for sightseeing," Colonel Tung joked. But that was more than ok, he added, because "it's all about the mission." Especially when evacuating wounded warriors.

The KC-135 is not the Air Force's first choice when using aircraft for aeromedical evacuation. But its ability to fly long distances makes it an excellent substitute when high operations tempos create aircraft shortfalls.



Sick and wounded troops are taken from a specialized transport vehicle onto a KC-135 Stratotanker at Bagram Airfield, Afghanistan. The KC-135 was manned by Airmen from the 931st Air Refueling Group who volunteered for a 12-day aeromedical evacuation mission that included four trips from Germany to Afghanistan. The 931st ARG is an Air Force Reserve unit at McConnell Air Force Base, Kan. (U.S. Air Force photo/Lt. Col. Tyoshi Tung)

Aerial refueling, the primary capability of the KC-135, is not part of the evacuation mission. "The jets are wall-to-wall with (medical) equipment" and aerospace medical technicians, Tech. Sgt. Warren Bearup said. "Our purpose is to get there and get back."

Sergeant Bearup was part of Colonel Tung's crew. He is an 18th ARS boom operator and, like Sergeant Derenthal, works full-time for the 931st as an Air Reserve Technician. Between drill weekends, Sergeant Bearup is a civilian flight scheduler assigned to the 931st Operations Support Flight.

It was his office that acquired the Afghanistan mission after 931st crews successfully completed the same missions twice before. Aeromedical evacuations are another way to make sure "we're doing our part," Sergeant Bearup said, in addition to the millions of fuel pounds 931st flyers deliver every year.

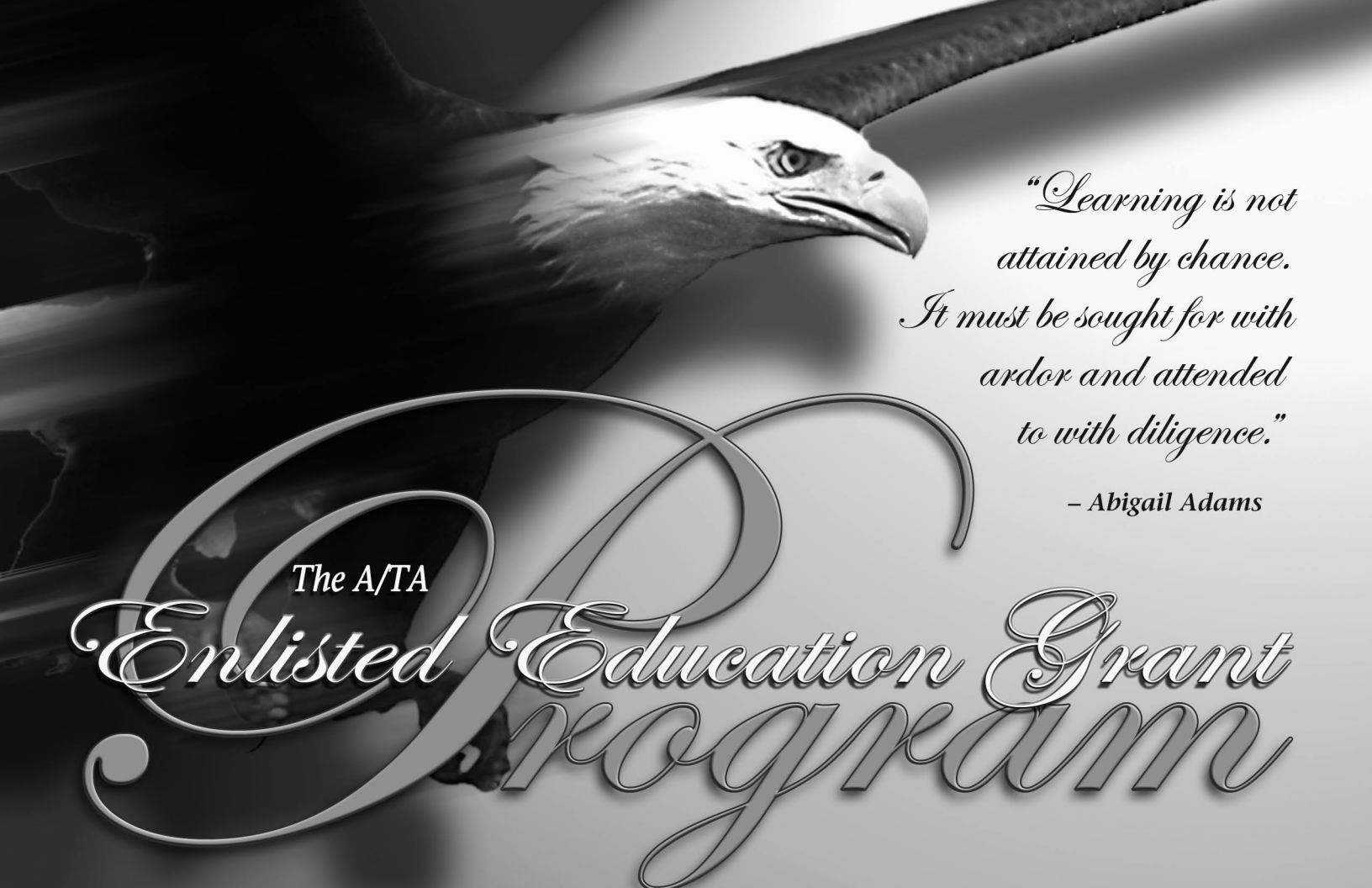
There was an incident during this latest mission that clearly illustrated why the KC-135's airlift capability is so important and why Sergeant Bearup called aeromedical taskings so "rewarding."

It happened about an hour away from arriving back at Ramstein. A patient's oxygen intake became unexplainably low. A medical technician told Sergeant Bearup the situation was urgent. A call was placed to German air controllers.

"Without hesitation," the controllers cleared a direct path for the tanker through heavily congested air space, Sergeant Bearup said, and the soldier got to a care facility much faster.

The incident made things tense for a while, Colonel Tung said, and reminded his crew why "it's all about the mission." ■





*"Learning is not  
attained by chance.  
It must be sought for with  
ardor and attended  
to with diligence."*

– Abigail Adams

The A/TA  
*Enlisted Education Grant  
Program*

The A/TA Enlisted Education Grant Program was created to provide financial help to A/TA enlisted members pursuing lofty educational goals. Recipients are free to use their \$200 Enlisted Education Grant for tuition, books, transportation, etc...

Think of it as a reward for educational enthusiasm and perseverance!

Airlift/Tanker Association Enlisted Education Grants are available to  
Air Force, Air National Guard and Air Force Reserve  
A/TA members pursuing undergraduate or graduate degrees.



Working to  
Improve  
America's  
Air Mobility  
Force.

**EEG CRITERIA:**

- ★ Current Membership in the Airlift/Tanker Association
- ★ Enlisted Member in Grades of E-1 through E-9
- ★ Commander's Recommendation
- ★ Assigned in an air mobility operational and/or support function (an augmentee on a mobility or maintenance support team, for example), OR, anyone directly or indirectly supporting the USAF Airlift or Air Refueling mission.
- ★ Must be a current member of Airlift/Tanker Association during the course which you are using to apply for the grant.
- ★ Checks will be issued upon completion of a course with proof of a grade of C or better in an accredited degree program
- ★ Individuals are limited to one EEG per 12-month period.
- ★ Student financial need is not a principal criterion
- ★ May not be used for a lower or lateral previously awarded degree

Additional details and forms are available online at [www.atalink.org](http://www.atalink.org)

If you meet the criteria, apply today! The A/TA wants to help you continue your education, so you, too, can soar like an eagle.

# *National Treasure:* Recognizing 40 Years of C-5 Galaxy Operations

by Colonel Gregory P. Cook, USAF (ret)

## Introduction

In the summer of 2008, a significant milestone in aviation history passed quietly by when the U.S. Air Force's mighty C-5 Galaxy, at one time the world's largest aircraft, celebrated the 40th anniversary of its first flight in June 1968. The crowd's reaction to this gargantuan airplane on that day was typical for those who see and experience this amazing aircraft first-hand. In awe of its sheer mass, it was hard to believe that something this large could actually fly. When considering its cavernous interior and built-in features, it was obvious that this airplane's airlift capabilities were incredible and unmatched by any other aircraft in the world. No one could ignore the distinctive, whistling sound of its huge engines as it lifted off the ground and lumbered into the sky. Since that momentous day, the C-5 has contributed heavily to our nation's defense, and it's timely to recognize its operational accomplishments over the last four decades.

