

# AIR COMMANDO

A Professional Publication by the Air Commando Association  
Dedicated to Air Commandos Past, Present, & Future

# JOURNAL

## CV-22

**V-22 Osprey During  
The Early and  
“Dark” Days**

**Ten Years of  
Operational  
Excellence**

**Ambush Over  
South Sudan**

**Standing Up  
First Air Force  
Osprey Squadron**



Vol 9: Issue 1

**Foreword by Bruce Fister  
Lt Gen, USAF (Retired)**

# Air Commando JOURNAL



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Air Commandos with the 8th Special Operations Squadron conduct a routine training mission on a CV-22 Osprey tiltrotor aircraft during a flight over Northwest Florida, November 2016. The Osprey has been used operationally since 2006 to conduct long-range infiltration, exfiltration, and resupply missions for special operations forces globally. (Photo by A1C Joseph Pick)



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# FOREWORD

I write this CV-22 Osprey introduction on the 24th of April 2020, 40 years after Operation EAGLE CLAW, the attempt to rescue 52 hostages held by the Iranians in the U.S. Embassy in Tehran. It is appropriate to remember those courageous special operators who risked all in this attempt. But all was not lost, for today the CV-22 and its crews and maintainers are how Air Force special operators could help make a similar operation successful.

The CV-22 was born from a joint service program in the 1970s where the basic Air Force special operations requirement was established and what would be designated the replacement for AFSOC's MH-60 and MH-53 helicopters. Eventually only the Air Force and Navy/Marine Corps stood, and the Marines became the lead acquisition service based upon their need for greater numbers of aircraft.

Over the years that led up to delivery of training CV-22s to the 58th SOW in July 2006, and the operational aircraft to the 1st SOW in January 2007, the program experienced many fits and starts, but dedicated and visionary airmen from the Pentagon, to AFSOC and USSOCOM, and down to the 1st SOW nurtured the vision until it became a reality. During my tenure as AFSOC Commander, I was asked, to again recertify the special operations requirement for this covert infiltration/exfiltration, fast, refuelable, long-range vertical take-off and landing capability. It is no secret that I had concerns with the program. In 1991 I had my first look at the Marine MV-22 test aircraft during a refueling stop at Hurlburt Field. Later that very day, the aircraft and crew were lost on approach to Cherry Point MCAS, NC. This gave me cause to reevaluate my own views. I saw dimly a great capability, but also an aircraft with many moving parts and consequent maintainability challenges. Yet, it was the only future capability I could envision that would drastically improve the opportunity for success for a future long-range infiltration and exfiltration mission with similar Operation EAGLE CLAW requirements. I saw many growing pains with the CV-22, but as has been proven, the men and women of AFSOC have been up to the task. The CV-22 has never let us down and should an EAGLE CLAW situation ever return, the weapon system and its people are ready to make those EAGLE CLAW warriors proud. And this generation of all Air Commandos still have "THE GUTS TO TRY."



Bruce L. Fister, Lt Gen, USAF (Retired)  
2d AFSOC Commander



# CHINDIT CHATTER

2020 is one of those years where a number of significant anniversaries of major SOF events come together. First is the 50th anniversary of the Son Tay raid, Operation KINGPIN. Second, and one that directly led to the third, is the 40th anniversary of Operation EAGLE CLAW, the failed rescue attempt that resulted in the loss of eight brave Americans and eventually to the stand up of USSOCOM in 1987. And, in 1990, 30 years ago this year, Air Force Special Operations Command was created.

Your Air Commando Association was going to have a hand in the key celebratory events for each of these anniversaries. First, AFSOC had asked ACA to assist in culminating a week of celebration of *Thirty Years of AFSOC* with a dinner patterned after our successful Chapman Medal of Honor Hall of Fame celebration last fall. Next, there were going to be several events commemorating Operation EAGLE CLAW and ACA was going to be represented and supporting those in a variety of ways. Third, this is the 50th and final anniversary celebration of the Son Tay raid that attempted to free American POWs from a prison in North Viet Nam. In that case, our intent was to join with the Son Tay Raiders Association and host their last reunion as part of our annual convention which was to be themed around Operation KINGPIN. But the best laid plans were sidelined at least temporarily by the COVID 19 crisis. Note I said, temporarily, because we are still looking forward to our convention and will adjust fire as necessary based on the guidance at the time. We are also working closely with the leadership at AFSOC to ensure these important anniversaries will not go unhighlighted. We intend to honor all who have played significant roles in each. We will keep our members in the loop regarding the status of the celebrations through our various social media venues.



One very significant event that is also linked to Operation EAGLE CLAW and the stand-up of AFSOC, was the acquisition, operational testing, and fielding of the CV-22 Osprey. This issue of the *Air Commando Journal*, is designed to take our readers through each of those phases, and resulted in what is now a very successful and battle-tested aircraft. The authors who contributed to this issue also showcase how, over the last ten years, the Osprey's transformational technology and the men and women who fly and maintain these airframes, have given the nation and the special operators in all four Services the ability to be anywhere any time, and safely get home again. As always, in SOF the hardware is important, but after reading this issue we think you'll agree that it is the people who use the hardware in ways unexpected by our adversaries that make the weapon systems "special." Please enjoy this edition of the *Air Commando Journal*.

It is with great sadness that the ACA mourns the loss of one of the great Air Commandos of our time. Col Jim Kyle, the Air Force component commander during Operation EAGLE CLAW, served our nation for more than 30 years, 20 of them in special operations. In 2015, Col Kyle was inducted into the USSOCOM Hall of Honor. May he rest in peace and may God bless his family.



Any Time - Any Place

Dennis Barnett, Col, USAF (Retired)

*ACA Chief Operating Officer and Editor-in-Chief*



Assisting ACA in our mission to support Air Commandos and their families: Past, Present, and Future

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# HOTWASH

## Vol 8, Issue 3

I look forward to the *Air Commando Journal*. To me it's like National Geographic magazine, very hard to throw away no matter how old it is.

Claude (Don) Clifford  
Marksville, LA  
Life Member #501

Don,

*We are so glad you enjoy the Journal! We have a great group of volunteers that work very hard to put it together. We couldn't do it without volunteer editors or authors!*

Jeanette Elliott  
Media Coordinator

## Mailing Address Error

Unfortunately, due to a software error, Volume 8, Issue 3 of the *ACJ* was mailed with many names switched with mailing addresses. If you did not receive the previous issue you can view it online at [www.aircommando.org](http://www.aircommando.org) and click on the "Journal" tab in the top main menu. We are very sorry for the inconvenience this may have caused.

## Visit to ACA Headquarters

I recently had the honor of visiting the Air Commando association in Mary Esther, FL. WOW! Meeting Pat, Jeanette, and Melissa was a treat. I have been emailing them and talking with them off and on for a couple of years. It was nice putting a face to their voices. The conference room with so many heroes on the walls was inspiring. Pat, who manages the store, has many great Air Commando things to purchase. I totally recommend visiting the ACA building and meeting the great staff who keeps this great association together. I also got a chance to visit the memorial park on Hurlburt Field. Another wow, what a great park. Plan on a couple of hours to walk around, to see the many great planes and honor walls. My personal high-light of the trip was to see and touch the Combat Talon tail number 657. I crewed that plane as a loadmaster and got my first combat hours on that plane. I also had the honor of meeting Matt, inducted in 2000 to the Air Commando Hall of Fame. Thank you very much to Pat, Jeanette, and Melissa for the wonderful experience at the ACA and MY brother Art for putting this experience together for me.

Dave Clark  
Vancouver, WA  
ACA Lifemember #5585

*Submissions may be emailed to [info@aircommando.org](mailto:info@aircommando.org) or mailed to Hot Wash c/o Air Commando Association, P.O. Box 7, Mary Esther, FL 32569. ACA reserves the right to eliminate those that are not deemed appropriate. Thank you in advance for your interest in the Air Commando Journal.*



# SITREP

Bill Turner  
CMSgt, USAF (Retired)  
*ACA Vice President*

Greetings Teammates,

Thank you for your continued support of the Air Commando Association, the Foundation, the membership, and mostly your support of Air Commandos deployed around the world...and the families and other loved ones who support them. As we sit in relative comfort pondering Coronavirus and the disease it causes, COVID-19, our warriors are standing the watch in Afghanistan, Iraq, several countries in Africa, and other international hot spots. There are no breaks in the combat zone.

Our maintenance, ops, and support teams are working tirelessly to maintain pressure on the enemy and, when necessary, permanently remove them from the battlefield. Back at home station, Air Commandos are training to maintain specialized special operations fixed wing, tilt rotor, and ISR platforms, and our aircrew and special tactics warriors continue to hone their armed overwatch, ISR, close air support, infil and exfil, SOF mobility, JTAC, combat rescue, personnel recovery, static line and freefall jump quals, and a whole host of other skillsets needed to fight the enemy at a time and place of our choosing. Those that are not the next to go, are supporting the training mission back home.

Also at home station, commanders and senior enlisted leaders are trying to keep pace with emergency health protection conditions and ever-changing

guidance and preventative measures issued by the Centers for Disease Control and Prevention, Department of Health, and the Commander in Chief, to hold the line against COVID-19. This is no small task. Just as they always do, AFSOC's leadership teams have the guidance, intent, and the full support of Lieutenant General Jim Slife and Command Chief Master Sergeant Cory Olson, and the headquarters staff. They are consuming volumes of information and making fact-based, informed decisions, and every day they are taking back more ground.

The special ops bases have been in lock-down mode for the better part of 60 days. The 0-6 level leadership teams are among the best I have ever seen, and they are making hundreds of decisions every day with a multi-pronged focus of keeping Air Commandos and their families safe, supporting the war fighters downrange, and training for whatever threat is on the next ridgeline. On Monday, 11 May 2020, the 1st SOW re-started continuation flight and other readiness training to maintain their lethality and alert posture to answer the call Anytime, Anyplace.

Due to COVID-19, Air Force Special Operations Command and the Air Commando Association have had to defer or cancel many significant historical celebrations that were planned for this year. November 21st will be the 50-year anniversary of the Son Tay Raid, April 25th was the 40-year anniversary of EAGLE CLAW, and May 22nd was the 30-year anniversary of the standup of AFSOC. These seminal events helped shape the Services' special operations commands into the lethal formations they are today. Celebrations are not what is important, it is the acknowledgement of the sacrifices made by our forbearers and

the Air Commando tab each of them wore when it was their time to enter into the belly of the beast. Each of these events served to ready the leaders and their formations borne of necessity to stand the watch and carry the colors into battle.

Today, with the battle streamers of yesteryear weighing heavy on the flagbearers and bolstering their confidence and commitment, the force is the most lethal it has ever been, and they are operating the most sophisticated weapons platforms the world has ever known. Air Commandos can swing from personnel recovery to armed overwatch to close air support to humanitarian operations in a fast moving, dynamic re-tasking environment where they leverage innovations in technology to bridge the information gaps and seams to maximize C4I wherever they are.

The tactical level leaders who run the squadrons are the heartbeats of the command. They cut their teeth in the days, weeks, months, and years following 9/11—combat is all they have ever known. With this as a backdrop, there is intense pressure on the force and families, and your Air Commando Association and Foundation stand ready to help wherever we are needed to reinforce the resiliency of past, present and future Air Commandos.

Again, it is an honor to be part of the past of AFSOC and I am excited to watch today's Air Commandos as they continue to bring great honor to the United States Air Force, SOF, and to our nation. To all of those who are waiting in the wings—so to speak—and waiting for their opportunity to make a difference, I say come on...what are you waiting for? Every day is a great day to be an Air Commando!

# ACQUIRING AFSOC'S OSPREY

## How the CV-22 Joined the Air Force

By James Teeple, Lt Col, USAF (Retired)

The Air Force's CV-22 acquisition process was a monumental, multi-faceted effort that orchestrated so many simultaneous tasks: defending the military need for tiltrotor capabilities, fighting for and sustaining political support, while also developing and fielding transformational technology. To accomplish those major lines of effort, the HQ AFSOC acquisition team had to create, demonstrate, and deliver unique joint, as well as Service-specific, testing, training, and force structure management processes and programs before AFSOC's Ospreys could be fielded for operational use.

As a quick point of clarification, the Bell-Boeing V-22 Osprey is the name of the basic tiltrotor aircraft. US Marine Corps Ospreys are designated MV-22s, while the Air Force's special operations Ospreys are called CV-22s, reflecting the AFSOC mission to focus on long-range infiltration, exfiltration and resupply of special operations forces into hostile or denied territory. Assigning the "M" prefix to the Marines' version is a peculiarity in the US military aircraft naming conventions, as M is normally reserved for special mission aircraft such as AFSOC's MC-130s or the Army's MH-47 special operations Chinook helicopters.



The CV-22 Osprey makes its descent onto Hurlburt Field, the first Air Force base to receive the operational aircraft. (Photo courtesy of AFSOC History Office)

This article will cover the period, 1993 to 1999, when the Department of the Navy, USMC, and AFSOC were developing the initial capability requirements that became the V-22. During this period, which ended with full scale development (FSD) and the concurrent flight and operational testing in 1997 described elsewhere in this issue of *ACJ*. AFSOC crewmembers participated with USMC aircrews and test pilots to accomplish the initial flight testing. Our HQ AFSOC acquisition team developed a comprehensive training system concept and designed the early force structure management programs to field the weapons system. Getting to initial operational capability and full operational capability would take several years after this early acquisition phase. You can read about those efforts in the other articles in this issue.

It is no exaggeration to say there were very few people or organizations who believed the CV-22 had any chance of becoming the aircraft that would revolutionize how AFSOC engaged target sets around the world. But in the summer of 1993, new life was injected into the Air Force's acquisition effort. This story offers a brief overview of the challenges and successes across Services, major commands, and headquarters

staffs that resulted in AFSOC joining the tiltrotor world.