For the Air Force and the nation at large, the story of the C-5 Galaxy has been a love-hate relationship. In times of operational need, the mighty C-5 fleet has risen to the occasion again and again with strategic, decisive impact. From the Vietnam War and the Yom Kippur War to the Gulf War and ongoing operations in the Middle East, the C-5 played a huge role in satisfying our worldwide airlift needs and attaining U.S. national strategy and military objectives. In routine, day-to-day operations, however, it is often perceived as an expensive and sometimes unreliable aircraft to procure, operate and maintain. Despite its troubled early developmental years and growing logistical challenges as it ages, the C-5 fleet remains the operational backbone of the nation's strategic airlift fleet due to its tremendous capability and capacity. As this matriarch of the nation's airlift fleet reaches middle age, however, modernization plans and programs for the C-5 provide promise that the aircraft will reach even greater heights of operational capability, reliability and success in the years to come. The delivery of a highly modified C-5M Galaxy in December 2008 foretells this new era of C-5 operations. By examining the history of the C-5 over the last 40 years and reviewing recent developmental efforts, it becomes clear that this incredible aircraft is truly a national treasure whose legacy will continue to grow.

## The C-5's Key Design Characteristics and Technological Innovations

The Galaxy is one of the world's largest aircraft, and everything about the C-5 is massive. At over 247 feet long, it approaches the length of a football field and its 65-foot high tail is as tall as a six-story building. Its wingspan is over 222 feet wide. The C-5's maximum gross weight for takeoff during peacetime is 769,000 pounds, which can be increased to 840,000 pounds during wartime operations. In 1984, it set an in-flight gross weight world record of 920,836 pounds. Maximum weights are achieved by varying

the combination of cargo/personnel weight and fuel on board in addition to the aircraft's empty weight. The cargo compartment can accommodate 36 standard 463L pallets, and the aircraft is approved to carry a maximum of 285,000 pounds of cargo. Empty, it still weighs a whopping 380,000 pounds.

The Galaxy has 12 internal wing fuel tanks with a total capacity of 51,150 US gallons of fuel, with a full fuel load weighing 332,500 pounds. This amount of fuel would fill over six regular-sized U.S. railroad tank cars and require a maximum offload from up to two KC-135 air refueling aircraft. The engines on a C-5 are enormous. They each weigh 7,900 pounds and have an air intake diameter of more than 8.5 feet. Each engine pod is nearly 27 feet long. The

engines have reverse thrust capability used to increase rates of descent in the air and decrease landing distance on the ground. Each engine generator independently produces enough power to support the aircraft's electrical needs; together the four generators can power a city of up to 50,000 people.

Technological innovations incorporated into the C-5 ushered in a new age of strategic airlift capability. It was the first airlift aircraft to be equipped with an air refueling receptacle, enabling non-stop operations anywhere in the world. With aerial refueling, the aircraft's range is limited only by crew endurance. Its

complex landing gear system enables this enormous airplane to operate on a vast number of airfields worldwide, including austere airfields with their unique operational challenges. Its on-board computer systems were revolutionary for its day.

Key design characteristics of the C-5 provide it with tremendous built-in capability and flexibility to allow drive-through loading and unloading of wheeled and tracked vehicles, and faster, easier loading of bulky equipment. In order to accommodate the full range of military cargo, the C-5 was built with nose and rear doors that open to expose the full width and height of the cargo compartment and with integrated, full width roll-on/roll-off ramps at each end that permit double rows of wheeled or tracked vehicles to be loaded.

The C-5 also is equipped with a revolutionary "kneeling" system that allows the aircraft (and thus the cargo floor height and ramp angles) to be raised or lowered to meet virtually any onload requirement. The kneeling landing gear system permits a parked C-5 to be lowered from 10 to 3 feet off the ground, a position in which the cargo ramps are at an ideal height for truck bed and ground loading. While kneeled, ramp angles are also greatly reduced, which eases the loading and unloading of wheeled and tracked vehicles.

These features allow the Galaxy to be loaded and/or unloaded simultaneously from either end of the cargo compartment. Wheeled and tracked vehicles can drive in before takeoff and drive out under their own power at destination without having to back up. The entire cargo floor has a roller system for rapid handling of



The history of the C-5 Galaxy dates back to 2 March 1968, when President Lyndon B. Johnson attended the rollout and christening ceremony at Dobbins AFB, Georgia. (USAF photo).



palletized equipment, with cargo-pallet rails, rollers, and restraints forming an integral part of the heavy duty cargo floor. When not in use, they fold away to provide a level deck. The C-5's floor-bearing pressure is the same over the entire floor, thus no tread ways or special handling is required except for very dense and heavy cargo which may require shoring to more evenly distribute its weight. The C-5 was also designed to facilitate airdrop operations, with the rear door used for aerial deployment of vehicles and equipment by parachute. Two troop doors on the side of the aircraft are used for paratroop exit.

The Galaxy was the first aircraft capable of loading and transporting nearly all the U.S. military's largest "over and out-size" air-transportable equipment, including battle tanks, helicopters, and the Army's 74-ton mobile scissors bridge. Two C-5s were later specially modified to carry space cargo.

### Developmental Pains

Never before had a jet aircraft of such scale, capability and complexity been contemplated, and revolutionary new concepts in aircraft design and propulsion were necessary to realize these requirements. The C-5 thus experienced a multitude of technical problems, delays and cost overruns during its early years of development and operations, which combined to trigger public outcry and several congressional investigations which scrutinized the C-5 development and acquisition programs. Issues with the landing gear and the wings in particular were quite problematic and took years to correct. While some C-5 deficiencies were unique to the aircraft, many were typical of those found in developing a new system and easily fixed. Despite success in updating, modifying, and sometimes replacing components, the Air Force continued to struggle in solving the C-5A's most critical, stubborn, and costliest problem—structural weakness in the initial wing design.

Recognition of the structural weakness of the wings brought about stringent operating precautions and flying restrictions for the fleet to ensure safety and to minimize the impact of fatigue on the aircraft's wings. Despite the restrictions, no other aircraft in the world could even come close to matching the C-5 in performance capability, which could still carry roughly 100,000 pounds more than the C-141. Thus the flying restrictions imposed on the C-5 did not prevent the aircraft from achieving initial operational capability and performing day-to-day strategic airlift operational missions. Yet the Air Force persevered in developing and fielding the C-5, recognizing that the capabilities the C-5 possessed were an operational necessity.

### First Flight and Operational Tests

The C-5 made its first flight from Dobbins AFB, Georgia on June 30, 1968, and immediately began to exhibit its herculean capabilities during operational test and evaluation. In June 1969, a C-5 landed at a then-record weight of 600,000 pounds, and then stopped in less than 1,500 feet. Another took off with a maximum weight of 762,000 pounds to become the heaviest aircraft ever

to leave the ground. The C-5 soon demonstrated its capability to fly at a speed of Mach 0.8 at 35,000 feet and later reached an altitude of 40,200 feet. Other impressive milestones followed. The C-5 became the heaviest aircraft to ever refuel in flight, taking on 100,000 pounds of fuel from a KC-135 tanker; shortly thereafter it attained a ramp weight of 768,158 pounds. It also demonstrated its capacity to carry 307,912 pounds of fuel with a simulated cargo of 197,640 pounds, and the ability to land within 1,200 feet of runway length.



**The C-5 was the first airlift aircraft to be equipped with an air refueling receptacle, enabling non-stop operations anywhere in the world. With aerial refueling, the aircraft's range is limited only by crew endurance. (USAF photo).**

The C-5 reached another significant milestone on May 11, 1972, when a Galaxy completed a nonstop unrefueled flight of 8,019 statute miles from Kadena Air Base, Okinawa, to Charleston AFB, South Carolina. The flight set a new nonstop distance record for the C-5, which lasted 16 hours and five minutes at an average ground speed of 527 miles per hour.