### Requirements Development and Approval

The CV-22 program fell under an Acquisition Category level 1 (ACAT) program, meaning its funding was projected to exceed \$2.7 billion. Just the cost of 50 V-22 airframes alone, without special operations modifications, was in the \$5 billion range. AFSOC's Plans and Programs office (then called XP, now A5) and the AFSOC CV-22 Command Systems Management group was charged with completing the Air Force's requirements document and getting it through the Joint Requirements Oversight Council (JROC) at the Joint Chiefs of Staff in less than six months. Due to the level of detail required and the scrutiny leveled on high-dollar programs, especially the multi-billion dollar ones, this is a task that normally takes a couple of years.

Our first task was to fully explain and justify the operational and sustainment requirements for SOF tiltrotor capabilities in an Operational Requirements Document (ORD). An older version of the ORD existed, but it did not adequately reflect what the

Air Force needed its CV-22s to do. Our AFSOC team, comprised of helicopter and fixed-wing pilots, and officer and enlisted maintenance and logistics experts, were charged with bringing the new ORD and subsequent development program to fruition. The guidelines for action were:

- If the system worked in an MH-53 Pave Low, don't fix it and put it in the CV-22.

- If it did not work in AFSOC's new MC-130H Combat Talon II, then fix it and put it in the CV-22.

- No matter who you were, officer, enlisted, operations, or support, you worked for AFSOC and spoke for the command when in meetings and with other Services.

- Make logical operational, logistics, and maintenance-related decisions when at meetings.

- Be everywhere, all the time, in someone's space and drive AFSOC's requirements and acquisition "train."

We, in the CV-22 office at AFSOC during this early stage, had to do political battle within AFSOC and across multiple user communities, including USSOCOM and the other component commands such as USASOC. Unfortunately, there were leaders at multiple levels, across the Services, and even within one of the prime contractors who were bent on killing the requirement for the Osprey's transformational capabilities.

In the fall of 1993, the ORD was eventually blessed by AFSOC, USSOCOM, and HQ USAF. Because the program was ACAT level 1, it required an analysis of alternatives (AOA) to demonstrate the benefits and shortcomings of other potential options. The AOA was worked simultaneously with the ORD and was also delivered in late 1993.

The original CV-22 force structure envisioned during the AOA called for 62 - 75 Air Force Ospreys, with the analysis considering the levels of risk USSOCOM was willing to assume and how much of the existing aviation force structure the CV-22s would offset to help pay the new airframe's life cycle costs. Ultimately, the USSOCOM commander decided to buy 50 CV-22s and assume more risk in operations. Included as part

of his decision was retiring all AFSOC helicopters, and at the time, a few Army special operations helicopters, and transferring several older MC-130s to the Air Force Reserves.

This was the requirement we took to the JROC for program approval. USSOCOM and the Marines each brought their own ORD to the JROC. The AFSOC team wrote USSOCOM's JROC briefing to comply with the standards: 27 slides for 27 minutes of time in front of the four Service Vice Chiefs of Staff. USSOCOM, because it is not a Service, is not a sitting member of the JROC, but we were represented at the table by the USSOCOM J3.

Also, by not being a Service, USSOCOM did not have a Service's budget to fund its program. The work we had done to find AOA offsets within other special operations programs, plus the extraordinary work that had been done to justify the requirement during the staffing process, convinced the JROC to approve the Air Force's CV-22 requirement. We went from Milestone 0 to 2+ with that one briefing. The Navy and Marine Corps, though, with \$5 billion in Service funding earmarked for the MV-22 program, gave a briefing that lasted over an hour and failed to justify the need for the aircraft's speed and self-deployability capabilities. Their requirement was disapproved.

While the JROC's disapproval of the Marines' request was frustrating, the year-long delay in development efforts ended up being beneficial. The JROC directed the Air Force and Marine Corps develop a joint ORD to address common AF and Marine Corps requirements, and also articulate SOF-unique requirements in one document. The USSOCOM J3's direction was for me to be with the Marines to help them develop their justification for speed and deployability, and then write the joint ORD.

Developing the joint ORD set the stage for the initial configuration of AFSOC's CV-22 and also set a date for retiring all helicopters in AFSOC. The biggest changes from the Marines' amphibious assault MV-22 to the Air Force's special operations CV-22 were the mission set and our requirement for a flight engineer (FE) in the cockpit as an

"Integral Cockpit Crew Member."

Changing from the Navy/Marine Corps 2-person cockpit crew to three crewmembers up front became a monumental battle with the Department of the Navy program management team and surprisingly, also with the leadership at one of the prime contractors. Their perspective was that they had developed a perfectly good 2-person cockpit for the Marines. The Navy's position was that a 3-person cockpit crew, as well as other AFSOC requirements would lead to huge development cost increases. Ultimately between months of frustratingly endless meetings, capability descriptions and explanations, and leadership discussions, the long-delayed JROC met again to approve the revised USMC requirement, the new joint ORD, and also directed the Department of the Navy to carve \$500 million of its budget out for CV-22 technical development.

Bell Helicopter was charged with developing the configuration analysis for SOF survivability. Their presentation to the program office was initially denied because of cost. We brought the same briefing back two months later after adding more flare and chaff systems to the aircraft configuration. There was much gnashing of teeth by the program manager, but the revised configuration was approved. Our AFSOC team then turned its attention to designing the layout and systems for the cockpit, while simultaneously developing a training system concept that included manning proposals and funding needs for the Air Force CV-22 enterprise. In the meantime, the Navy program management office put money into two full-scale development aircraft to modify them into approximate CV-22s and later building two Production Representative Test Vehicles (PRTV).

## **Cockpit, Training, and Manpower Development**

One innovation from Bell Helicopter was the V-22 cockpit rapid prototyping simulator. Basically, this allowed you to fly a configuration and then provide feedback to the engineering team who could quickly alter the layout. Within about 12 hours, it was possible to try the new configuration to evaluate the



**Capt Tyler Oldham, 20th SOS CV-22 Osprey pilot, adjusts map display during a CV-22 simulator flight at Cannon AFB, NM, in 2012.** (Photo courtesy of USAF A1C Eboni Reece)



**Maj Christian Helms, 20th SOS CV-22 Osprey pilot, prepares for an in-flight refueling in the CV-22 simulator at Cannon AFB.** (Photo courtesy of USAF A1C Eboni Reece)

change. If it worked, we could move on to the next test item.

This entire initial cockpit and crew systems testing process was done over about two years. Aircrew were selected from AFSOC's helicopter and Combat Talon communities. Occasionally, we would bring in a flight surgeon from the Air Force Flight Standards office to look at what was being done with symbology, controls, and displays to make sure they met flight safety standards. Crews would spend two weeks at a time during this process and at the end of each two-week period they would fly a representative operational scenario to see if what they recommended was good enough to move on to the next phase.

This cockpit and crew systems development period finalized AFSOC's placement of the FE as an integral member of the cockpit crew, a claim that has been resoundingly justified over the last 10 years of CV-22 combat operations. It was also during this time that AFSOC's crews began developing the initial procedures for the reduced visibility approaches that are now the standard for AFSOC Ospreys in austere and environmentally challenging conditions. All of this was integrated with the Crew Systems office at Boeing for concurrent software development into the actual CV aircraft.

As the HQ AFSOC team developed the initial CV-22 crew training system, the initial premise was that the Air Force would be responsible for its own training, from basic qualification in the aircraft to full mission-ready status. Ultimately the USMC accepted the requirement

to provide basic qualification training and the AF, with its smaller and highly specialized fleet of Ospreys, only needed to provide CV-22 transition and mission qualification.

Since the CV-22's "bread and butter" is the last 10 miles of the insertion profile, when the aircraft is flown in helicopter mode, we set the requirement for the initial aircrew training cadre as a 60/40 split between SOF helicopter and fixed-wing experience. The helicopter force was to be 75 percent Pave Low and 25 percent non-Pave Low aircrew until the manpower and training system had matured enough to accept non-SOF aircrews. The 40% fixed-wing cadre was to be manned by experienced SOF aircrews with terrain following radar experience if possible.

The schoolhouse at Kirtland AFB, NM, could only declare its initial Required Assets Available (RAA) for training when they had an instructor cadre, maintainers, publications, and one full-motion and one non-motion FAA Certified Level D simulator available for training. The AFSOC plan was to eventually deliver two of each type of simulator. The operational squadrons were also planned to receive one non-motion simulator to match those at the schoolhouse, providing the units valuable training opportunities without having to fly the actual aircraft and the ability to rehearse operational scenarios prior to a mission. The availability of the unit-level simulators was timed to coincide with each operational unit standing up. Over the years the actual fielding of the

simulators seems to have worked out fairly closely to what was set out in the original planning documents.

AFSOC's final goal was to assign two operational units overseas, one in Europe and one in the Pacific, two in the US, and one at the schoolhouse at Kirtland AFB. Today's force structure reflects that 20-year old fielding goal. However, developing the cost estimates necessary to field AFSOC's 50-aircraft fleet was another battle.

## Fielding and Beddown Cost Estimating

Estimating the costs and programming for an AFSOC force structure: people, aircraft, units, training, support, documentation, facilities, and so on, was a six-year exercise in staff "kabuki dances," characterized by endless cycles of brainstorming, analysis, briefings, and decisions. HQ USMC had a document called the Weapons System Planning Document (WSPD). As a joint program AFSOC used their WSPD to describe how AFSOC units were to be stood up and manned, what the Air Force's CV-22 flying hour program would be, and how our simulators were to be fielded. The only problem was, the WSPD reflected how the Marines fielded a unit which was completely different from how the Air Force did business.

To overcome the limitations of the WSPD, our team developed the AFSOC Usage Spectrum simultaneously with the Command Management Action Plan (CMAP). The Usage Spectrum

was designed to produce the flight hour program. We developed this by taking every training document of existing AFSOC platforms and using them for the AFSOC Ospreys. Thus, the Usage Spectrum broke down the events from initial training through operational employment. The results led to the CV-22 flying hour program. The Marines' Usage Spectrum was only a few pages. When we had finished our analysis, our document was about 70 pages and a flying hour program of 36 hours per month per aircraft, a figure which continues to this day.

The Navy was not willing to accept the USAF/USSOCOM fielding plan for the CV-22s as they felt it would put program funding at risk. The Air Force's CMAP outlined how AFSOC and USSOCOM planned to bed down, operate, and pay for the CV-22 fielding plan. Over a two-week period, special operators in various headquarters were able to get the CMAP signed by AFSOC, USSOCOM, the Air Staff, and the Secretary of the Air Force's staff. Each

of those offices sent letters approving the CMAP to the Department of the Navy.

During a Navy Program Office cost and funding meeting, the discussion came to an abrupt halt when the Air Force disagreed with the WSPD method of costing a USAF program. When Dept of the Navy senior leadership insisted that the WSPD was the baseline document for all planning, the Secretary of the Air Force's representative reminded the Navy that the AFSOC CMAP had been blessed by all relevant levels of AF and USSOCOM leadership as the default planning document. The Navy reluctantly accepted the Air Force and USSOCOM position that the CMAP would be used to cost the USAF Osprey program.

From 1993 to 1999, numerous officers, NCOs, and civilians accepted the endless frustrations and sometimes occasional disappointments needed to carry the CV-22 acquisition process through to fruition. From our HQ AFSOC staff perspective, this was not "the fun stuff," but it had to be done, and done well if we were to bring this

game-changing capability to the Air Force. It was a tumultuous process with many setbacks, but also numerous rewarding successes. The behind the scenes tenacity during those early years of the acquisition process, in what was for most of us completely foreign to our experiences in the Air Force, resulted in a hugely successful and transformational capability. Ten years of successful combat employment proves that the effort was worth the challenges.



*About the Author: Lt Col James Teeple served in the US Army as a helicopter pilot flying AH-1 Cobra and UH-1 gunships in Vietnam, and then Hueys and Chinooks from 1970 - 1974. He transitioned to the Air Force and flew the HH-53 Super Jolly Green Giant in combat rescue. Jim was also an initial cadre NVG and special operations pilot. Following graduation from staff college, he flew the MH-53 Pave Low with the 20th SOS before accepting the position as HQ AFSOC CV-22 Command Systems Program Manager.*

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# V-22 OSPREY

## During The Early And “Dark” Days

By Gary “Chainsaw” McCollum, Col, USAF (Retired)



V-22 Deck Landing qualification with VMMT-204. (Photo courtesy of the author)



Det 2, 18 FLTS at MCAS New River (Photo courtesy of the author)



Standup of Det 2, 18 FITS (Photo courtesy of the author)

## Introduction

By now, the V-22 Osprey has more than proven its military value in operations around the globe, but there was a time early on when the program went from the cusp of full rate production to nearly disappearing altogether. This is only a small portion of the story of the team that refused to see this transformational aircraft be judged solely on hearsay and flawed, overwhelmingly negative press. The previously unproven tiltrotor technology showed significant promise toward meeting requirements first identified after Operation EAGLE CLAW, and a small but dedicated number of people believed even a first-generation tiltrotor like the V-22 could fill that capability void like no other type of aircraft, fixed- or rotary-wing. For those of us who lived them, these were the “dark days” of the V-22.

What follows are the author’s firsthand observations and experiences from the Osprey program’s early days of operational testing and standup of the initial USAF and USMC training cadre. These were the times when the vast majority of news articles regarding the V-22 were negative and the overwhelming misperception throughout the military and civilian communities was that the Osprey was a death trap for all who dared fly it.

The V-22 Osprey was the first joint aircraft acquisition program led by the US Marine Corps with USAF/ USSOCOM, USN, and for a brief period, the US Army as joint partners. Bell Helicopter and Boeing Rotorcraft co-lead the corporate membership of the V-22 Joint Program Office (JPO) located at Naval Air Systems Command (NAVAIR) on Naval Air Station (NAS) Patuxent River, MD. By 1999, the acquisition program had proceeded through its initial Experimentation & Manufacturing Development (EMD) phase and was in Low Rate Initial Production (LRIP). Bell-Boeing was building a small number of production aircraft pending the results of Operational Evaluation (Op/Eval) and a Full Rate Production (FRP) decision. Developmental Flight Testing (DT) was ongoing, but well behind schedule, and dedicated Operational Testing (OT) was just beginning. The Navy

had also decided the V-22 would be the flagship for a “bundle” of cutting edge technologies, including an automated aircraft maintenance and logistics support tracking program (that electronically tracked maintenance status and ordered replacement parts, among other functions), an electronic maintenance and technical manual system (IETM), self-monitoring and reporting of impending faults to enable replacement before part failure (VSLED), the new Joint Mission Planning System (JMPS), and others. Each of these “bonus” features would complicate introducing the aircraft into the operational force.

The formal qualification training program for AFSOC flight crews was to include academics, simulator, and flying training on the MV-22 at Marine Corps Air Station (MCAS) New River, NC, courtesy of Marine Medium Tiltrotor Training Squadron 204 (VMMT-204) and its Air Force teammate, 58th Operations Group/Detachment 1. Following the initial V-22 qualification, CV-22 initial and mission qualification would be conducted by the 58th Operations Group at Kirtland AFB, NM. Some benefits to this syllabus flow included standardized training for V-22 crew members of all Services, lower costs and higher mission availability of the Marines’ larger MV-22 fleet, and staying joint in the USMC and USAF standup effort. Disadvantages included the usual inter-service frictions, and sacrificing some level of authority on the timing, method, and prioritization of USAF training. Still, over time, members of the various groups formed a strong team, and some of the author’s best friends remain Marines and civilians met during these challenging times.

## VMMT-204 - The V-22 Training Squadron

For their initial cadre, the Marines almost exclusively chose helicopter pilots, largely drawing from their CH-46 schoolhouse (HMT-204) as it stood down and transitioned into VMMT-204. Also included were a KC-130 pilot, an AH-1 pilot, and a handful of CH-53 crews.

The Air Force selected six pilots and four flight engineers as its initial

V-22 instructor cadre, all with special operations and training or terrain following experience. The AFSOC cadre had a broad background in airlift, fighters, trainers, or helicopters. A separate AF maintenance training operating location, comprised of a few enlisted maintainers under the supervision of a master sergeant, would also be established at MCAS New River, albeit under a different chain of command.

To use the small team of Air Commandos most efficiently, each of us served in parallel roles within the Marine squadron and our detachment. I was assigned as the VMMT-204 DSSN, Director of Safety, Standardization, and NATOPS (Naval Air Training and Operating Procedures Standardization), and also tri-hatted as Det 1’s Chief of Safety, Chief of Stan/Eval, and Chief of Tactics. Other members of the detachment filled similar dual roles with the exception of Lt Col Charles Beard, our first detachment commander and our primary conduit to AETC, AFSOC, and USSOCOM. Lt Col Jeff White served as the squadron’s operations officer and later as detachment commander, and most of the rest of the detachment also served in Ops, while Maj Jim Breck focused on training devices and MSgt P.J. Henderson worked for me in Stan/Eval.

As DSSN, I supervised a handful of Marines plus MSgt Henderson. My small shop was tasked with creating, more or less from scratch, all applicable flight manuals, regulations, operating instructions, tactics, techniques, procedures, safety programs...the list goes on. The V-22 Program Office had provided us with a preliminary draft of the MV-22 NATOPS manual, which was a sort of combination of an Air Force Dash-1 and aircraft operating regulations. That document had not been validated and was in an immature form better suited to design engineers and test pilots than operational flight crews. Many sections were still “TBD.” With so much waiting to be written, we tried to make sure anything we recommended for the Marines’ MV-22 would support AFSOC’s CV-22, as well.

Typical of these challenges were the initial “Boldface” procedures. Boldface

are time-critical emergency procedures which must be committed to memory and immediately executed without reference to any checklist in order to preserve life and/or protect the aircraft from significant damage or loss. Some of the initial MV-22 Boldface checklists contained a dozen or more steps, some in paragraph form. One emergency checklist had several Boldface steps, one line of which was 83 words long. There was no way that made sense. Over the objections of many within the DT community and some of the Marines, we eventually simplified the Boldface portion of this particularly complex procedure into two steps with a total of five words, but it took considerable time, effort, and professional discussion to make it happen.

Even the basics demanded review for this unique new weapon system. Nobody knew what the V-22 survival training requirements should be, or what its parking and taxi clearances were, or how it would integrate into airspace or traffic patterns. Our challenges were not limited to the military, as the Federal Aviation Administration (FAA) also had no idea how to categorize or treat tiltrotors. We had to serve as the V-22 experts, recommending or drafting regulations and procedures from start to finish. The authority for these decisions, however, did not lie within the squadron. We had to simultaneously staff our proposals up the USAF, USMC, and USN chains of command for ultimate approval, and we were forced to run that gauntlet for practically every recommendation we made.

Many of our recommendations or decisions had to do with how to “properly” operate the V-22 in a training or operational environment. Given nearly all of the initial cadre had exactly zero hours experience in the V-22, we relied heavily on the expertise of the design engineers and contractors. VM-MT-204 had two Marine DT pilots who were V-22 qualified, but even those two rarely agreed on the “right” way to do something, and their tactical expertise was particularly limited. Because of the newness of the airframe, we drew on our diverse experiences and aviation knowledge, knowing we were often working from a position of ignorance.

We attempted to keep as many items as possible as “recommended draft techniques” pending the chance to later refine options in the actual aircraft. It was a unique situation, especially since we would be developing and validating our TTPs and regulations for the V-22 while training each other to fly it, but we had to start somewhere. On a recurring basis, we would gather all the available members of the cadre to review the draft publications and try to gain consensus before moving forward. As one might expect, place a dozen pilots in a room and you’ll get three dozen opinions, but we did the best we could to provide a solid foundation.

As time passed and we gained better training devices, we were able to at least partially test many of the draft items in the simulator to develop more informed opinions of what “right” looked like. At first, we had only a V-22 wing and nacelles, perched atop scaffolding for maintenance training. We joked that we should suspend a couple lawn chairs below it and designate it our first V-22 simulator while awaiting the arrival of more advanced training devices. Shortly thereafter, we gained a part-task trainer that allowed us to learn some of the software menus and conduct basic simulated instrument flight. We eventually received multiple Category D flight simulators, complete with primary and secondary motion systems, fairly good visuals, and the ability to link two training devices into the same simulation system for formation training. While none of these devices perfectly replicated the aircraft, with increasing fidelity they provided a solid foundation for our transition to flying the real thing. Once we gained the ability to link the two simulators together, Maj Preston Plous and I would routinely conduct 1-on-1 air-to-air engagements. This article won’t reveal who consistently defeated whom, but tactics he and I developed during these sessions made their way into the V-22 tactics manuals and proved themselves during operational testing. Unfortunately, they also identified how severely limiting some of NAVAIR’s flight envelope restrictions were, as compared to the actual capabilities of the aircraft.

Due to the immaturity of the weapon system, our flight and ground operations limitations and approvals were governed by an Interim Flight Clearance (IFC), which was typically a dozen or so pages of message traffic defining the approved aircraft configurations for hardware and software, operating envelopes, and interim procedures for specific tasks or operations. The IFC sometimes changed multiple times per week, as further restrictions were developed, developmental tests accomplished, or risks were identified and officially mitigated.

It was humorous to watch the first few pilots through the pipeline adjust the metric for “experience” as they progressed through training. At first, one wasn’t considered “experienced” until he had flown the simulator. Later, “experience” meant 50 hours of simulator time, then 100 hours. Once the squadron received its first aircraft, “experience” included performing a maintenance ground run (engine start!)...then joining the “100% Club” (reaching flight-ready proprotor RPM), then 5 hours of flight time...20 hours...50 hours...and so forth. In those early days, everything was new and there were no V-22 experts.

One of the things we did all agree upon was that the sooner everyone started flying the V-22 like a tiltrotor, the better. We stressed the need to keep a level flight deck during VTOL (vertical takeoff and landing) and conversion-mode flight. This forced the pilots to learn to use nacelle angle as the primary flight control for airspeed rather than raising or lowering the nose as one would do in a helicopter. We also tried to make sure all entry-level training provided a direct linkage to tactical employment of the weapon system.

The plan for “building the pyramid,” as it were, included simultaneous initial cadre training and syllabus development and validation at VM-MT-204, while the Multi-Service Operational Test Team (MOTT) conducted the operational testing necessary to inform a Full Rate Production decision. Counterparts from VM-MT-204 and the MOTT worked as closely as possible to refine syllabi, TTPs, the NATOPS, training and evaluation performance standards, and the like, as

we all simultaneously gained experience. Our corporate partners also provided substantial expertise and logistical support, an important advantage given the complexity and newness of the aircraft and the immaturity of its maintenance and support documentation, training, and development.

VMMT-204 received its first assigned production MV-22 in early 2000. In April of that year, the MOTT experienced a mishap that killed 19 Marines including the sole Marine fixed-wing pilot in the program and a CH-53 pilot who had flown an exchange tour with AFSOC's 20th SOS. Due to a number of contributing factors, their two-ship element was late descending on approach, and while maneuvering from one side of flight lead to the other at a very low airspeed and high rate of descent, "Dash 2" experienced vortex ring state (VRS). Vortex ring state is an aerodynamic phenomenon common to rotary-wing aircraft where, in layman's terms, the rotor or proprotor loses lift due to entering its own downwash. In this case, one proprotor entered VRS to a greater extent than the other, not only increasing the sink rate but also causing the V-22 to roll and depart controlled flight at an altitude too low to permit recovery.

In order to finish Op/Eval, the MOTT borrowed VMMT-204's aircraft. While the squadron did receive a second aircraft about that time, our buildup proceeded at a much slower pace. Eventually, the aircraft from the MOTT were absorbed into VMMT-204's small fleet. Most of the MOTT Marines were also transferred in, giving us additional experienced crewmembers and maintainers, and presenting further challenges as we integrated "new" expertise, opinions, and personalities into our squadron.

In the summer of 2000, I became the third Air Force operational pilot, and the first AETC pilot, to be qualified in the V-22. Earlier that year, P.J. Henderson was the first Airman and first flight engineer from our detachment to achieve V-22 qualification. The simulators did a superb job of preparing one to fly the Osprey, and the cadre of Marine instructor pilots provided the necessary top-off to what I had already learned and

practiced at length on the ground. That said, nothing fully prepares one for the actual performance of the beast, and at two years since my last flight and five years since the last time I had flown a high-performance aircraft, it was great to get back in the air.

The cadre's transition from their respective legacy aircraft to the V-22 was interesting, to say the least. In particular, some of the Marine helicopter pilots admitted being intimidated by the "high tech" glass cockpit of the V-22 and its ability to fly at high speed and in the weather. Many of them preferred their "steam gauge" instruments to the much more capable but also more complicated V-22 systems. Concepts such as flying through weather and instrument penetration approaches to precision landings were foreign to their rotary-wing culture. For most helicopter pilots, weather is something to be avoided. On the return leg of a routine out and back mission with one of the more highly experienced MOTT pilots, we encountered a low cloud deck extending a few thousand feet up, with scattered thunderstorms beginning to build in the late summer afternoon. His plan, in the best tradition of visual-flight-only helicopter pilots, was to "scud run," flying progressively lower and slower in an attempt to stay below the weather. I finally convinced him it would be safer and easier to request an instrument flight plan and climb above the cloud deck so we could see where the thunderstorms were building. He said that was something he would have never considered, but after a smooth and uneventful return to base, he acknowledged that it was yet another important tool that tiltrotor pilots should have in their kit bags. He ended up sharing his new knowledge with the rest of the squadron not long afterward. The time the Air Force cadre spent with the Marines was littered with similar events ... subtly planting seeds of "good ideas," figuratively watering those seeds by quietly reinforcing them over time, and eventually seeing them bloom, sometimes a year or so later. That technique didn't always work, but one could almost mark the calendar for when it did.

By December 2000, experienced crews and maintainers from the MOTT

had been absorbed into VMMT-204, the Op/Eval report had been written, and the V-22 program was on the cusp of a Full Rate Production decision as the squadron was heavily into the business of building the initial cadre pyramid and preparing to stand up the formal qualification pipeline.

Then, on 11 December, we lost another aircraft and its crew of four Marines during a practice instrument approach to New River. No one will never know for certain what happened, but without the full cooperation of the entire V-22 team, particularly the prime contractors' engineering representatives, we could never have determined the most likely factors leading to this mishap. Once the investigation boards determined the causal factors of this mishap, every single pilot from the investigation teams was ready to immediately return to flying. Although the loss of life was tragic, both mishaps in 2000 involved the loss of flyable aircraft.

Alas, a return to flight operations was not to be. Although HQ USMC and the Joint Program Office intentionally avoided using the term "stand-down," they did indefinitely "pause" all V-22 operations immediately after the mishap – a "pause" that would last for years. The Full Rate Production decision, which was expected to be announced that same week, was also suspended.

More trouble loomed. The maintenance metrics for the aircraft had been poor, overall, for the entire time the MOTT and VMMT-204 had been operating. Three main factors contributed: the designers had been aggressively optimistic in how easily the aircraft could be maintained, availability of replacement parts and functionality of IETM were poor, and all of the hours a "broken" aircraft sat overnight or over a weekend were also counted against the overall maintenance repair time. The new electronic maintenance and logistics system meant there was no way to record the down time in the same way most legacy flying squadrons did, making the V-22 appear much worse when compared to Marine helicopter fleets. Pressure mounted from the chain of command to make those numbers look better. While we were still in the midst of the mishap investigations, scandal brought

significant national media attention onto the squadron. That led to almost a year of intense scrutiny by the Department of Defense Inspector General ... all only days after losing our four Marine brothers in the mishap.

The situation was bleak.

The already plentiful number of Osprey critics increased. Many were suspected of being sponsored by commercial competitors of Bell & Boeing. Nearly all news articles or editorials relied upon misinformation or only partial knowledge of the aircraft, its capabilities, and its limitations. In particular, the “Red Ribbon Panel” was comprised of vehement opponents of the

and maintainers came together to review and, to the extent possible, redesign the aircraft to both ensure its safety and dramatically improve its maintainability and reliability within the time and fiscal constraints provided. It was at about this time that an Air Force officer, Colonel Craig Olson, took over as the Joint Program Manager and Ken Baile became Lead Engineer. Marine Colonel Dick Dunnivan, who had served some time as an Airman before his inter-Service transfer, took command of the squadron. These men proved integral in leading a positive turn across the program.