The U.S. Air Force took delivery of the first operational C-5 in December 1969, with the first squadron attaining initial operational capability at Charleston Air Force Base AFB, South Carolina in September, 1970. Just two months later, airdrop tests began under simulated operational conditions and experienced no serious difficulties. In the spring of 1971, a C-5 completed its first 40,000-pound cargo drop and shortly thereafter achieved the Air Force's goal of dropping 73 paratroopers from a single Galaxy flying at an altitude of 2,000 feet and 130 knots of airspeed. Another significant milestone occurred when a C-5 dropped



**C-5 production concluded with delivery of the last "B" model aircraft in April 1989. The C-5 is almost as long as a football field and as high as a six-story building and has a cargo compartment about the size of an eight-lane bowling alley. (USAF photo).**

four 40,000-pound pallets sequentially on a single pass. Only the C-5 is capable of dropping 160,000 pounds of cargo in this manner. The airdrop test program, completed in August 1971, proved the C-5 to be an outstanding airdrop platform for both cargo and paratroopers.

Despite its cavernous size, the C-5 proved easy for pilots to handle. Although stringent operating restrictions remained in effect, the aircraft demonstrated amazing operational performance. For example, its rate of climb at sea level reached 1,890 feet per minute, and its average cruising speed approached 450 knots. With maximum allowable payload and without air refueling, the C-5 could fly 3,250 nautical miles, and its ferry range was more than twice that distance. With one aerial refueling, a C-5 aircraft carrying its maximum design load could reach almost any point on the globe.

### Initial Operations in Southeast Asia.

The C-5 received its operational baptism by fire in the spring of 1972, when North Vietnam invaded the South after most American forces had left the theater as part of a planned withdrawal. C-5s were called into action to fly significant amounts of cargo across the Pacific and within the Southeast Asia theater of operations. On one occasion, C-5s helped move some 3,000 South Vietnamese troops and 1,600 tons of cargo in just nine days. Galaxies were also called upon to execute an emergency airlift of tanks and helicopters to the besieged forward airfield at Da Nang, Vietnam. The C-5 was the obvious choice for the mission, carrying 1,650,000 pounds in ten flights and completing

engine-running offloads to expedite the mission.

On May 3, 1972, a single C-5 flew three sorties from Yokota Air Base, Japan to carry a total of six Army M48 tanks, each weighing 98,000 pounds. Using engine running offload procedures to limit exposure to enemy fire at Da Nang, the C-5 crew opened the cargo doors and extended the ramps as the aircraft came to a stop so the tank drivers could start their engines and drive off quickly under their own power. It took just seven minutes to offload the tanks, and the Galaxy was airborne again with total time on the ground in the dangerous forward area amounting to less than 30 minutes. Shortly thereafter, C-5s moved M41 tanks and M548 tracked vehicles to both Da Nang and to Cam Ranh Bay in Vietnam. Altogether, C-5s flew 109 missions in Southeast Asia and transported 5,450 tons of cargo during May 1972, thus helping to contain the North Vietnamese offensive.

In late 1972, the United States rushed weapons into South Vietnam before a truce could take effect that would limit deliveries of combat equipment. C-5s were called upon again to complete this vital task and flew 69 special assignment missions between October 28th and November 28th. During that period, they airlifted some 3,000 tons of cargo, including 32 Northrop F-5 fighters and 66 Cessna AT-37s for the South Vietnamese Air Force, CH-53 helicopters and mine-sweeping equipment for the U.S. Navy, and helicopter parts and communication equipment for the U.S. Army. In its operational and combat debut, the C-5 clearly proved its worth and illustrated its potential for an even greater role in the years to come.

#### Operation NICKLE GRASS

The C-5 again demonstrated its amazing capabilities during the Yom Kippur War in the fall of 1973. The Arab armies of Syria and Egypt attacked Israel on October 6, 1973, advancing from the Golan Heights and across the Suez Canal. The war was marked by huge numbers of combat equipment lost to enemy action, as well as enormous consumption rates of ammunition and supplies used in prosecuting the battle. Over the course of the fast-paced conflict and its epic battles, stocks of all war-related materials for both sides became depleted to dangerously low levels. The Arab coalition received support and supplies from the Soviet Union via airlift within days of the beginning of the war. Confronted with a two-front war, inadequate resources and significant battle losses, Israel soon turned to the U.S. for help. Faced with a difficult and delicate international situation, President Nixon ordered an aerial resupply of Israel. It was code-named NICKEL GRASS. On October 13, 1973, a week after the invasion but only nine hours after the Presidential order, a C-5 loaded with 193,000 pounds of cargo was on its way to Israel.

For the next 32 days, American C-141 and C-5 airlifters flew 567 missions to deliver over 22,000 tons of equipment and supplies to Israel via air, out-performing the Soviet effort even though the U.S. airlift had to cover four times the distance and it started five days after the Soviet airlift began. During 145 missions, C-5s alone airlifted 10,800 tons of supplies to Israel, with an average load of 74 tons per flight. By comparison, the Soviet Union resupply of the Arab states flew 935 missions over 40 days to deliver a total of 15,000 tons of supplies, averaging just 16 tons per load. NICKEL GRASS constituted the first major test of the C-5, which moved nearly half the tonnage on only 25% of the missions. The C-5 was the only aircraft that could carry outsized equipment like the

Army's 155mm howitzers and CH-53 helicopters plus M-60 and M-48 tanks. Twenty-nine of the C-5 missions airlifted tanks that Israel desperately needed and quickly engaged in battle.

Operation NICKEL GRASS was a huge success in many ways, and demonstrated the decisive role that airlift – and especially the C-5 – could play in determining the outcome of a fast-paced conflict. All the American equipment that reached Israel before the ceasefire of October 24 arrived by air and before the first ship loaded with supplies reached an Israeli port. The airlift effort delivered the supplies necessary for Israel to continue the fight, with many

items such as anti-tank weapons, artillery ammunition and tanks engaged in battle just hours after arriving. Materials were transferred directly from U.S. airlifters to Israeli trucks waiting in long lines for their precious cargo and taken immediately to Israeli supply distribution points. The pace of offload never slackened. Once it became clear that the United States was committed and able to sustain this logistical effort by air, the tide of battle turned and cease-fire negotiations began. The mighty C-5 had risen to the occasion and performed with strategic, decisive impact.

Despite its lingering problems and operational restrictions, the accomplishments of the C-5 during its initial operations in both Southeast Asia and the Arab-Israeli conflict demonstrated the aircraft's extraordinary capabilities

and vindicated its value to the nation. By the time production of the C-5A ended in 1975, American political and military leaders recognized that the C-5 was indeed a vital national asset and an awe-inspiring sight as it whistled through the sky.



**The C-5 demonstrated its amazing capabilities during the Yom Kippur War in the fall of 1973, the first major test of the massive airlifter. This photo shows an M-60 tank being off-loaded from a C-5 at Ben Gurion International Airport during Operation NICKEL GRASS. (USAF photo).**

#### Further development of the C-5A and Introduction of the C-5B

A total of 81 C-5As were produced between 1966 and 1975, although throughout the 1970s and into the 1980s, the C-5 fleet continued to operate under stringent flying restrictions because of its inadequate wing structure design. While the flying restrictions imposed on the C-5 did not prevent the aircraft from performing day-to-day missions, it became clear that the C-5 would never achieve its intended design life unless the aircraft received a new wing.

In October 1974, the Secretary of Defense approved a wing modification program for the C-5A. The entire modification program progressed smoothly until the last re-winged C-5A rejoined the operational fleet in mid-1987 as scheduled. Besides extending the wing's flying life, the program ensured a degree of structural soundness that ended the previous operating restrictions. The improvements that strengthened the structure of the C-5A were included in a new version of the Galaxy, the C-5B, for which Lockheed-Georgia reopened its production line in the mid-1980s. A total of 50 C-5B models were produced from 1986 to 1989. In 1989 and 1991, two Galaxies were also specially modified to a C-5C configuration to make them capable of transporting outsize space cargo for NASA, primarily satellites and space cargo modules for the space shuttle.

For over 20 years, the C-5 had survived severe Congressional and public criticism, endured engineering and financial crises, and flown under stringent operating restrictions. While the C-5 had clearly demonstrated its remarkable capabilities, its full potential had yet to be realized because it had been operating under so many constraints. With the rebuilt wing eliminating these restrictions, and with a projected service life now set at 30,000 or more flight hours, the aircraft was in effect still in its infancy. As time would



show, the Air Force's confidence in the C-5 would prove to be justified. By the late 1980s and early 1990s, with a full complement of C-5A, B and C models operating unrestricted, a new chapter in the Galaxy's history was about to be written.

### **A New Era Begins: Unleashing the Power and Might of the Galaxy**

Operational necessity, coupled with the lifting of restrictions and improvements in fleet reliability resulting from aircraft upgrades, combined to open up the world to C-5 operations. No longer constrained to operate principally from main operating bases with heavy logistics support, the C-5 was now being sent to austere or remote locations without the previous concerns that the aircraft would break down. In many cases, the arrival of a C-5 in a new place would portend a celebration. Whole towns would turn out to gawk at the huge aircraft; the aircraft itself became a symbol of U.S. national power and prestige. When aerial ports became overloaded with excessive cargo, a few C-5 sorties would efficiently and effectively redistribute the cargo and speed it to its destination. Combatant commanders across the globe praised both the aircraft's ability to close a force quickly and its capability to transport military equipment and personnel simultaneously.

A few examples illustrate the growing role and impact of the C-5 at that time. In December 1988, four C-5s participated in the delivery of more than 885,000 pounds of earthquake relief supplies to the then-Soviet Republic of Armenia. C-5s also assisted with the Alaskan oil spill cleanup in March 1989, transporting nearly two million pounds of equipment to Elmendorf AFB, Alaska. In October 1989, C-5s responded to the aftermath of Hurricane Hugo, airlifting more than two million pounds of relief supplies to Puerto Rico and the Virgin Islands. In December of 1989, C-5s contributed mightily to airlift needs during Operation JUST CAUSE, the U.S. intervention in Panama that ousted the dictator Manuel Noriega.

In essence, C-5 operations across the globe finally became normalized and routine beginning in the late 1980s and throughout the decade that followed. It was during this period that the C-5's true capabilities were finally brought to fruition. Its operational successes were many and substantial as the fleet began to exercise its muscle in responding to contingencies and crises worldwide.

### **The C-5 Evolves into the Centerpiece of the Nation's Strategic Airlift Fleet**

The world changed dramatically in the 1990s, a decade that was prefaced by the implosion of the former Soviet Union in 1989 and began with the Iraq invasion of Kuwait in 1990 and the Gulf War. Ironically, as the U.S. defense budget and the American military were dramatically reduced in the aftermath of the Cold War to reap the so-called "peace dividend," the number and scale of U.S. military commitments and operations actually increased during this period. In addition to the Gulf War and follow-on operations to contain Iraq, the decade was notable for a precipitous rise in peacekeeping, peace enforcement, and humanitarian operations. From Kurdish refugee relief in Turkey to famine and peacekeeping efforts in places like Somalia and Rwanda, plus scores of natural disasters worldwide, American forces were called into action. The U.S. military also responded twice to ethnic strife, repression, and conflict in the Balkans, supporting the full spectrum of contingency,

combat, and humanitarian operations in both Bosnia-Herzegovina and the Kosovo region. Each of these operations required immense amounts of strategic airlift support, thus the nation's airlift force was in constant demand and stretched to its very limits. The C-5 fleet was heavily engaged throughout the decade, and evolved into the mainstay of the strategic airlift force in the course of demonstrating its incredible capability and value.

A major display of the Galaxy's strengths occurred during Operations DESERT SHIELD and DESERT STORM in Southwest Asia from 1990 to 1991. In response to the invasion of Kuwait by Iraq in August 1990, C-5s and C-141s in only five days airlifted to Saudi Arabia a brigade of the 82d Airborne Division, the men and equipment needed to sustain five fighter squadrons totaling 120 aircraft, plus an AWACS contingent. The line in the sand had been drawn.

In the buildup and combat operations that followed, the C-5 and other USAF transport aircraft airlifted almost a half-million passengers and more than 577,000 tons of cargo to Southwest Asia. This included fifteen air-transportable hospitals and more than 5,000 medical personnel to run them, as well as the full gamut of combat forces and equipment. From bombs and missiles to helicopters, tanks and trucks, the fleet carried them all. Altogether, DESERT SHIELD and DESERT STORM required the services of 80 percent of the Air Force's C-141 fleet and 90 percent of the C-5s. These aircraft moved nearly three quarters of the air cargo and one third of the personnel airlifted into the Gulf region. Since the C-5's capacity by far exceed that of the C-141, the deployment afforded an impressive vindication of the C-5 Galaxy. It played a pivotal role during the build-up, the prosecution of the war, and in the operations that followed. After DESERT STORM, the strategic airlift force provided 12 years of continuous support

to coalition forces engaged in the enforcement of northern and southern no-fly zones over Iraq, and also supported U.S. and NATO operations in the Balkans from 1995 onward.

Another dramatic example of C-5 capability was demonstrated during operations in Somalia and the Horn of Africa. From December 1992 to April 1993, C-5s supported Operation RESTORE HOPE by providing humanitarian airlift of 2,800,000 pounds of supplies and more than 600 passengers into Somalia. As the situation in Somalia began to spiral out of control in 1993, U.S. forces came under heavy fire from rebel forces during operations in October of that year. In the fire fight that followed, eighteen American troops were killed, with some of their bodies dragged through the streets of Mogadishu. In response, President Clinton ordered an immediate expansion of U.S. forces and weapons in Somalia to protect U.S. bases, keep roads and ports open, and to ensure the safe withdrawal of the remainder of U.S. forces in Somalia. The speed at which the President wanted forces to arrive necessitated an extraordinary airlift effort led by the mighty C-5. Only C-5s were capable of airlifting the 18 M-1 Abrams heavy tanks and 44 Bradley armored fighting vehicles ordered into action by the President. The nonstop flights from the U.S. to Somalia took some 18 hours and required four refuelings each from KC-135 and KC-10 tankers along the route of flight. Once again, the Galaxy demonstrated its amazing capability to rapidly lift heavy, substantial forces in time of need.

In the mid-1990s, the C-141 fleet began to experience wing structural problems. Severe restrictions were placed on its



**The U.S. Navy's Deep Submergence Rescue Vehicle Mystic (DSRV 1) is loaded aboard a U.S. Air Force Reserve C-5A Galaxy aircraft at Naval Air Station North Island in San Diego, California, on 22 August, 2000. The Mystic is being transported to Europe to take part in Exercise Sorbet Royal 2000, a NATO submarine rescue exercise off the Mediterranean coast of Turkey. (DoD photo by Petty Officer 1st Class Jason Everett Miller, U.S. Navy).**

*"The only museum in the United States  
dedicated to  
airlift & tanker history."*



AIRCRAFT



EXHIBITS



MUSEUM STORE



AND MUCH MORE

AMC MUSEUM

DOVER AFB, DELAWARE



Free Admission!

Open Tuesday thru Sunday, 9:00am - 4:00pm

tele: (302) 677 5942    web: [amcmuseum.org](http://amcmuseum.org)



operational use and a rapid, massive retrofit program was begun to repair the fleet. Even as precious resources were spent to repair the wing cracks on the grounded C-141 fleet, acquisition of the C-17 gained speed as the realization grew that the C-141 was nearing the end of its structural and economic service life. With the C-141 fleet grounded and the C-17 just beginning to come off the production line, the C-5 fleet supported a much greater percentage of strategic airlift needs, delivering to places it had never been before. In the process, it became the mainstay and centerpiece of the nation's strategic airlift fleet.

Starting in September 2001, almost the entire active duty fleet of C-5s and C-17s – a total of about 140 aircraft – was dedicated to supporting the Operation ENDURING FREEDOM war effort in Afghanistan. By mid-2002 C-5s had carried about 46 percent of the intertheater cargo, yet flown only about 29 percent of the missions flown in Operation ENDURING FREEDOM.

During the build-up for Operation IRAQI FREEDOM in early 2003, C-5s and C-17s together compiled 11,400 sorties. C-5s flew about 900 fewer sorties than the C-17s, but carried about 11,500 more tons and 5,300 more passengers. C-5s hauled an average of 53.8 tons per sortie, compared with an average 33.1 tons by the smaller C-17. Strategic airlift continues to play a key role in combat operations throughout the Middle East. On a typical day, C-5s bring heavy loads of cargo and troops from the United States to staging bases in Europe, Central Asia, and the Middle East, while both C-5s and C-17s fly directly to forward operating bases in Iraq and Afghanistan. The C-5 in particular has proven extraordinarily useful in transporting large, urgently needed Mine Resistant Ambush Protected (MRAP) vehicles into the region to bolster force protection efforts and combat operations in the theater.