We still faced resistance at many key points, some of which will be discussed later, but most of us joined the task as Integrated Process Teams (IPTs) were formed to address everything from critical aircraft systems to enhancing maintenance access to critical areas within the airframe. In addition to supporting all these IPTs with our small cadre of aircrew and maintainers, we also continued our efforts to refine the syllabi and further

throughout those dark days.

Prior to this point, interaction between the squadron and the program office and/or primary contractors was limited. From here on, though, the handful of V-22 guys from VMMT-204 would become intimately familiar with other members of the widespread “Team Osprey.”

About every week for the next couple of years, my Marine NATOPS Officer, Capt Denny “Viper” Sherwood, and I traveled to NAS Patuxent River, the Boeing plant in Philadelphia, Bell facilities in Fort Worth and Amarillo, Edwards AFB, or elsewhere around the country. As the DSSN and NATOPS Officer, respectively, we officially represented the Fleet Marine Force at many of the IPT meetings. My being the “FMF” rep at these meetings sometimes caused consternation and accusations of having gone native, but that was my role to fill, and I made certain to clarify whom I represented when speaking. On a few occasions, particularly when I needed to speak for the CV-22 community, I’d ask Denny to take the “MV-22 lead” to avoid any confusion. To the maximum extent, we tried to pre-align the MV-22 and CV-22 objectives to present a united “operator” perspective to the rest of the V-22 team. Over the next couple years, Viper and I pretty much rewrote the majority of the NATOPS Manual and the draft Dash-1, since that was easier than trying to make changes to the documents we’d been provided.

On 9/11, Preston Plous and I were at Kirtland AFB for MC-130 requalification, since the detachment’s chain of command had decided all of us would maintain our flying currencies in our previous AFSOC weapon systems during the extended V-22 “ops pause.” All of us at New River, Marines and Airmen alike, knew we already had a small fleet of V-22s we could safely fly to meet the combat demands we knew were coming, if only we were provided a short time to spin ourselves back up. We were unable to convince anyone up our respective chains of command to let us get back into the air and get in the fight. We also individually volunteered to deploy in our previous weapon systems, but our attempts were repeatedly rebuffed. Our fate was to



**Author after qualifying in MV-22 at MCAS New River.** (Photo courtesy of the author)

entire tiltrotor concept, proclaiming that not only was the V-22 a death trap, but that a tiltrotor could never achieve the safety, maneuverability, or performance of existing helicopter technologies. Those of us who knew the facts understood that the V-22, like any new and transformational design, would have plenty of challenges in its early days. We also knew it and potential future-generation aircraft of its type would bring a long-overdue capability that no other weapon system could fulfill, and that despite its flaws, it had shown itself to be safe if operated properly and with due respect.

The upper echelons of DoD decided to give the program roughly two years to conduct a thorough review of itself and revise the design as necessary to make it safe and operationally effective and suitable. The entire team: program management, design engineers, the flight test community, the manufacturing team, and we “knuckle-dragging” operators

develop TTPs and aircraft software to better meet the mission. Not everyone up the chain was on board, however. The Marine 2-star general responsible for VMMT-204 at the time told one of our promising young majors that if he stayed with the V-22 program, his career would effectively be over. That young major is now a major general.

It is worth stating at this point that Colonel Steve Connelly, USAF (Retired), deserves the utmost appreciation of our Air Commando community for his ceaseless efforts on behalf of AFSOC through these years. As often as not, Steve was the sole HQ AFSOC representative at the innumerable IPTs and meetings across the country during this period. His ability to encapsulate the key issues into insightful, though often lengthy, emails and papers was legendary, and proved critical to the resolution of many of our challenges. Steve also served as an invaluable mentor and motivator to those of us sticking with the V-22 program

continue to “bring the V-22 program along” at its snail-like pace, regardless of the Global War on Terrorism. It was an especially frustrating time for all of us, but we kept at it, knowing our efforts would ultimately benefit the generations of V-22 warriors who followed us.

## Breaking Up the Band - Transition to Operational Test

As the initial cadre approached the end of a normal military move cycle, the continuation of the program remained very much in doubt. Most of the Marines and Airmen were assigned back into traditional roles not necessarily related to V-22, and AETC decided to not backfill those of us leaving the training detachment. Lt Col White was selected to command the 18th Flight Test Squadron. Lt Col Plous initially assumed command of the training detachment at New River to keep the flag in-place until the program began to rebuild, but was later tapped to command the 67th SOS at RAF Mildenhall. The “youngest” of the pilots, Maj Eric Hill, assumed command of 18 FLTS/Det 1, the AFSOC element of the CV-22 test team at Edwards AFB, with TSgt Donnie Wright going with him.

As the only V-22 qualified USAF

non-test pilot at the time, and given my reasonably good relations with our Marine counterparts and heavy involvement with most of the IPTs, it made sense for me to stand up Detachment 2 of 18th FLTS at NAS Patuxent River, collocated with the V-22 Joint Program Office and the MV-22 Integrated Test Team. This new detachment would form the core AF component of the next multi-service OT team (MOTT 2.0), and in the interim would provide much-needed AFSOC maintenance and operational expertise to the JPO and DT teams. Joining me would be a group of USAF maintenance professionals, mostly coming from the CV-22 team at Edwards, led by SMSgt Craig England, who was new to the V-22. I insisted on one fixed-wing and one helicopter flight engineer, and MSgts Scott Marston and Cameron Haak, respectively, joined the team. Lt Col Bob Post, an MH-53 Pave Low veteran, also joined us as AFOTEC’s new MV-22 test director.

The Marine counterpart to Det 2 was a small element from HMX-1 at MCB Quantico composed of previous MOTT Marine maintainers and flying crewchiefs, led by Maj Anthony “Buddy” Bianca. Buddy commuted back and forth from Quantico while his enlisted Marines were all at Pax River. Initially, there was no memorandum of agreement between

USAF and USMC regarding MOTT 2.0, so our two detachments were officially separate units, but Buddy and I decided we would do our best to form our Marines and Airmen into a single OT family. As such, we attempted to coordinate and present a unified front from the operational end user perspective to Team Osprey. Most of the Marine maintainers outranked my maintenance Airmen, so that presented an additional challenge, but the maintenance Air Commandos handled the situation with grace and professionalism.

Since the two OT units were something of a late addition to the population at Pax River, we had to create and coordinate numerous local, major command-level, and Service-level memoranda of understanding/agreement between the various organizations, and eventually gained use of a temporary facility just outside the MV-22 Integrated Test Team hangar. I quickly learned that anyone not located in the Test Pilot office spaces inside the hangar missed out on much of the action, as in many cases impromptu meetings were called to make decisions or recommendations about the program based merely on who happened to be available at the time. As the lone AF and OT pilot on site, I finally convinced the DT chief pilot to give us use of a desk in the test pilots’ office, while also

Marine Corps MV-22s on the flightline at  
Nellis AFB. (Photo courtesy of the author)



attempting to maintain a presence with my OT detachment in the trailer outside the fence. With three separate military network systems to keep track of, none of which could fully communicate with the others, I ended up carrying three laptops around in order to accomplish all my various duties.

Our maintainers immediately engaged with the manufacturing and program office teams. It took a while for the larger community to finally accept that a TSgt or SSgt was authorized to speak on behalf of AFSOC, but my guys put forth superior effort toward improving the design, maintenance, and support systems for the V-22. Whether it was showing the manufacturer better ways to build and maintain the aircraft, or fixing and then validating the dysfunctional IETM system, our maintainers brought much-needed real-world expertise and ingenuity to the areas of the program that needed it most. Likewise, the AFSOC FEs jumped in to lend operational influence to everything from the design and test of the CV-22 flight engineer's seat to "missionizing" the cargo compartment of the aircraft.

## **The Integrated Process Teams (IPTs) and Return to Flight**

Meanwhile, our effort with the IPTs continued.

Marine Maj Paul "Pup" Ryan, a developmental test pilot at Pax River, was charged with leading the Critical Systems IPT, tracing back to Day One why the aircraft's flight-critical systems were designed the way they were, what had changed over time, and why normal and emergency procedures were written in their current form. The Manned Flight Simulator at Pax River had the team's best aerodynamic model and used real flight control and mission computers to let us evaluate current or modified software. Boeing's Triple Lab in Philadelphia linked real aircraft system components, including hydraulic pumps and actuators, to a full cockpit that could run production or test software on the flight control and mission computers. Engineers could induce real leaks and failures into the

hydraulic and electrical systems, letting us test how the aircraft would react to system failures. This IPT proved a monumental endeavor, producing a tome of information dozens of inches thick. We took the knowledge gained and rewrote huge chunks of the MV-22 NATOPS, CV-22 Dash-1, and similar documents, in many cases dramatically changing system descriptions as well as normal and emergency procedures. We also drove significant changes to the software to improve the way the aircraft behaved in degraded conditions and how it communicated to the crew. We hoped that this once-in-a-lifetime coming together of the entire V-22 team would be kept updated through the life span of the weapon system as changes were made or more was learned.

Another IPT, focused on displayed Warnings, Cautions, and Advisories (WCA IPT), tied in closely to the Critical Systems IPT. All of us knew the crew-machine interface was at times confusing and/or inaccurate, so we thoroughly reviewed every indication provided to the crew in the cockpit, from indications shown to the crew on the multifunction displays (MFDs), to all the other switches and indicator lights in the cockpit. As our Critical Systems IPT reviewed and revised aircraft software and procedures, our WCA IPT simplified and clarified the way the aircraft "talked" to the crews during both normal and emergency operations.

## **An Unwanted View Behind the Curtain - The Military Acquisition Process**

During our interactions with the larger V-22 design, production, and test communities, it became apparent that the design engineers could generally be divided into two categories...those who wanted to provide us with the most capable weapon system possible, and those who were overly risk averse. Particularly frustrating was how a single engineer in the wrong position could drive the entire decision-making process, regardless of guidance from the highest levels of the operational users. Two examples illustrate the challenges we

faced trying to change the perspective from an aircraft that had, for almost two decades, been a technology demonstrator to an operational capability.

The cargo compartment is really the "mission heart" of the V-22. Understandably, the designers and DT team had spent the majority of their efforts on the aircraft's "front end" systems and flying qualities but, regrettably, not nearly as much thought had gone into the operational aspects of the cargo compartment. Something as simple as handholds for passengers and crewmembers had not been provided in the cabin, but there were plenty of exposed fluid lines and flight control or electrical wiring bundles dangerously exposed. When the operators asked that a few handholds be installed, our request was rejected because NAVAIR's chief structural engineer felt it would require a complete redesign of the aircraft structure. The engineer's thinking was that the framing did not provide for handhold attachment points capable of sustaining a 5,000-pound load, even though no human could possibly grasp something with that much force. While the joint V-22 community agreed that less capable handholds were both necessary and readily achievable without major structural modifications, the engineer would not relent. The operators eventually figured out a usable, but less than optimal, workaround.

A similar case involved the design of an internal auxiliary fuel tank. Self-deployment range of the V-22 was considered a Key Performance Parameter in the original requirements documents, making it a "Go/No-Go" metric for the FRP decision. We determined that previous modifications to the aircraft probably would result in falling just short of the target by a small percentage. Rather than make a minor adjustment to the requirement, headquarters decided to pay for the design and construction of an internal Mission Auxiliary Fuel Tank system. While a simple 55-gallon drum, a tiedown or two, and a hand pump with some hose and fittings could have fit the bill, NAVAIR Structures again got involved.

Because the tiltrotor was so new, NAVAIR treated the system like a fixed-

wing, carrier-based aircraft. Therefore, any internally carried fuel tank had to meet G-load requirements based on catapult launch and tail hook recovery specifications for aircraft carrier operations – even though the V-22 could not be launched via catapult nor would it land on a ship using an arrested recovery. The result was a complicated internal auxiliary fuel tank system that cost far too much time and money to develop, took up too much space in the already cramped cargo compartment, and weighed about as much as the small amount of fuel it carried. All this happened in order to meet a requirement that would seldom, if ever, apply in the actual operational environment, especially given the V-22's ability to refuel in flight.

One of the most frustrating experiences for me, personally, was the unnecessarily conservative limiting of the V-22's flight envelope. Certain engineers, it turned out, considered it their duty to protect the flight crews from themselves. Perhaps admirable at first blush, this outlook meant that they did not trust pilots to fly the aircraft in a safe and professional manner. It also did not acknowledge that sometimes operational safety requires max-performing the aircraft to accomplish the mission or to defeat enemy threats. It was shocking to some of the engineering team that we might turn, decelerate, and change configuration all at the same time. They had never imagined us maneuvering in multiple planes at once. Picture the page you are reading as the actual performance envelope of the aircraft, with the margins representing the questionable regions as far as safe flight is concerned. Now imagine the engineers restricting your operations to only the middle few sentences. That was often the culture we were facing.

One of the most infuriating examples of this over-conservatism was the (nose) pitch limit placed on the aircraft. The V-22 engineering team could not tell us what flight profile provided the optimum climb performance, either for rate of ascent or for climb angle. Obviously, if excess torque was available, a vertical (hover) climb would provide the best angle of climb, though not a particularly useful one. We discovered

through repeated experimentation in the simulator that a 60-degree nacelle rolling takeoff, or a “jump” takeoff at a slightly higher nacelle angle, followed by a climb at 20-30 degrees nose high, with a slow transition to airplane mode yielded the best performance. Likewise, the V-22's unique ability to quickly change its configuration and thrust vector meant that a rapid or emergency turn reversal from

the NATOPS stall recovery procedure. Since the V-22's thrust vector is vertically offset from its center of gravity, rapid application of maximum power in airplane mode at very low speeds could theoretically cause the aircraft to tumble tail over nose. These conditions would be difficult to achieve, even on purpose. In a crew aircraft like the V-22, the likelihood of unintentionally getting into this



**CV-22 Ospreys land at Melrose Air Force Range, NM, creating a brown out.** (Photo by TSgt Sam Weaver)

low level, airplane-mode flight could be accomplished by rapidly raising the nose as high as the entry airspeed permitted, then a quick conversion (raising the nacelles), turn, and transition to airplane mode in the opposite direction as altitude was traded to regain airspeed. Using this technique resulted in quite a small turn radius which, as anyone who has found themselves at low level and suddenly boxed in by weather or canyon walls or other need to reverse course quickly, knows is highly desirable.