### Realizing the Dream: The Promise of Mid-Life Improvements

The high operations tempo of the last 20 years has effectively reduced the operational capability of the C-5 fleet, yet realization of its high value spawned a number of studies and acquisition efforts to modernize it through new engines, avionics, and other improvements. In particular, declines in mission capability rates of the C-5 Galaxy prompted senior Air Force leaders to take a hard look at ways to improve the availability and sustainability of the Air Force's largest transport.

A series of C-5 modernization studies were conducted from the mid-to-late 1990s to determine the feasibility, requirements and alternatives for modernizing the fleet. When these studies confirmed that 80 percent of the C-5's airframe service life remained and that modernizing the fleet was a viable and cost-effective course of action, the Air Force implemented a comprehensive modernization plan for the aircraft. Its main objectives are to increase fleet availability, improve mission capable rates to at least 75%, and reduce total cost of ownership. The resulting programs focus on upgrading the aircraft with modern commercial engines and systems and making structural improvements that will extend the service life of the C-5 through the year 2040. The fleet will experience a two-step upgrade, beginning with the Avionics Modernization Program (AMP) and followed by the Reliability Enhancement and Re-engining Program (RERP). After both multi-billion dollar upgrades are complete, the aircraft will be re-designated as a C-5M.

By the end of 2008, 46 C-5s had received the AMP upgrade and logged over 45,000 flight hours with these new systems. The RERP program is intended to provide significant reliability,

maintainability, and availability improvements primarily in the propulsion system, but also incorporates more than 70 system improvements throughout other areas of the aircraft. After these modifications are complete, the C-5 should also become more reliable and easier to maintain and its operational capability greatly enhanced. Many compare these upgrades to that of the KC-135R modification program, which injected new life into the aging tanker force and greatly increased its overall capabilities, performance and reliability.



**The C-5M flies during its First Flight ceremony at Lockheed Martin's Marietta, Georgia, plant. This flight takes place 38 years after the C-5 Galaxy's maiden flight, June 30, 1968. (USAF photo).**

The first C-5M "Super Galaxy" developmental test aircraft was delivered to the Air Force in December 2008, with two more test aircraft scheduled for delivery in early 2009. These three aircraft will be used to test and validate the viability of the RERP upgrade program. Initial tests at the Lockheed-Martin C-5 production and modification facility in Marietta, Georgia have proven very promising, with all Key Performance Parameters exceeded. Hopes remain high for a successful upgrade program. Air Force evaluators seemed very impressed by the initial performance of the C-5M during the developmental test flight program, especially in the areas of

engines and avionics. One of the most notable distinctions in the C-5M configuration is the Stage III noise-compliant engines, which eliminate the distinctive whine that has long been a trademark of C-5 operations. Air Force operational test and evaluation is scheduled to run through early 2010.

### Conclusion

The story of the C-5 Galaxy over the last 40 years since its first flight in 1968 has been an odyssey of challenges, triumphs, frustrations and celebrations. The C-5's innovative new design features and technologies provided airlift operational capabilities and advantages never before realized. Yet developing an aircraft of this complexity and magnitude was not an easy task, and the C-5 experienced some difficulties during its early years of development and operations. The Air Force persevered in its development and fielding of the C-5, however, recognizing that the C-5's capabilities were an operational necessity.

The operational debut of the C-5 in both Southeast Asia and the Arab-Israeli conflict in 1972-1973 demonstrated its extraordinary capabilities and vindicated its value to the nation. The Galaxy again brought its amazing heavy lift capabilities to the fore during Operations DESERT SHIELD and DESERT STORM in Southwest Asia from 1990 to 1991, in the deployment of heavy armor to Somalia in 1993, and during recent operations in Afghanistan and Iraq.

The C-5 fleet has been heavily engaged for the last 20 years, evolving into the mainstay and centerpiece of the nation's strategic airlift force. Realization of its high value spawned a number of studies and acquisition efforts to modernize it through new engines, avionics, and other improvements. The Air Force is finally implementing a comprehensive modernization plan that will fix or replace outdated technologies that were revolutionary 40 years ago, but not adequate for the needs of the 21st Century.

As this matriarch of the nation's airlift fleet arrives at middle age, modernization plans and programs foretell that the C-5 galaxy will reach even greater heights of operational capability, reliability and success in the years to come. The history of the C-5 over the last 40 years has made it clear to American political and military leaders that this amazing aircraft is truly a national treasure, and one that will continue to serve with distinction for another 30 years. ■

Thanks to all our industry and government exhibitors, our 2008 convention in Anaheim was another huge success. We faced some daunting challenges to locate 150+ exhibitors into an exhibit hall that had significantly less floor space than we have come to expect as well as significant pushback from the Anaheim Fire Marshall. To add to the challenge of limited floor space, we also had our exhibitors in three separate ball-rooms – a situation we have not faced before. However, the obvious spirit of cooperation by our exhibitors allowed us to work our way through the major issues and still have a high quality event. The unsolicited feedback that I received was that this was the best A/TA Exhibit Hall to date. We strive to make each convention better than the previous ones, so it was nice to hear the positive responses – Anaheim was not an easy event to plan and execute.

This year in Nashville we should not have the tough challenges we faced last year with limited floor space. We will have all of the exhibitors in one large exhibit hall and there will be ample space for all our exhibitors. As a bonus, the aisles will be wider to allow the crowd to flow more freely throughout the exhibit hall. We are very familiar with the Gaylord Opryland Resort and look forward to returning to our “home base.” The Program Committee has already met with the hotel staff to start developing the 2009 convention plan and everything is on track for another successful event.

Last year, we made a modest increase in our exhibit fees with the intention of stabilizing these fees for the next few years. I am happy to report that we do not foresee the need to make further adjustments this year so our 2009 exhibit fees will be the same as 2008 exhibit fees. As has been standing policy, we will continue to give preferred status to our Industry Partners (who pay an annual membership fee for that status) as we develop our exhibit floor plan. Industry Partners are allowed to actively participate in the selection of their exhibit location and their spaces are assigned first. By industry standards, our Industry Partners fees (corporate membership dues) are a real bargain – if you are not already an A/TA Industry Partner, please consider becoming one. Please visit our website at: [www.atalink.org](http://www.atalink.org) to see our fee structure.

In these challenging economic times, we know there will be major pressure to reduce industry expenses across the board. With our convention coming late in the year, we encourage both our industry and government exhibitors to please plan ahead and make sure A/TA is in your show schedule. In the past, we have often heard our exhibitors say “if they could only support one show per year, it would be A/TA”. We receive such comments as a huge compliment and accept the responsibility that goes with it. We take this responsibility to heart and realize that we must continue earn to your support by ensuring that you get real value for your investment in Airlift/Tanker Association. We are totally committed to delivering maximum value for your show dollars and we will continually work hard to deliver on that commitment.

We are looking forward to yet another special convention in Nashville and want you to be part of that success by making 2009 our best convention. I am confident this will be another great event - see you in Nashville.

Bob Dawson  
Vice President Industry Affairs

## A/TA INDUSTRY PARTNERS (as of 18 February 2008)

AAI Services Corporation	Gulfstream Aerospace Corporation
AAR Corporation	Hamilton Sundstrand
Adacel	Honeywell International
ARINC	IBM
ASMBA	ITT Electronic Systems
ARSAG	JBT AeroTech (formerly FMC Technologies)
Atlas Air Worldwide Holdings	Jeppesen
Aurora Flight Sciences Corporation	JLG Industries, Inc.
Avaex Technologies	L-3 Communications, Integrated Systems
BAE Systems	Little Giant Solutions
Bell Helicopter Textron Inc.	Lockheed Martin Corporation
Boeing Company, The	McLane Advanced Technologies, LLC
Booz Allen Hamilton	Moog Inc.
Bose Corporation	MTC Technologies
C-27J Spartan JCA Team	NAT Seattle Inc.
CAE	National Air Cargo
Capewell Components Company	Northrop Grumman Corporation
Cessna Aircraft Company	Omega Aerial Refueling Services, Inc.
Cobham	Oregon Aero, Inc.
Computer Sciences Corporation	Parker Aerospace Corporation
Consolidated Air Support Systems (CASS)	PESystems Inc
David Clark Company	Phantom Products, Inc.
Derco Aerospace, Inc.	Pratt & Whitney / Military Engines
DRS C3 Systems, Inc.	Raytheon Company
DRS Technologies, Sustainment Systems	Rockwell Collins, Inc.
Dynamics Research Corporation	Rolls-Royce Defense North America
DynCorp International	SAIC
EADS North America	Sanmina-SCI Corporation
Elbit Systems of America	Satcom Direct Communications, Inc.
Engineered Arresting Systems Corporation	Spokane Industries, Inc.
Esterline Defense Group	Standard Aero
Evans Composites, Inc.	Symetrics Industries, LLC
Federal Express Corporation (FedEx)	Telephonics Corporation
Federated Software Group	Thales
Flightcom Corporation	The Boeing Company
FlightSafety International	Tug Technologies Corporation
Gander International Airport	Tybrin Corporation
GE Aviation	USAA
Global Aero Logistics, Inc.	Volga-Dnepr Unique Air Cargo
Global Ground Support	Vought Aircraft Industries, Inc.
Goodrich Corporation	



# INDUSTRY PARTNER SPOTLIGHT

Pratt & Whitney, a United Technologies Corp. company, is a world leader in the design, manufacture and service of aircraft engines, industrial gas turbines and space propulsion systems. The company's 38,577 employees support more than 9,000 customers in 180 countries around the world. The company's broad portfolio of businesses includes industrial gas turbines that light cities and power ships, and rocket engines that send payloads into orbit at 20,000 miles an hour.