These techniques worked well, except one of the Boeing aerodynamics engineers had placed a 15-degree maximum pitch attitude on the flight envelope. Given the V-22 is already about 5 degrees nose-high in level cruise flight, this gave us at most about a 10-degree maximum climb angle in airplane mode ... far less than what the Osprey is capable of achieving. This particular engineer, not a pilot, had scared himself in the simulator while blindly applying

situation and inappropriately applying corrective action approaches zero. Also, a pitch limit to the flight envelope does not even directly address the aerodynamic condition it attempts to prevent.

After continued and often heated discussion with the aerodynamics engineer about this ridiculous flight envelope restriction, I convinced him to accompany me into the Manned Flight Simulator to fly the aircraft under various conditions. I wanted to show him the inherent stability of the V-22 and demonstrate how an actual pilot would react to the highly unlikely conditions that concerned him. We flew acrobatic maneuvers including barrel rolls, cloverleaves, Immelmans, and even hammerhead stalls in airplane mode, and I showed him how much his pitch limitation handcuffed aircrews during the maximum-performance climbs, threat maneuvering, and rapid turn reversals as previously described. I even showed him that I could achieve the extremely

low airplane mode airspeeds of concern without exceeding 15 degrees nose high. Unfortunately, it was almost entirely wasted effort. Although we eventually convinced him to minimally expand the envelope to support terrain following flight in the CV-22, the engineer was unwilling to relax the overly conservative restriction or even reword it to directly relate to the condition to be avoided. I consider this one of my worst failures to the crews now flying the aircraft, but I'm at a loss to know what more could have been done.



2-ship flight of MV-22s on USS Bataan. (Photo courtesy of the author)

While the developmental test pilots at Pax River were all about the flying qualities of the V-22, none of them was particularly interested in learning about or using the mission management systems. For Marine helicopter pilots accustomed to legacy cockpit configurations, all the glass cockpit technology was pretty advanced, but for the AFSOC crews, it fell woefully short. For instance, straight-line navigation might be fine for a helicopter that only flies in visual conditions over short distances, but great circle navigation is required for the long-range and FAA-compliant missions the V-22 would conduct. Somewhere along the requirements and resourcing process, some staff officer had decided great circle navigation was too expensive a capability for the V-22. Once we actually started flying long-range and instrument flight rules training and test missions, though, the Marines realized they had been mistaken.

Additionally, the original production hover, navigation, and NVG heads-up displays (HUD) were inadequate. The

original hover display, for instance, provided altitude, heading, and lateral drift information, but nothing for positional awareness. Thus, if one intended to execute an on-time landing onto or hover over a precise spot on the planet, the pilot could not do that without sacrificing the primary attitude display on one of his/her two multifunction displays. This was unwise, unsafe, and against basic flying regulations. Even selecting the Navigation page on one MFD and the Hover page on the other made the task more difficult than necessary.

Pilots typically fell into two camps, the minimalists who wanted only the most basic information on the displays, and maximalists who wanted as much pertinent information on every display as possible. We maximalists knew we could either mentally disregard displayed information that was not immediately pertinent to the current task or declutter the displays to meet a given pilot's preference. We leveraged the Software Integration Lab in Texas, modifying and testing different display methodologies until we designed Primary, Navigation, and Hover displays that smoothly nested together and provided all necessary information to accomplish the CV-22 mission. Many of our improvements were later adopted by the Marines for their MV-22s.

When we were testing the NVG HUD for the CV-22, some of the human factors engineers were unwilling to include the terrain following (TF) cues in the HUD, concerned that a pilot would become spatially confused while viewing the TF pitch and roll commands while looking somewhere other than out the front of the aircraft. To most of the pilots, the whole point of having an NVG HUD was to enable us to spend more time "outside" the aircraft while retaining aircraft and situational awareness via information on the HUD. To alleviate the concerns, I flew a full 45-minute in-the-weather CV-22 simulated terrain following mission while looking out the pilot's side window, flying the aircraft

using only NVG HUD information and last-minute visual landing cues at the objective area. My neck was sore, but the point had been made...we got our TF cues into the NVG HUD.

## Return to Flight

Once the key IPTs had made enough progress to support a safe V-22 return to flight, the next step in the mandated ops pause was to conduct Vortex Ring State/High Rate of Descent (VRS/HROD) developmental test. Little study of VRS phenomena had actually been accomplished in either tiltrotors or helicopters, so the V-22 team's VRS/HROD test became a long and involved science project. After the DT pilots went through a deliberate requalification and re-currency program, they started conducting HROD test flights at Patuxent River with a specially modified EMD aircraft. It didn't take long for them to determine that the V-22 is far less susceptible to VRS than any helicopter by a factor of roughly three, and that its ability to vector thrust provides a powerful and effective method to quickly recover from a temporary loss of control. Even after confirming what the team already suspected, the test program continued for a substantial amount of time. The VRS test and its report won the V-22 test team some aeronautical awards, but it also soaked up significant time and effort at the expense of other flight tests that would have been far more valuable to the operational community by expanding the flight envelope.

Eventually, the HROD test had progressed far enough to support the resumption of other flight test projects, including some communication and navigation testing. Slowly, other members of the MV-22 and CV-22 test teams were either requalified or initially trained in the aircraft. Buddy Bianca and I eventually requalified and started flying combined DT/OT test flights with the team at Pax River, while still spending most of our time on staff efforts like the IPTs or trying to inject an operational perspective into the DT community and program office. A personal highlight at this time was flying a V-22 to Kitty Hawk, NC, to commemorate the 100th

anniversary of the Wright brothers' first successful powered flight.

## VMX-22 and “Op/Eval Redo”

As time progressed and it looked like we would, in fact, accomplish Op/Eval of the new and improved MV-22B, Bob Post, Buddy, and I worked with Lt Col Chris “Mongo” Seymour on a concept of operations for MOTT 2.0 and an “Op/Eval Redo.” Mongo, a Marine DT pilot, was serving as the V-22 lead at HQ USMC after an assignment flying with the CV-22 Integrated Test Team at Edwards AFB. Eventually, we came up with the concept of a dedicated tiltrotor OT squadron located at MCAS New River and not within the standard Marine chain of command as VMMT-204 had been. This unit was eventually approved and designated VMX-22, and its first squadron commander was Colonel Glenn “Bluto” Walters, another outstanding leader arriving at just the right time. (Bluto later retired as Assistant Commandant of the Marine Corps.) As VMX-22 stood up, Buddy and his HMX-1 Marines were absorbed into the new squadron.

To their credit, the Marines broadened the aperture when selecting VMX-22's initial cadre, bringing in not only prior tiltrotor and helicopter pilots, but also fighter/attack pilots and a Navy helicopter pilot. Meanwhile, Bob Post and the majority of my detachment remained at Pax River to stay tied into the efforts there. MSgt Marston and I moved to MCAS New River in 2004, gaining two more AFSOC helicopter pilots, an MH-53 FE, and additional maintainers from the CV-22 team at Edwards, led by MSgt John Lysaght. As VMX-22's Chief of Tactics and deputy test director, and also the commander of a now-split detachment, I had to spread my time to cover all of it. As we approached Op/Eval Redo, though, I increasingly relied on SMSgt England to take care of the Pax River contingent.

The tasks for VMX-22 were staggering: we had to train and build experience for all these new pilots, enlisted aircrew, and maintenance personnel, plus develop, staff, gain approval for, and ultimately execute thorough and

transparent operational testing of the MV-22B, all in less than a year. VMMT-204 was still in standby status, so we also trained other members of the larger V-22 team. Given the Osprey's previous experiences with test and training, there was intense scrutiny on everything we did, both within the respective military chains of command and from without. Throughout this process, we were joined by the Institute for Defense Analysis and others, some of whom were among the V-22's biggest critics, and often visited by senior Service and governmental leaders and their representatives. When we said transparent, we meant “see-through” transparent.

As the program started to turn the corner, we hosted increasingly more distinguished visitors. These visits proved positive, overall, as senior decision-makers finally were able to see first-hand how the V-22 actually performed, rather than merely basing their judgements on what they read in the still mostly negative press. We hosted so many DVs that we developed a standard playbook for what events and briefings we would provide, based on the level of dignitary and how much time they had available to visit with us.

One of the highlights was when we hosted the Secretary of the Air Force, the Chief of Staff of the Air Force (CSAF), the USSOCOM commander, and the Assistant Secretary of Defense for Special Operations/Low Intensity Conflict all on the same day, and each on a unique schedule and with different priorities. Perhaps the most humorous part of that day was near the end when we were flying back to base so the CSAF could present valor awards to a couple of my Airmen. We were slightly behind schedule after flying multiple demonstration flights with the DVs, and I had just picked up the USSOCOM commander from the drop zone after his inaugural V-22 freefall jump. I had Bluto on my wing and CSAF was aboard his aircraft. As the

formation approached the air station, we were turned away by the tower controller because the published quiet hours for the medal ceremony had begun. The tower controller understood that the DVs who would be presenting the medals were aboard our aircraft, but he refused to let us enter the airspace because the schedule said quiet hours were in effect. Bluto finally had to have the tower controller call the Station commander to clear our “8-star” formation of two Ospreys to land. That was a memorable day and one that did not fit the standard playbook by any means.

The redo of Op/Eval would be similar to the testing originally conducted by the MOTT, only on a far larger scale and with a more seasoned cadre. Since the MV-22 and CV-22 shared most of the same capabilities, the more robust we could make our MV-22 Op/Eval, the fewer follow-on tests the Air Force would need to conduct with our tiny fleet of CV-22s. That would free up aircraft to build the CV-22 cadre and for additional SOF-specific tests. Thanks to the superior efforts of the vast Team Osprey, acting on



**Freefall parachutist jumps from MV-22.** (Photo courtesy of the author)

recommendations from the Air Force and Marine maintainers and operators, the aircraft performed as advertised when we finally conducted the formal test. Through extended shipboard operations and OT missions across the continental United States, we put the V-22 through its paces. We validated TTPs, gained real-



**Those of you enjoying the success that is today's CV-22 owe the following individuals a debt of gratitude for their outstanding contributions to the AETC initial cadre and east coast OT team.**

**58th OG/Det 1 (VMMT-204)**

Lt Col Charles Beard (MH-53)  
Lt Col Jeff White (MH-53)  
Maj Preston Plous (F-111F, MC-130P)  
Maj Jim Breck (T-38, MH-53)  
Capt Eric Hill (Army and USAF H-60)  
MSgt P.J. Henderson II (MC-130H FE)  
MSgt Dan Swoyer (MH-53 FE)  
TSgt Dan Hunt (MH-53 FE)  
TSgt Donnie Wright (MH-53 FE)  
SSgt Lisa Dalkey (Admin)

**18 FLTS/Det 2 (Patuxent River)**

SMSgt Craig England (Maintenance)  
MSgt R. Scott Marston (MC-130H FE)  
MSgt Cameron Haak (MH-53 FE)  
TSgt Brandon Troyer (Maintenance)  
TSgt Jason Rushing (Maintenance)  
TSgt Steve Hersom (Maintenance)  
TSgt Venance Robinson (Admin)  
SSgt Mike Smith (Maintenance)  
SSgt Joe Schmidley (Maintenance)

**18 FLTS/Det 2 (New River)**

Maj Mike Hargis (MH-53)  
Capt Jim Peterson (Army H-60, MH-53)  
MSgt R. Scott Marston (MC-130H FE)  
MSgt Jim Hessick (MH-53 FE)  
MSgt John Lysaght, Jr. (Maintenance)  
MSgt Melvin Pitts (Admin)  
TSgt David Stephens (Maintenance)  
SSgt Charles Shrecengost (Maintenance)  
SSgt Isaac Clayton (Maintenance)

world operational expertise, and identified other areas for improvement. Most importantly, though, any doubts about the V-22's ability to accomplish its mission were largely erased. The V-22, within the limits of its configuration at the time was ready for full rate production. Team Osprey's incredible efforts through the dark days had resulted in a much-improved design that was considerably more operationally effective and suitable for the mission than the original.

As we were finishing up our OT report, I received a call from the AFSOC Vice Commander with news that I was needed elsewhere. After six years' service on the V-22 program, I was reluctant to leave just as things were finally getting good, particularly knowing how much the CV-22 community needed experienced pilots. I sincerely hoped and believed the relentless efforts of the few who served through the dark days had set up our V-22 "descendants" for success.



*About the Author: Colonel Gary "Chainsaw" McCollum served for six years as an Air Force initial cadre pilot in the V-22 Osprey. He has commanded at the detachment, squadron, group, and JSOAC levels, and his final assignment was as Director of Special Operations and Personnel Recovery on the Air Staff. He is a command pilot who served as an instructor or evaluator in the F-111F Aardvark, T-38 Talon, MC-130H Combat Talon II, V-22 Osprey, and MQ-1B Predator.*



**A formation of CV-22 Ospreys flies over an auxiliary field.** (Photo courtesy of Todd Berenger)

# BRINGING THE CV-22 OSPREY TO AFSOC

## *A Flight Engineer's Perspective*

*By Scott Marston, SMSgt, USAF (Retired)*

In January of 2000, I was a Combat Talon II evaluator flight engineer (FE) with nearly 2,700 flying hours, coming up on five years with the 1st Special Operations Squadron at Kadena AB, Japan, and thinking about my next assignment. I loved the Talon II and its mission, but I wanted to do more and to be challenged more. I heard the CV-22 Osprey program was ramping up and I really wanted to be part of it.