## A Brief History

Pratt & Whitney was founded in Hartford, Connecticut, in 1925 by Frederick Rentschler, who left the Army convinced that future aircraft would require lighter-weight engines with much greater power and higher reliability. His proposed design of an air-cooled engine flew in the face of conventional wisdom, which held that heavier liquid-cooled engines would power the future of aviation.

Rentschler became president of the Wright Aeronautical Corporation and pressed for research into his idea. Unable to convince his board of directors, largely composed of investment bankers with little aviation knowledge, he resigned in 1924 and, supported by old friend and Wright chief engineer George Mead, he developed a proposal for a high-powered air-cooled aircraft engine for the U.S. Navy. Admiral William A. Moffett promised to approve the purchase of such an engine.

Rentschler approached the Pratt & Whitney Tool Company of Hartford, Connecticut with his idea and on July 23, 1925 they agreed to fund its development, creating the Pratt & Whitney Aircraft Company in which Rentschler and Mead had a controlling position.

Pratt & Whitney's first engine, completed on Christmas Eve 1925, was named the "Wasp" by Faye Belden Rentschler, who Frederick had married July 25, 1921. The 410 horsepower Wasp (R-1340) easily passed its official qualification test in March 1926 and the Navy ordered 200 engines. The speed, climb, performance, and reliability that the engine offered revolutionized American aviation.

In 1928 Rentschler formed the United

Aircraft and Transport Corporation, the predecessor to United Aircraft (later United Technologies), in cooperation with Vought and Boeing. United Aircraft and Transport completed the first coast-to-coast passenger network in March of that year.

In 1929 Rentschler ended his association with the Pratt & Whitney Machine Tool company but was allowed to keep the name Pratt & Whitney Aircraft Company.

Today, Pratt & Whitney's large commercial engines power more than 30 percent of the world's passenger aircraft fleet, and nearly 11,000 Pratt & Whitney military engines are in service with 27 armed forces worldwide. In addition, Pratt & Whitney offers a global network of MRO and MAS focused on maintaining engine readiness for their customers.

## The Air Mobility Connection

Pratt & Whitney military engines include the F135 for the F-35 Lightning II, the F119 for the F-22 Raptor, the F100 family that powers the F-15 and F-16, the J52 for the EA-6B Prowler, the TF30 for the F-111, the TF33 powering AWACS, Joint STARS, B-52, and KC-135 aircraft, and the F117 for the C-17 Globemaster III.

Certified at 40,400 pounds of thrust, Pratt & Whitney's F117 is the exclusive power for the U.S. Air Force's advanced transport, the C-17 Globemaster III, built by The Boeing Company. With four F117 engines powering each C-17, this aircraft can carry a payload of 160,600 pounds, take off from a 7,600-foot airfield, and fly 2,400 nautical miles unrefueled.

Unique to the C-17, the F117 engines are equipped with a directed-flow thrust reverser capable of being deployed in flight. On the ground, the thrust reverser can back a fully-loaded aircraft up a two-degree slope. Also noteworthy, the F117-powered C-17 set 22 world records during qualification testing before achieving Initial Operational Capability (IOC).

Today's F117 engine – the reduced temperature configuration (RTC) – uses technical and material advancements such as second-generation single-crystal turbine

materials, improved cooling management and thermal barrier coatings to lower operating temperatures. These enhancements contribute to the F117's excellent reliability, durability and long time on-wing.

A Full-Authority Digital Electronic Control (FADEC) with greater capacity delivers higher operational performance, lower fuel burn and improved maintenance diagnostics. The F117-PW-100 engine is the military version of Pratt & Whitney's PW2000 commercial engine. Because the F117 is derived from a commercial application, it meets all current and anticipated commercial engine requirements for low noise and exhaust emissions. The F117 engine is a solid performer and complements its commercial counterpart's reputation as the world's leading midrange-thrust engine.

## Community Involvement

Pratt & Whitney employees generously volunteer their time and energy to make their local communities better places. They participate in many local projects and community efforts such as serving meals in homeless shelters, building houses for Habitat for Humanity, fundraising for charities, acting as Big Brothers and Big Sisters and sponsoring annual food and clothing drives.

## Environmentally Responsible

Pratt & Whitney is committed to environmental responsibility and is leading the way in developing and powering next generation propulsion systems that deliver environmental performance by focusing on all aspects of environmental impact including manufacturing, engine performance and service.

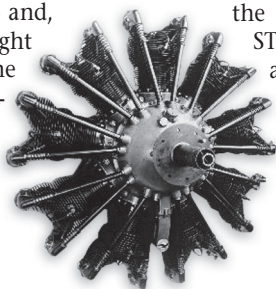
From the Geared Turbofan™ engine which delivers double-digit fuel burn improvements and significant reductions in emissions and noise, to their EcoPower® engine wash service, which improves efficiency and fuel burn, and reduces emissions; to factory improvements that reduce energy and water consumption, Pratt & Whitney is an environmental leader.

Through leading-edge engine technology, world renowned manufacturing techniques and a global service organization, Pratt & Whitney is completely focused on meeting the new demands of the 21st century.



# Pratt & Whitney

A United Technologies Company



**The speed, climb, performance, and reliability offered by the "Wasp" engine revolutionized American aviation.**

# A FALL OF GIANTS

by Murdock Moore

It was yet another war in the Middle East, though the western portion. The forces of a multi-national coalition had pinned an outnumbered foe into a coastal enclave. The defender was in desperate need of supplies. Air resupply was called for. A fleet of giant air transports were called in. The aircraft were not C-5As. It was not Israel, 1973. It was Tunisia, 1943. The airlifter called upon was the huge German ME-323 "Gigant." The April 22, 1943 airlift would be a total disaster.

By April 1943, in the vernacular of the day, the "Hun was on the run." Axis forces, who had reconquered the Nile a year before, found themselves pocketed in French Tunisia. This was a 2,000 mile Allied push back. The pocket dwindled by the day. Time was needed, tanks were needed, but most of all, fuel was needed. Tankers and cargo ships that had been carrying refined petroleum, oils, and lubricants (POL) littered the Mediterranean floor by the score. Allied submarines and bombers had put them there. If POL couldn't be shipped in perhaps airlift could fly it in. The vehicle of choice, the six engined Messerschmidt ME-323.

Like its name implied, the Gigant was a giant, with a 179 foot wing span, a 91 foot fuselage and a 33 foot high tail. Though it had started out as a wooden wonder tank carrying glider, four, then six French Rhone 1,180 H.P. radial engines were quickly attached.

The flight engineers station for monitoring those engines was uniquely situated between the inboard and mid engines. The engineers also doubled as gunners, being provided aft firing machine guns. Being true Renaissance men, the engineers were also the aircraft's loadmasters.

Above the cargo bay sat the pilot, copilot and radio operator/gunner. Additional

gunners could top the crew out at eleven.