AFSOC/A3 told me I'd have to transfer to the Talon schoolhouse at Kirtland and apply from there. I did, and on 11 Dec 2000, I was informed I had been selected as the lone fixed-wing FE, along with three MH-53 Pave Low FEs (MSgt Cameron Haak, TSgt Ken Myers, and TSgt Jeff Franco), for the 58 SOW's first two CV-22 crews. I initially felt a little out of place, knowing the CV-22 would operate similarly to the Pave Low, minus aerial gunners. The Pave Low FEs were used to working with two FEs who conducted both flight deck operations and cargo compartment duties. I felt a little behind the power curve coming from Combat Talons and not having back end experience, but I knew the flight deck very well and

was experienced with terrain-following/terrain avoidance (TF/TA) operations, which was where the majority of the CV-22 missions would be flown. That aside, I was humbled I had been selected and was ready for the challenge. I was determined to make darned sure they would not regret having a fixed-wing FE in the initial group.

The original plan was for Crew 1, my crew, to go to Marine Corps Air Station (MCAS) New River, NC, and start MV-22 qualification training, while Crew 2 started working the training syllabus and simulator acceptance. Once we were qualified, we'd swap with Crew 2 and pick up the syllabus and simulator work while they did their qualification training. Once both crews were qualified, we would start training subsequent crews. Unfortunately, on the same day we were selected, an MV-22 from New River crashed, killing all four crew members. The Department of Defense ordered a stand-down of all V-22 operations until the investigations were completed and the program was fully reviewed. I thought this was the end of my CV-22 journey before it even started.



**A CV-22 Osprey tiltrotor from 8th Special Operations Squadron, 1st Special Operations Wing, Hurlburt Field, FL., flies over an area near the base Jan 2009.** (Photo by SrA Julianne Showalter)

During the stand down, I tried to learn everything I could about Pave Low operations. I was especially interested to learn how the FEs integrated into the crew. On the Combat Talon, I mainly computed performance data, preflighted, ran checklists, and worked unscheduled maintenance when off-station, while the loadmasters primarily took care of the cargo compartment. The CV-22 would be crewed by two pilots and two FEs. I had no experience in the myriad of back end duties like fast rope/hoist/crew-served weapons or similar mission ops. MSgt Haak and TSgt Myers taught me about all the Pave Low FE crew duties to prepare me for the CV-22.

AFSOC Requirements had periodic access to Bell's System Integration Lab (SIL) simulator in Hurst, TX. We used the lab to modify, test, and improve mission software for the CV-22, while also allowing pilots and FEs to learn the aircraft controls and systems, and develop and refine crew coordination. During these sessions, I came to realize how differently Pave Low FEs integrated into flight deck operations compared to what I had done on the Combat Talon, especially during TF/TA flight. The Pave Low crews talked much more when working a mission than when I was in the



(Photo courtesy of Scott Marston)

mix. We discussed the differences of how the cockpit ran and how similar the CV-22 TF/TA system was to the Combat Talon's, and we began to adjust our calls accordingly. This is a great example of the give and take that made the most of our combined experiences.

In early 2002, we were told the stand-down would soon be lifted and flying operations would resume. That meant we needed to restart the Multi-service Operational Test Team (MOTT), initially at NAS Patuxent River, MD. AFSOC would support the effort with a small team of aircrew and maintenance by forming Detachment 2, 18th Flight Test Squadron. The det required one helicopter FE and one fixed-wing FE, so Cameron Haak and I were teamed up to support that requirement. Det 2 was collocated with the MV-22 Integrated Test Team and we worked together toward MV-22B Operational Evaluation (Op/Eval). This was set up because the Marine's MV and the Air Force's CV aircraft are over 80 percent similar, with USAF's

Osprey having several SOF unique components. By testing this way, we could evaluate everything that was V-22 common and when AFSOC began CV-22 Op/Eval about two years after the main operational test period, we would only need to evaluate CV-22 specific capabilities.

I was ready to start becoming a V-22 flight engineer, but I wasn't sure what it was going to be like flying with the Marine Corps crews because they used flying crew chiefs instead of FEs. We heard through the rumor mill that flying with the Marines was going to be nothing like flying with AFSOC crews. The Marines didn't have enlisted crewmen in the cockpit and we heard they were not going to be very receptive of our input. When we got going, to my pleasant surprise, everything I had heard about them was wrong. From the first time we got on the aircraft, I couldn't tell if I was with an Air Force or a Marine Corps crew. The Marines depended on their crew chiefs, too.

My first MV-22 sortie was a simple out-and-back training flight for crew proficiency. We took off from Pax River in hover mode, and as we quickly transitioned to airplane mode I knew I made the right decision to be a part of this new aircraft. I was positioned in the right door, not sure if I knew what I was doing, and was amazed at lifting off vertically for the first time in my flying career. Once we were cleared for forward flight, I closed the right door and the nacelles started coming down for the transition to airplane mode. It seemed to take only a few seconds, with the giant propellers just 9 inches from the fuselage. When the nacelles were all the way down, the pilot beeped the RPM from 100 percent to 84 percent, and things got much quieter. SSgt Schneider, my Marine crew chief partner and a member of the MV-22 Integrated Test Team, assured me this was normal and I started doing my scan of the cabin as we headed to MCB Quantico at 230 knots. It only took 15 minutes to get there and the pilots beeped the RPM back up to 100 percent, starting the conversion back to VTOL (Vertical Takeoff and Landing) mode and then we landed on one of the hard stands. Man, was I hooked!

Most of my flying time at Pax River was with Marine or Bell/Boeing company pilots, because the USAF pilots had to wait longer for requalification/qualification than I did. Most of my flying there was in the crew chief role, flying with two crew chiefs in the cabin, one at the right door and the other on the tail. During this period, we started laying the groundwork for how the cabin FE would operate. In AFSOC, we were working under the plan that only one FE would be in the cabin with the other on the flight deck, thinking the flight deck FE could always assist in the cabin if the mission required. We didn't want to restrict ourselves to each FE having just one position to operate. We wanted flexibility and did not want to drive a requirement for additional crewmembers to fill certain roles. The CV-22 was already limited by cabin size, and avoiding anything that might reduce the number of operators we could carry was always a top priority for us. The V-22 cargo compartment is very small compared to a C-130, and is also small when compared to the MH-53. Once you understood it was designed to replace the Marine's CH-46s and had to stay within those dimensions due to amphibious



(Photo courtesy of Scott Marston)

assault ship limitations, the smaller fuselage of the Osprey made more sense.

In addition to flying with the test team, we worked a myriad of back end issues with our Marine crew chief counterparts. We identified requirements for a troop seat replacement, plus cargo and vehicle loading, unloading, and tie-down requirements, which led to us creating a cargo loading manual. We also created the initial airdrop procedures and evaluated the .50 caliber machine gun. The Marine crew chiefs were great to work with on all these projects. Even though we had different mission requirements, we tried to always come together and get the best for each Service. They took suggestions from us as we did from them, and this worked for most of the testing we did at Pax River.

Another example of the team effort was how we came together on the load-bearing requirements for securing cargo. Without getting into the weeds, suffice it to say that the Navy's standard, based on carrier operations, was extremely high, and we operators expressed our concerns that it was unreasonable. The Marines' MV-22 mission was more closely aligned with Air Force and Army operations, and we believed the limitations should be closer to those Services' requirements. After all, the Osprey was not going to be catapulted off a ship or land using a tailhook. The issue was even more complex because the tie-down points inside the aircraft were not rated for 10,000 pounds, which would have required an entirely new, heavier aircraft structure. Together, the Marines and Air Force went to NAVAIR Structures to discuss the weight limit requirement and our goal to get it reduced for the MV-22. We presented a lot of Air Force and Army data on incidents of cargo coming loose to justify changing the Navy requirements. The Marines also presented how they operated in the field and showed that their operations did not warrant such massive G-load requirements. We also made the case that it would take a massive amount of cargo tie-down straps to meet the Navy requirement and it just wasn't practical or necessary for our missions. We had engineering support to back up our case and after our

presentation, NAVAIR eventually adjusted the requirements.

SSgt Schneider and I also worked together on the cargo and personnel airdrop tests. I was excited to get going on this part of testing because I had plenty of experience with this. First up was loading CDS (containerized delivery system) bundles for airdrop. This required the installation of an airdrop kit that was designed with a boat winch, where one of the crew chiefs would hand crank the guillotine knife when cleared to drop and then cut the gate and release the load(s). I looked at this thing and wondered, "Who designed this?" I know they were trying to copy the system the C-130 uses, but they missed the mark by a long shot. We went ahead and accomplished the CDS bundle drops to prove the aircraft could do so safely. Afterward, I sat down with the team and we completely scrubbed the kit and developed a different system that could remain on the aircraft at all times and more effectively accomplish airdrop.

Personnel drops were accomplished by static line and military free fall. We were restricted on how many jumpers we could carry because the cargo seats on the V-22 would not adequately support jumpers, so they would have to floor load. This was the first time I had been on an aircraft without jump lights, as the V-22 had none. On the Combat Talon, the cockpit crew signals when it is safe to drop/jump by turning the jump lights green and calling out "Green Light," and uses "Red Light" signals to indicate when it is not safe to drop/jump. On the V-22, as on helicopters, we would employ the jumpmaster directed personnel drop method. Another difference is when flying the V-22 in airplane mode at 130 knots, the nose is pitched up 6-8 degrees, similar to doing a CDS drop in a C-130. Not jumping from a level platform was something new for jumpers to deal with, and also highlighted the fact that the V-22 did not have handholds for the jumpers. Like other issues, we worked through the problems and came up with usable solutions.

In late 2003, we were notified that Op/Eval would be accomplished by a new Marine tiltrotor operational test squadron, VMX-22, at MCAS New River, and some of us from Det 2 would be moving from Pax River to New River. Once there, we would integrate into the squadron duty sections. I was assigned to the VMX-22 NATOPS/Safety office, which is like our Stan/Eval. I was also part of the crew chief section. I was not qualified to do maintenance like the other Marine Corps crew chiefs who held the plane captain qualification, so I asked the Marines about completing their plane captain training. I



(Photo courtesy of Scott Marston)

convinced the leadership that getting qualified would increase my systems knowledge and enable me to do some maintenance on the aircraft. The real selling point was that it would relieve the Marines from having to schedule two crew chiefs when I was on the sorties, since I could fulfill all the plane captain duties. The Marines agreed and I started my training before moving to New River. I qualified as plane captain six months prior to the start of Op/Eval and was flying as a crew chief and plane captain, and I really felt like I was carrying my load as an equal member of the team.

The spin-up before Op/Eval began by getting everyone ready for all the mission sets we were going to accomplish during the test. This flying would be different from Pax River, where we were doing developmental testing and operational software verification for the aircraft. At Pax, we mainly flew to runways and grass landing zones. During Op/Eval, we would be doing formation flying, air refueling, NVG ops, external lifts, shipboard operations, airdrop, brownout LZs, resupply, AIEs (alternate insertion/extraction), air intercepts, and troop movements...the full set of mission requirements. We were now going to see what this beast could really do on the battlefield.



(Photo courtesy of Scott Marston)

Working with the Marines at New River was quite different from missions at Pax River. VMX-22 was a full-up squadron with both young and seasoned Marines who were all about the MV-22 and what it could do for the Marine Corps. These Marines were motivated and ready to go, but many weren't exactly excited about flight engineers being in the mix with them. Let me tell you, though, if you show them respect and work with them and not against them, you would be amazed what the Marines would do for you to succeed. Marines and Air Commandos have many things in common.

All the space we had in the cabin was now going to be severely reduced with cargo, passengers, auxiliary fuel tanks, and numerous other pieces of equipment. We now had to look at how flight engineers or crew chiefs were going to work in the back, with probably only one in the cabin. At this time, we still hadn't decided where the hoist/fast rope points were

going to be located. Early in the program they were located at the right cabin door, but due to the downwash of the V-22 proprotors and other technical issues, this location proved unusable. After multiple iterations, it was decided the hoist and fast rope hard points needed to be located in the aft cabin near the end of the ramp. We still didn't have any aircraft with that configuration, so on every Op/Eval mission we had to consider how AFSOC crews could operate in that configuration. This was not a primary mission set for the Marines and not all their aircraft would get the hoist, so they let us Airmen take lead on all hoist/fast rope scenarios.

During this phase of the program, I learned all about brownout landings, an environment where I had little experience. The C-130 can experience a sort of brownout during landings on dirt strips when we reverse the propellers to decelerate during landing roll, but at that point the aircraft is already on the ground.

In the V-22, as you begin your descent into the landing zone and are roughly 60 feet from landing, you can lose nearly all reference with the ground in a dusty or snowy environment. During my first brownout landing, I frantically scanned left and right, fore and aft, from the right door to find any reference that would assist our descent. Adding to the "fun," trying to communicate with the pilots over the noise of the proprotors was almost impossible. When I took a position on the tail, I could finally make out a reference on the ground, so I could pass information to the pilots. I thought to myself, "Man, this was in the daytime. I can't wait until we do this at night on NVGs." I had never experienced anything like it, and it really got my attention!

In 2005, the Op/Eval team went to Nellis AFB, NV, to conduct desert, high altitude operations. MSgt Donny Wright and I were assigned to one of the first missions where we would conduct formation landings in the desert. This was also the first time that two AF flight engineers were paired up with two Marine pilots for a mission. Donny and I decided that we were going to work the cabin as we would on a CV-22 for the mission. This entailed us doing the callouts for the landing, which was different from how the Marines were doing it. During the flight, Donny had the right door and I was on the tail and we made very few calls, only adding something extra by exception. One unique aspect of the V-22 is that the pilots don't completely lose their ground reference as often as helicopter pilots do when they flare right before touchdown. V-22 pilots have more situational awareness when coming in for a brownout landing. So, we made a 50-foot clear down call, then a 10-foot call, and a countdown from 5 feet. After the mission, we debriefed with the rest of the squadron, and Maj Paul Rock, our aircraft commander, got up to speak. Donny and I were expecting to get called out for not following Marine SOPs, but instead he stated, "I flew with two Air Force flight engineers today and we need to start doing callouts the way they accomplish it." This wasn't what I was expecting. Donny and I thought we were going to be enemy #1 with the Marine crew chiefs, but instead we all worked together to develop SOPs for the V-22. As we continued developing Techniques, Tactics, and Procedures (TTPs), we stayed in contact with the

CV-22 Test Team at Edwards AFB, who were conducting CV-22 combined tests, to pass along our experience because at that point the Edwards crews were not allowed to conduct dirt landings.