Although it had C-124-esque front end loading clam shell doors, wings similar

tons of barreled gas. The outbound escort would be comprised of 39 ME-109 fighters meshing with 65 fighters arising from Africa. *A quick, closed operation!*

Except for a myriad of problems:

**Problem #1:** You are flying a "covers-the-sun" size transport with a top speed of 136 mph and the maneuverability of the Titanic;

**Problem #2:** Your aircraft is made of canvas and wood (add tons of extra gas below, compressed air, an ignition source and your armored tub becomes a skillet);

**Problem #3:** Your outbound escort would also be covering a column flight of Junker JU-52 transports. The formations were not inline, but parallel;

**Problem #4:** The transport columns would be flying into contested air space in daylight;

**Problem #5:** The ME-232s were decked out in stand-out European Green camouflage;

**Problem #6:** In Trapani, Sicily, an allied intelligence agent had reported the departure of the 14 plane Gigant formation (one ME-323 was down for maintenance, another ground aborted with two bad engines plus a blown tire (it still tried to take off); and,

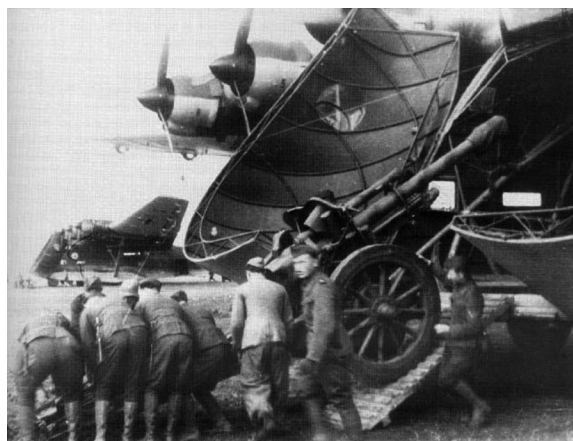
**Problem #7:** *The Big One* – Oberstleutnant (LtCol) Werner Stephan, the ME-323 flight commander, for reasons never to be known, broke formation and took his flight south, minus the escort. While this shortened the flight time, it also took the formation towards Cape Bon, Tunisia, a briefed hot bed of Allied fighter activity.

An RAF Spitfire pilot spotted the errant formation. He had a radio. The fight



The Me-323 Gigant was, in effect, a powered version of the Me-321 transport glider, basically similar except for strengthening and the installation of engines in nacelles: four in the original prototype and six in subsequent prototype and production aircraft (about 200 built). Versions included the Me 323D, E and F (plus variants), with a variety of engines, defensive armament and fuel capacity. They were no easy machines to fly, often needing rocket or towing assistance to get them airborne. Slow and vulnerable - despite heavy defensive armament - they suffered severe losses when ferrying supplies to the Afrika Korps in the closing stages of the North African campaign. (Courtesy photo).

to the C-5A, six engines like the AN-225, and C-17-style multi-wheel bogies, it had only a C-119 size cargo bed – all of 36 feet (permissible overhang extended this to 47 feet). Weight and balance was simple, a 10 wheel undercarriage had a central center of gravity wheel pair, centered by the see-saw effect.



German soldiers loading a 10.5 cm leFH 18 field gun into the cargo bay of a Me-323 Gigant aircraft during WW II. (Courtesy Photo).

The mission plan – each of the sixteen Tunis bound ME-232 would carry nine



was on. Two ME-323s were quickly shot down. Some of the escorts, noting the unfolding disaster rushed in, as did two squadrons of South African Air Force P-40s. As in the Battle of Britain, the Spitfires broke towards the ME-109 escorts while the lower performance P-40s took on the lumbering transports. Within minutes it was over – every ME-323 was shot down (18.5 “Italian flying boat” air kills were claimed). Only 19 of 138 Gigant aircrew members survived. Oberstleutnant Stephan was not among them. A “hero of the fatherland” was the press story line, flying and dying gallantly in a desperate bid of resupply. A tactical blunderer of the first order he was to air staffers, breaking the air plan and destroying 7% of Luftwaffe strategic transports.

The North Africa campaign ended three



**A German crew off-loads a 10+ ton Marder tank through the Me-323 front-end clam shell doors. (Circa WWII). (Courtesy photo).**

weeks later. The Allies captured 260,000 prisoners. The ME-232 had long since departed to the Russian Front, where things were safer.

By early 1944 production of the type had ceased at 223 aircraft (not counting glider conversions). By late 1944 drastically shortened Axis lines of communication and almost continuous Allied air superiority resulted in the dissolution of the “Gigant” squadrons. Some pilots stayed with air transport units, others were transferred to fighter schools. Senior flight engineers and mechanics stayed on the ramp, the less experienced moved into Luftwaffe anti-aircraft artillery or airfield security units, the later evolving into infantry units.

No ME-323 survived the war though their front end loading clam shell doors and multi-wheels bogies, for rough field operations, did. As did their spirit, evident today in Luftwaffe air transport units again flying in the Middle East with priority NATO and UN cargoes, though with a third less engines.

**Murdock M. Moore is a twenty two year veteran of military service, mostly in airlift support, a long time A/TA member and has contributed several historical articles for inclusion in A/TQ.**

## Ramstein Airmen Show C-130 Capabilities to Polish Military

by Senior Airman Nathan Lipscomb,  
435th Air Base Wing PA

As the U.S. and Polish celebrate 90 years of diplomatic relations this year, members of the two countries' air forces strengthened their bonds by way of the C-130 Hercules in late January at Powdiz AB, Poland.

Members of the 86th Airlift Wing from Ramstein Air Base, Germany, visited Powdiz Air Base by way of Warsaw to show off the aircraft's capabilities to Polish military members.



**Staff Sgt. Robert Hayes (right) goes through his C-130 Hercules preflight checklist as a member of the Polish air force looks on Jan. 29 at Powidz Air Base, Poland. The Polish air force will soon be adding the C-130 to their aircraft inventory, allowing them greater cargo movement capabilities. Sergeant Hayes is an 86th Airlift Wing flight engineer from Ramstein Air Base, Germany. (U.S. Air Force photo/Senior Airman Nathan Lipscomb).**

Poland is expected to receive five C-130E models from the U.S. Air Force in the near future. The new airframe is expected to expand Poland's cargo and troop moving capabilities while allowing seamless cooperation between the two countries in contingency operations anywhere in the world.

The C-130 will be the biggest of the country's aircraft, said Polish Brig. Gen. Tadeusz Mikutel, the 33rd Air Base commander.

During the visit, members of the 86th AW demonstrated low-level flying, mission planning, standard maintenance and loading procedures, and had a chance to exchange ideas with the Polish military.

“One of the things we are able to do while we are here is to be able to partner and work with the Polish Air Force

to demonstrate some of the capabilities of the C-130's that they will soon have in their inventory,” said Brig. Gen. William J. Bender, the 86th AW commander. “I hope that we will continue to have a great working relationship between our Air Force and the Polish air force.”

While addressing the local Polish media, General Bender reassured the press and the Polish air force that they will be receiving a quality aircraft despite the E models age.

“The models the Polish air force will be getting will have some modifications, and many components will be changed, so now you are looking at year 2000 technology instead of 1960 technology,” General Bender said. “It has great capabilities that I believe the Polish air force should be excited to have.”



**An Airmen from the 86th Airlift Wing from Ramstein Air Base, Germany, talks with a Polish air force member about C-130 Hercules procedures Jan. 28 at Powidz Air Base, Poland. (U.S. Air Force photo/Senior Airman Nathan Lipscomb).**

C-130 trained members of the Polish air force had the chance to watch and discuss what their U.S. Air Force counterparts do in their every day jobs on the C-130.

“They have received the same training that we have as members of the U.S. Air Force,” said Tech. Sgt. Jay Mitchell. “With the demonstrations here, they get to see how things work outside of the classroom environment.”

Through the training and teamwork, the U.S. and Polish air forces will continue to strengthen the bonds they have helped establish through the C-130.