Flying the MV-22 in airplane mode is not much different than flying in an MC-130. It is actually smoother than the Combat Talon, even at low level. Two differences from the MC-130 were that the MV-22 did not have a weather radar or a pressurization system. Flying at higher altitudes without a weather radar was a little unnerving at times for me. The Marines that came from the helicopter world were used to not having a radar and they didn't seem concerned about flying without one. I knew the CV-22 had a multi-mission radar, so I didn't worry about this issue during Op/Eval.

Not having an aircraft pressurization system on the V-22 was something to adjust to when flying long, high-altitude flights. Of course, the C-130 is pressurized so there is no need for supplemental oxygen, but the V-22 was not designed to be pressurized. This became quite apparent when we were tasked to deploy from New River to Nellis AFB, with two in-flight refuelings, flying at 21,000 feet where we would be on oxygen the entire seven-hour flight. In the Talon, we flew HALO (high-altitude, low-opening) missions and might have required oxygen for an hour or two, but nothing to this extent. Flying on oxygen that long was tiring, and the short oxygen hoses limited our movement around the cabin. This was going to be a new way of flying long distances, and what were we going to do about the special operators flying as passengers? This issue led to the development of the Passenger Oxygen System, which was a 25-liter liquid oxygen converter, inside an armor-plated box, for team members to use for flights above 10,000 feet MSL longer than three hours.

During the summer of 2005, the Op/Eval was concluded and Det 2 earned its pay by completing over 752 flight test hours during 170 test events. This hard work led to a successful evaluation of the V-22 and a Congressional decision for full-rate production of the CV-22B for AFSOC.

In January of 2006, I was promoted to Senior Master Sergeant and reassigned to Detachment 1, 1st Special Operations Wing, at Hurlburt Field to be part of the team to stand up the first operational CV-22 squadron. The detachment was mainly maintenance personnel, with me as the sole operator. Lt Col Ted Corallo was selected to be the first squadron commander, and he was my go-to on the standup. To be honest, I knew nothing about standing up a squadron, and I didn't get much sleep over the next eight months, worrying I was missing something that would make this a total failure. Trying to integrate a hybrid aircraft into the AFSOC inventory was much more complex than I thought. Working the staff actions to get a callsign, inter-plane radio frequencies, AIE equipment, range times, or even a vehicle for the squadron were not my bailiwick, but I would learn on the fly.

Introducing the CV-22B to the daily flying operations at Hurlburt was another challenge. Everyone was enthusiastic about adding the tiltrotor to AFSOC's already awesome capabilities, but people just did not understand the nuances the CV-22 presented. The 8th SOS is the second oldest active duty

flying squadron in the Air Force, and was designated to be the first operational CV-22 squadron. After flying the legendary MC-130E Combat Talon for decades, the unit would transition to the CV-22. As we moved forward, I had to coordinate with the operations group to have our CV-22 integrated into the flying schedule. Most of the wing personnel did not fully understand what the CV-22 could do, so before the meeting started, the other squadrons were deciding who was going to get Eglin range time for the 8th SOS airdrop training. I had to let them know the 8th was not going to use all of its allocated range time just for airdrops. We also needed training time on the air-to-ground range because the CV-22 was getting a ramp-mounted, crew-served weapon and crews needed to qualify and maintain currencies just like the MH-53s and the AC-130s.

The CV-22 also needed air refueling training from AFSOC's MC-130 fleet. This presented a small problem, because we refueled in airplane mode at 200 knots. At the time, the MC-130E/Ps were configured to refuel helicopters, generally at 115 knots, requiring a low-speed drogue. The CV-22 would add a new wrinkle by requiring at least one of the refueling pods to have a high-speed drogue. The MC-130H fleet had the variable speed drogue, but at the time it had only been flight tested up to 185 knots, only 5 knots above the CV-22's minimum approved refueling airspeed. The MC-130E/Ps, however, had a high-speed drogue, allowing us to refuel at a more comfortable 200 knots, but it needed to be installed. As a result, bringing the CV-22 into the inventory was already affecting how the other squadrons were doing their operations, because it was neither a simple helicopter nor a fixed-wing operation. With the Osprey, everyone needed to shift their paradigms.

Another area that had not been completed was adding tiltrotor flight operations to the official Air Force Instructions (AFIs). It seemed at the time that everyone assumed when we were in conversion mode we were just a helicopter and when we flew in airplane mode, then we were a fixed wing aircraft. This created problems in critical areas like life support equipment. At first, the AFSOC and wing life support functions decided to use fixed-wing AFIs to cover the CV-22, requiring us to carry everything other airplanes did. Had we done that, we would have filled the cargo compartment before we even took on any cargo or personnel, so obviously we needed to change that plan, as well.

Oxygen requirements also became a sticking point. Helicopter rules are generally less restrictive than those for airplanes because of the flight regime, so initially we followed the fixed-wing oxygen rules. I have to give the Marine Corps credit here. While we were going through the stand-down back in the early 2000s, they kept working their tiltrotor requirements. It seemed like the CV-22 fell off the radar around that time, as our limited staffs prioritized supporting the deployments for the Global War on Terrorism.

While we were waiting for our first CV-22 to arrive at Hurlburt Field in November 2006, the Det 1, 1 SOW FEs traveled to Edwards AFB to maintain flying currency. This let us work together with the Det 1, 18 FLTS FEs to develop and refine FE duties and TTPs for the CV-22. By then, they had

most of the CV-22 cockpit experience, and I had most of the cabin experience. Now we would start deciding how things should work moving forward to the AF Op/Eval of CV-22 specific missions and capabilities.

By early 2007, the 8th SOS had two aircraft and four pilots and four FEs. We stayed very busy flying to get ready for Op/Eval and preparing to receive more personnel into the unit and additional aircraft on the ramp.

The CV-22s we received had the new hoist and fast-rope point at the tail. We did not have much experience working with these yet, so we began training with our Special Tactics and Special Forces teammates at Hurlburt to develop procedures for AIE operations. There was one thing common for both hoist and fast-rope that would change the way we operated. The downwash under the CV-22 was at higher speed than current or previous special operations helicopters. For hoist operations, we would hover 75-100 feet above the operators so they could best operate the rescue devices. Hoist operations from the higher altitudes were initially unnerving for the PJs because being on a cable that long was not a comfortable feeling, and when they reached the ramp, there were no handholds to use to help pull themselves aboard. As a result, we went to the V-22 joint program office with a requirement and they eventually designed and installed handholds on the aircraft for hoist operations.

During fast-rope, the rope would trail behind the aircraft instead of hanging straight down like on most helicopters,

raising the risk factor for operators as they slid down the rope. We looked at several risk mitigation methods like weighted ropes, a 120-foot rope, and hovering higher. Ultimately, we decided on the 120-foot rope as standard, but even this introduces problems because it leaves extra rope on the ground or rooftop, where it might blow around and get hung up on something.

In July 2008, I closed out my Air Force career and retired. I believe our CV-22 team accomplished a lot, but I knew there was much more to do to get the CV-22 to Initial Operational Capability. That effort is better told by another writer, but there are two distinct memories for me that made everything our V-22 team accomplished worthwhile, from early test efforts at Pax River, New River, and Edwards AFB, to transitioning the historic 8th SOS from the venerable MC-130E Combat Talon to the CV-22B Osprey.

The first occasion was when we went to conduct our first helo-cast and water hoist with the SOF liaison team at Hurlburt Field. We briefed with them and explained how the aircraft would be a little different from what they were used to. As we lifted off and started the transition to airplane mode, the aircraft rapidly accelerated and in less than a minute we were already flying at 230 knots. The liaison officer sitting next me said, "Why in the hell is this aircraft not deployed in the AOR? This rocks!"

The second instance that gave all of us great pride took place in late 2007, when we integrated into an exercise with the 14th Weapons Squadron (WPS). From the beginning, we CV-22 guys always knew we would be working with the 14th WPS and eventually be a part of it. They didn't know what to do with us or how to integrate the CV-22 into the exercise, so we initially were designated as the primary aircraft for the exfil of the "precious cargo," just to get us into an exercise. As the weapons officers went through the mission planning, though, they realized we had the ability to accomplish almost any mission, so they decided we should be the backup for the MC-130P HALO airdrop as well as the backup for the MH-53 infil. This was all in addition to our primary mission to exfil the precious cargo. Given all the additional tasking, the mission planner asked how much extra fuel we would need to accomplish all the primary and backup missions. Our pilot, Capt Millet, stated, "None, we can do it all on one bag of gas." This caused some strange looks in the briefing room, but Capt Millet sensed the moment and said, "There's a new sheriff in town, boys." Right then, I knew we had arrived and the CV-22 would change the tactical advantage on the battlefield for America. I am proud I was given the opportunity to contribute.



*About the Author: SMSgt Scott Marston was an Evaluator Flight Engineer with over 5,000 flying hours in the C-130E, MC-130H, MV-22B, and CV-22B. He flew the Combat Talon II in the 15th SOS, 1st SOS, and the 550th SOS, and was selected as initial cadre for the CV-22B Osprey program. Sergeant Marston was an integral member of the Marine/AF joint test and AFSOC Op/Eval teams. SMSgt Marston's final assignment was to the 8th SOS, where he helped stand up AFSOC's first operational CV-22 squadron. SMSgt Scott Marston retired in July 2008 after 25 years of service.*



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The 71st standup and assumption of command on 20 May 2005.

# Standing Up the First Air Force CV-22 Osprey Squadron

By Jim Cardoso, Col, USAF, (Retired)

For current Air Commandos, it is almost impossible to imagine an AFSOC without the CV-22. The Osprey has been in combat operations for over a decade and has moved well beyond an aviation oddity towards being a critical component of the special operations commander's aviation toolkit. CV-22 operational squadrons are stationed both in the US and overseas, and are deployed right now to the various far-flung places that Air Commandos tend to go. Hundreds of pilots and flight engineers have cycled through the 71st Special Operations Squadron, the CV-22 schoolhouse at Kirtland AFB, NM, and have employed their unique skills on the battlefield with amazing results.

For some of the more seasoned Air Commandos, a tiltrotor-less AFSOC remains a fairly recent memory. And the revolutionary developments to go from "then" to "now," including a robust pipeline to prepare men and women to execute complex and high-risk missions that are standard for the CV-22 community, don't just spring up overnight. Tales of that journey to turn a concept into a combat reality are captured throughout this issue of the *Air Commando Journal*. That being said, describing all the accomplishments and the trailblazers who lived them would fill countless volumes. This article will focus on the reactivation of the 71st SOS as the first CV-22 squadron in the Air Force, and the build-up of that

initial cadre and program towards the current well-established training program.

On 20 May 2005, at Kirtland AFB, in the same hangar we would make our future home, the 71st SOS was officially reactivated as a USAF Formal Training Unit (FTU). An Osprey from the Edwards AFB flight test team was flown in for the event and dominated the southwest corner of the hangar. Col Eric Fiel, 58th Special Operations Wing commander, to whom I owed a huge debt of gratitude for selecting me for command, sat in the front row of distinguished visitors. Unlike the normal change of command, this was an assumption of command since we were reactivating the squadron and there was no previous commander to relinquish the guidon. Col Paul Harmon, 58th Operations Group commander, first uncased the 71st SOS colors, furred since October 1993, then handed them to me, while Lt Col Todd Lovell, my operations officer, led the formation of troops and presented the ceremonial first salute. Within this formation was also the newly activated 71st Aircraft Maintenance Unit (AMU) of the 58th Aircraft Maintenance Squadron (AMXS). While the 71st SOS reactivation meant that operations and maintenance would now fall under different group organizations per standard USAF practice, I wanted our maintenance teammates in the formation to demonstrate the Team Osprey spirit. While no one remembers speeches from

official military functions unless they are extraordinarily good (or bad), I laid out four lines of operation that would be maintained as my Commander's Intent for the first two years of the squadron's existence:

**1) INTEGRATE:** we needed to seamlessly integrate the CV-22 and our fledgling training program into the 58th SOW's daily operations.

**2) PROCESS:** not an exciting word, but a critical one. We had to create, then maintain, the programs and processes to make the 71st SOS a part of the Air Force's operational training fabric and eventually, the best in AETC.

**3) FAMILY:** it was imperative to preserve the cohesion of Team Osprey across all aircrew, operations support, maintenance, civilian, and our families.

**4) CULTURE:** we had to develop the culture of CV-22 as the combat vehicle of choice for special operations forces, manned by warriors dedicated to accomplishing the mission—on time, on target, anytime, anyplace. Our students would leave with the tools to become not only CV-22 pilots and flight engineers, but part of the legacy that is America's special operations forces.

With that, the era of the CV-22 Osprey officially began. At the time of the 71st SOS reactivation, we had no aircraft, no facilities, no defined squadron flights or functions, very few trained instructors, and a training program that was, at best, "in progress." The flight operations manual, known as the Dash-1, still had large swaths of operational procedures with the letters TBD (to be determined). There was no Tactics, Techniques, and Procedures manual on how to operationally employ the aircraft. The vast majority of our maintenance force was still learning this complex machine, aided by Bell-Boeing fleet support representatives. For just about all of us involved in this auspicious beginning over 15 years ago, it was among the most memorable and rewarding times in our lives.

The journey to stand up the 71st SOS and kick off the formal training pipeline to build AFSOC CV-22 combat capability really started almost a year earlier, with a simple two-page official announcement from Air Force Personnel Center on 30 July 2004, with subject line: "23 JUN 04 MV/CV-22 INITIAL CADRE SELECTION BOARD RESULTS." It named me as 71st SOS commander, Lt Col Todd Lovell as the operations officer, and the following officers and NCOs as initial cadre instructors:

**PILOTS**

- Maj Mike Duffy
- Maj Mike McKinney
- Maj Gray Riddick
- Maj Darryl Sheets
- Capt Paul Alexander
- Capt Mike Holder
- Capt Todd Thorpe
- 1Lt Scott Gwin

**FLIGHT ENGINEERS\***

- MSgt AJ Hoyt
- MSgt Mike Wood
- TSgt Kenny Myers
- SSgt Erik Davis
- SSgt Wayne Lively
- SSgt Nick Pelhan

(\* CV-22 enlisted aircrew members are now called Special Mission Aviators (SMA), but at the time were identified as FEs.)