# Association & Chapter CONTACTS

## Board of Officers & Staff

### Chairman (Acting) Board of Officers

Gen Walter Kross USAF Ret  
Chairman@atalink.org

### President

CMSgt Mark A Smith USAF Ret  
President@atalink.org

### Sr Vice President

Maj Gen Richard C Marr USAF Ret  
SrVP@atalink.org

### VP Programs

Col Dennis L Murphy USAF Ret  
ProgramsVP@atalink.org

### Secretary

Ms. Carol Mauchline  
Secretary@atalink.org

### Treasurer

Col John J Murphy Jr USAF Ret  
Treasurer@atalink.org

### VP Industry Affairs

Col Robert E Dawson USAF Ret  
IndustryVP@atalink.org

### Legal Advisor

Maj Gen Richard D Roth USAF Ret  
Legal@atalink.org

### Parliamentarian

Maj Wesley L Marsh Jr  
wesley.marsh@scott.af.mil

### Historian

Lillian E Nolan  
lillian.nolan@scott.af.mil

### Membership/Convention Registrar

Dennis W (Bud) Traynor III  
ata@atalink.org  
mis@budtraynor.com

## Board of Advisors

### Chairman Board of Advisors

Maj Gen James I Baginski USAF Ret  
jibagger@aol.com

### Board

CMSgt William M Cannon USAF Ret  
bcloader@aol.com

Lt Col Ted E Carter Jr  
GeneC17@aol.com

Gen Duane H Cassidy USAF Ret  
dhcassidy@nc.rr.com

Col Barry F Creighton USAF Ret  
barry.creighton@lmco.com

Col Robert F Ellington USAF Ret  
RElling900@aol.com

SMSgt Regina L Hocter  
regina.hocter@wpafb.af.mil

Col Phillip A Iannuzzi Jr  
philip.a.iannuzzi-jr@boeing.com

Lt Col Walter L Isenhour  
walter.isenhour@aviano.af.mil

CMSgt Michael R Kerver  
kerver\_michael@bah.com

CWO4 Richard J Langstraat USA Ret  
celeste.miller@aarcorp.com

Col Chester H Mauchline  
corky.mauchline@ae.ge.com

Col Paul E McVickar USAF Ret  
Paul.McVickar.ctr@ustranscom.mil

Gen William G Moore USAF Ret  
615-790-3999

Col Ronald E Owens USAF Ret  
ronaldo@flymidamerica.com

Col Jack D Patterson USAF Ret  
castlebridgekeep1@me.com

Maj Gen Robert B Patterson Sr USAF Ret  
sasbob@att.net

CMSgt David M Pelletier II USAF Ret  
eagle141@comcast.net

SMSgt Edward E Rennecker  
edward.rennecker@us.af.mil

MSgt Eric E J Riker USAF Ret  
rikerandassoc@aol.com

Gen Charles T Robertson Jr USAF Ret  
charles.t.robertson@boeing.com

LtGen John B Sams Jr USAF Ret  
jbsj11@gmail.com

BGen James W Swanson USAF Ret  
jim.swanson@dhs.gov

CMSgt James W Wilton USAF Ret  
jim.wilton@comcast.net

## Convention & Symposium

### Convention Chairman

Col Jack D Patterson USAF Ret  
castlebridgekeep1@me.com

### Symposiums Chairman

LTC Jeffrey Bigelow, USAF  
Seminars@atalink.org

### Program Committee

Col Miles C Wiley III USAF Ret  
Programs@atalink.org

### Golf

Golf@atalink.org

### Master of Ceremonies

Col George E Dockery USAF Ret  
george130@comcast.net

### Heritage Committee

Col Ronald E Owens USAF Ret  
ronaldo@flymidamerica.com

### Nominating Committee

Gen Ronald R Fogleman USAF Ret  
rfbuzzard1@aol.com

## Airlift/Tanker Quarterly

### Editor A/TQ

Collin R Bakse  
ATQ@atalink.org

### Business Manager A/TQ

Doug Lynch  
Advertising@atalink.org

### Public Affairs A/TQ

Col Gregory P Cook USAF Ret  
Greg@GregoryPCook.com

## Command Liaison Representatives

### Liaison AETC

Maj Manuel R Gomez Jr  
manuel.r.gomez@dcma.mil

### Liaison AFRC

MajGen Charles E Reed Jr USAF  
Charles.reed@us.af.mil

### Liaison AMC

BrigGen Brooks L Bash USAF  
brooks.bash@iraq.centcom.mil

### Liaison AMC (alternate)

Maj Timothy M Gonyea USAF  
timgonyea@mac.com

### Liaison AMC (POC)

Ms Darcy Lilley  
darcy.lilley@scott.af.mil

### Liaison ANG

BrigGen Thomas Haynes USAF  
Thomas.Haynes@scott.af.mil

### Liaison USAFE

Col David M Callis  
david.callis@scott.af.mil

### Young Leader Representative

MSgt Richard T Martin  
Peppieandmister@hotmail.com

### Young Leader Representative

Maj Aaron J Larose  
aaron.larose@dover.af.mil

## Chapter Contacts

### Alamo

Maj Manuel R Gomez Jr  
manuel.gomez@dcma.mil

### Big Country

MSgt Lester S Farley Jr  
lester.farley@dyess.af.mil

### Capital

Col Kevin J Kilb  
kevin.kilb@pentagon.af.mil

### Cheyenne

1Lt Ryan Walker  
ryan.walker@us.af.mil

### Denali

TSgt Eric Hadsall  
eric.hadsall@elmendorf.af.mil

### Diamond Head

Capt Timothy M Ryan  
timothy.ryan@hickam.af.mil

### Eagle

Maj David A Grein  
david.grein@dover.af.mil

### East Anglia

Col Creg D Paulk  
creg.paulk@mildenhall.af.mil

### Flight Test

TSgt Daniel D Halverstadt  
daniel.halverstadt@us.af.mil

### Golden Bear

LtCol Brian W Lindsey  
Brian.Lindsey-02@travis.af.mil

### Goldwater

Lt Col Michael H Morgan  
michael.morgan@azphoe.af.mil

### Great Lakes

Capt Joseph C Winchester  
joseph.winchester@miself.af.mil

### Hafa Adai

MSgt Scott MacKeller  
scott.mackeller@andersen.af.mil

### Halvorsen

SMSgt Gregory E Todd  
gregory.todd@spangdahlem.af.mil

### Huysen

LtCol Vincent G McCrave, USAF ret  
Vincent.McCrave@scott.af.mil

### Inland Northwest

Maj Henry G Hamby IV  
brad.hamby@fairchild.af.mil

### Keeper of the Plains

Maj Michael K Rambo  
michael.rambo-02@mccconnell.af.mil

### Low Country

LtCol Richard G Moore Jr  
richard.moore@charleston.af.mil

### Lt Gen Turner/Berlin Airlift

CMSgt Severino Di Cocco USAF Ret  
disevann@aol.com

### Maxwell

Col Stephen M Fisher  
stephen.fisher@maxwell.af.mil

### Pacific Northwest

Capt Patrick L Brady-Lee  
patrick.brady-lee@mcchord.af.mil

### Peachtree

Col Jon A Hawley USAF Ret  
jon.a.hawley@lmco.com

### Pikes Peak

Maj Kenneth R Picha  
kenneth.picha@usafa.af.mil

### Razorback

Maj Jerry R Hickey  
jerry.hickey@littlerock.af.mil

### Red River

LtCol James A Durbin  
james.durbin@altus.af.mil

### Rheinland-Pfalz

LtCol Anthony E Schenk  
anthony.schenk@ramstein.af.mil

### Rheinland-Pfalz-Lajes

MSgt Rachel Czmyr  
rachel.czmyr@lajes.af.mil

### Ryukyuu

Capt Joseph W Carr Jr  
joseph.carr@kadana.af.mil

### Sam Fox

Maj Kimberly L Welter  
Kimberly.Welter-02@afncr.af.mil

### See Seventeen

CMSgt Michael M Welch USAF Ret  
michael.m.welch@boeing.com

### Space Coast

CMSgt Larry N Cayabyab USAF ret  
mschiefc@earthlink.com

### Special Operations

CMSgt Daniel McMullan  
Daniel.McMullan@hurlburt.af.mil

### Tarheel

MSgt Kimberly T Madison  
kim.madison-02@pope.af.mil

### Team Robins

Col James C Dendis  
james.dendis@robins.af.mil

### The Shogun

Capt Jonathan Wilhelm  
jonathanwilhelm@gmail.com

### Tidewater

Lt Col Brian D Joos  
brian.joos@jfc.com.mil

### Tip of the Sword

Capt Jerry W Yarrington  
jerry.yarrington@incirlik.af.mil

### Tommy B. McGuire

SMSgt Robert A Boyer  
robert.boyer3@mcguire.af.mil

### Tony Jannus

Lt Col Jon E Incerpi  
jon.incerpi@us.af.mil

### Warriors of the North

Lt Col James L Warnke  
james.warnke@grandforks.af.mil

### Wright

Capt Richard L VanSlyke  
richard.vanslyke@wpafb.af.mil

Contacts listed are the most current available. Please contact Bud Traynor and Collin Bakse to make corrections and/or changes, or to suggest additional contact information for this page.