In addition, we had already determined that CV-22 pilot initial qualification would start in the USMC MV-22. At the time the Marine squadron, VMMT-204, was also being established as the MV-22 FTU at MCAS New River in Jacksonville, NC. This concept was not unlike the process to train AFSOC's MC-130H and MC-130P pilots, who back then started at Little Rock AFB in basic C-130s, then moved to Kirtland AFB for Combat Talon II and Combat Shadow-specific training. Fledgling CV-22 pilots would learn basic V-22 flight skills in a "slick" MV-22, then transition to Kirtland for advanced CV-22 tactical training. With this in mind, the 58th OG, Det 1, was established at New River for administrative oversight of the Air Force officers assigned as primary instructors and the students. Lt Col Darin Valha was the Detachment Commander. Four other initial cadre MV-22 instructor pilots were selected to man the detachment: Maj Mike Hargis, Capt Frank Lazzara, Capt Jim Peterson, and Capt Doug Vieweg.

While many of the men selected came with rotary-wing experience, there was a cross section of MH-53M Pave Low, MH-60G Pave Hawk, MC-130H Talon II, and MC-130P Combat Shadow expertise. Each weapon system had its own cultural tradition and I felt it was critical to ensure that the CV-22 developed its own, not as a helicopter that flew fast nor a C-130 that could hover, but as a singular tiltrotor capability. Regardless, all the aviators were highly experienced Air Commandos with multiple deployments and operational hours under their belts. Even the company grade officers selected for CV-22 were former Army warrant officers and pilots who had transitioned to the Air Force in the late 90's. In starting the 71st SOS, I was truly blessed with rock-star talent.



CV-22 simulator trains pilots to fly in formation.

One of our primary challenges was to get ourselves trained in the CV-22. At the time of initial cadre selection, only Todd Lovell and TSgt Myers were qualified to any level in the aircraft. The Air Force did not have any production CV-22s to train with, and even the 18th Flight Test Squadron (FLTS) crewmembers who would conduct Operational Test (OT), were still in training. VMMT-204 had not yet been activated, so MV-22 training was being conducted by the Marine test squadron, VMX-22, while they were prepping to oversee the MV-22 operational evaluation.

We did, however, have two CV-22 simulators at Kirtland AFB at the time of initial cadre selection. These has been delivered to and were managed by 58th SOW, Det 1, the CV-22 Integration Team led by Lt Col JD Edwards. Several of the aircrew selected as initial cadre had been working in the detachment and gained familiarity with the aircraft via the simulators. These devices had incredibly high levels of cockpit and out-the-window realism, and were designed to reduce the amount of training time on the aircraft and enable the highest ratio of sim-to-live training of any aircraft in AFSOC.

Eventually, we settled on a plan to leverage a combination of MV-22 training with VMX-22 at MCAS New River, simulator training at Kirtland, and later, participation in the Operational Utility Evaluation (OUE) and Electronic Warfare Initial Assessment (EWIA) with the Air Force Operational Test Evaluation Center (AFOTEC) /18th FLTS team at Kirtland AFB and Edwards AFB. It was a convoluted methodology to say the least, but we had to take advantage of the opportunities and resources wherever they were available.

I want to turn back to the 58th SOW Integration Team for a moment. Managing simulators was by no means the only thing JD Edwards' incredible team at Det 1 accomplished. All the building blocks for a robust flying and training program were laid out by his small and dedicated team. This included preparations for aircraft delivery, establishing necessary facilities, and initial identification of the training pipeline milestones needed to create an aircrew and maintenance force. In fact, perhaps their greatest legacy was building the initial operations and maintenance team to generate and fly training sorties.

It's common knowledge that the CV-22, like any large aircraft that operates in the rotary-wing envelope, is a maintenance-intensive aircraft. Going from VTOL (vertical takeoff and landing) to APLN (airplane) mode necessitates a lot of moving parts that are unique to the V-22. The aircrew and maintainers in Det 1 leveraged experience from the Development Test (DT) teams at Edwards AFB, which was incredibly valuable. But of equal, if intangible, value was beginning to create a cohesive team that got us through the initial effort of standing up this revolutionary capability.

With the plan to train our instructor force moving forward, the challenge of establishing a squadron loomed large. While all subsequent CV-22 squadrons evolved from a squadron already in existence or recently so, the 71st SOS was built from scratch. Think of all the things you take for granted in a squadron: the building and interior planning and training

spaces, the different squadron functions—scheduling, current operations, safety, standardization and evaluation, weapons and tactics, life support, flight records, etc., and the processes that tie all those functions together to generate sorties and produce trained aircrew. Even naming the squadron the 71st SOS and the designing the squadron patch had to go through a bureaucratic maze before being approved by the Air Force Historical Research Agency.



**Al Heuss, Col, USAF (Retired) was a pilot and Vietnam veteran in the 71st SOS when they activated in 1968 as an AC-119G gunship squadron. He attended the 71st standup to represent that era and presented the AC-119G picture right after the assumption of command. The picture still hangs in the 71st Heritage Room. (Photo courtesy of the author)**

We were given the south end of Hangar 1000, in an area that had once housed bustling MH-53J/M maintenance and sortie production personnel, but had devolved to spillover space or had been abandoned. Despite the older design and furnishings that required a complete renovation, it was a great location on the flightline and right next to our maintenance teammates. One area which did not exist in the previous space, which we were determined to include, was a heritage room stocked with post-flight beverages and adorned with items from our history. While the CV-22 did not have a heritage yet, the 71st SOS certainly did, stretching back to the Second World War. We would build the CV-22 Osprey legacy as the next chapter. (Editors note: for more history of the 71st SOS, see “Evolving into the Shadows” in the Fall 2019 issue of the ACJ Vol 8-2 on line at [aircommando.org](http://aircommando.org))

But beyond that, everyone who has been in an AF squadron knows there is more to it than a building, rooms, functions, and processes. The current Chief of Staff of the Air Force, General



David L. Goldfein, calls the squadron “the beating heart of the United States Air Force; our most essential team.” Over a decade before he uttered that truth, we were determined to create that beating heart for the CV-22 community. A great squadron is the extended family you leave behind as the AF sends you all over the world. It’s where the military team should feel a sense of purpose and meaning, the spouses and families a sense of home, and visitors a sense of culture and history. None of that existed as we moved the 71st SOS

It kicked off on time and actually ended early, the last sortie flown on 29 June. AFOTEC Det 6, led by Maj Mike Hargis, and 18th FLTS/Det 1, led by Maj Percy Dunagin, were in charge of driving the effort. The 58th SOW and especially the 71st SOS and our maintenance team provided necessary support—workspaces, airfield operations, training areas, and aircrew and maintenance manpower to execute the missions.

We flew a cross section of different training profiles: basic contact and instrument maneuvers, remote operations, NVG low-level, formation flying, air refueling, and terrain-following/terrain-avoidance using the radar. Each sortie was carefully debriefed and dissected to uncover any significant deficiencies that would inhibit starting the formal aircrew training pipeline. None presented themselves and on 13 July 2006, Maj Hargis formally declared OUE successfully completed.

There was one interesting speed bump which none of us expected. That final sortie on 29 June was flown with Maj Dunagin as the aircraft commander and me as the copilot. It was a single-ship NVG mission consisting of many of the training profiles previously noted and was initially only notable in how smoothly it went. We took off on time, landed on time, and reported no maintenance gripes with the aircraft. Despite the late hour of return, we celebrated the final OUE sortie with a cold beverage in the still-evolving heritage room, and went home feeling very upbeat. I returned the next morning to catch up on office duties and was contacted by a maintenance supervisor with a terse, “Hey sir, you may want to go out to

the aircraft you flew last night.” When I got to the aircraft there was a large crowd around it, some people were looking under it, and others in various small groups having “what do we do now” types of discussions—not good.

It turned out that sometime during the previous night’s sortie, we landed on a piece of wood in one of the remote sites, driving splinters up through the bottom of the aircraft. Now, anyone who has flown helicopters in austere locations knows that poking holes in the bottom of the aircraft is something you try to avoid, but it is also something that inevitably happens on occasion. With the Pave Low, you made sure no critical systems were impacted, did some sheet metal work, and it’s back in the fight. But with a composite aircraft like the CV-22, there’s a little more labor involved. Additionally, some of the sanding and preparation that needed to happen could possibly break New Mexico environmental laws! This was one of those situations and processes that the checklist still had “TBD.” We contacted the New Mexico Environment Department to ensure we complied with all environmental and health standards, and with some old-fashioned ingenuity from our maintainers we eventually got it fixed, and in the process learned a lot about this type of repair that was sure to happen again.

On 14 July 2006, the day after OUE was declared complete, Air Education and Training Command (AETC)



**CV3 delivery: taking possession of CV3 (Tail #0026). Taken at the Bell-Boeing’s final production facility at Amarillo International Airport. We took possession and flew it to Kirtland that day. In a later PA ceremony, the aircraft was “delivered” to Kirtland by AFSOC/CC.**

**Pictured L-R: Lt Col Jim Cardoso, Lt Col (Retired) Lance Bodine, former 551 SOS/CC and at the time CV-22 PM for Bell-Boeing, MSgt Kenny Myers, 71 SOS, and Lt Col Todd Lovell. (Photo courtesy of the author)**

towards official activation, but as sure as we would build a world-class training program, we would build that, as well.

All that being said, a squadron exists to support a mission. We had a pathway to get our initial cadre instructors trained, and just about all the initial cadre pilots spent a good chunk of 2005 and early 2006 at MCAS New River. Time at home was spent continuing training in the simulator and building our training program. However, we had to ensure the Osprey itself was ready to start flying training operations. This was accomplished by an OUE. This is not the same as Operational Test and Evaluation (OTE). While OTE certifies that the aircraft and sustainment systems are capable of executing the combat mission, OUE certifies that the same aircraft and systems are ready to proceed with training towards building an operational aircrew force.

The OUE was originally designed to be a single event running 15 June 2006 to 15 August 2006, but delays in electronic warfare (EW) testing drove OUE to a single month at Kirtland AFB in June 2006. The EW testing would take place at Edwards AFB during a separate period in August 2006. While both events were led by the flight test team, 71st aircrews participated as a method to build flight hours towards instructor certification.

The OUE at Kirtland, in retrospect, went fairly smoothly.



**AFSOC's first CV-22 Osprey taxis into place after arriving at Kirtland AFB, NM.** (Photo by SSgt Markus Maier)

took possession of the all four operational CV-22s. Our first order of business was to prepare the Ospreys for deployment to Edwards AFB to support the EWIA coming up in two weeks. True, it wasn't a combat deployment like Air Commandos were supporting in Iraq, Afghanistan, and other locations, but for a 58th SOW unit under AETC, this was a big deal.

We planned to send a robust package of aircrew, maintainers, and equipment to augment existing Edwards AFB capabilities. Even though the aircraft now belonged to AETC, this was DT and the 418th FLTS out of Edwards AFB would direct the mission requirements and profiles. Our missions involved very precise test cards and flight parameters under the watchful eye of experienced developmental testers. Mixed in with those specified test missions, we flew operational training profiles to continue seasoning the 71st initial cadre instructor force. While at Edwards, I completed my mission pilot evaluation under the watchful eye of Maj Steve Breeze from 18th FLTS/Det 1. For any pilot, that first Form 8 for initial mission qualification is a big deal. I still remember very clearly my initial evaluation as an MH-53J Pave Low aircraft commander in January 1997. To now carry the A-code, being in command of the aircraft and crew, on this revolutionary machine at the beginning of its history in our Air Commando arsenal was incredibly exciting and very humbling.

In many respects, though, the most important achievement of that 30-day deployment to Edwards AFB was to further solidify the operations and maintenance camaraderie of Team Osprey. An old friend used to say that you never really know a man until you have a drink with him. In AFSOC you never really know your teammates until you deploy with them. Our historically high operations tempo and deployment rates, while presenting their own challenges, have fostered a spirit of teamwork and mission focus that distinguishes Air Commandos from the vast majority of the Air Force. For the entire month of August 2006, the Kirtland AFB operations and maintenance team worked side-by-side for long hours in the desert heat, blew off steam together during planned and impromptu social gatherings, and in general leaned hard on one another to get the mission done, regardless of the obstacles. And when we redeployed to Kirtland AFB on 31 August 2006, we were ready to carry that spirit of Team Osprey into executing the mission of building and delivering a world-class formal training program.

This buildup would continue unabated, well beyond my change of command in May 2007. We would continue to qualify initial cadre aircrew members in the 71st SOS, further strengthening our ability to train to the level required by AFSOC. These same men and women spent countless hours working with 58th SOW, HQ AETC, HQ AFSOC, the V-22 Joint Program Office, and many other entities in developing and refining the training program and pipeline to produce tiltrotor Air Commandos. We would continue the process of exploring ways to employ the aircraft towards an eventual AF CV-22 AFTTP 3-3, Tactics, Techniques and Procedures manual. Determining how best to execute a 90-degree or 180-degree turning approach on a low-illumination night, and performing the first night water operations profile at Elephant Butte Reservoir, near Truth or Consequences in southern NM, were among the many memories of exploring what this aircraft was truly all about.

We also realized quickly that CV-22 downwash turned a lot more landings into brownouts than we ever confronted in previous rotary-wing experience. Being able to successfully execute what came to be known as the low-visibility approach (LVA) profile to landing was not a special mission qualification in the Osprey, it would be a basic mission requirement that every pilot graduating from our schoolhouse would have to master. We accepted opportunities to take the CV-22 to airshows and orientations, often in conjunction with stops where our Army and Navy special operations partners lived, such as Joint Base Lewis-McChord, home of 1st Special Forces Group and 2d Battalion, 75th Ranger Regiment. We executed the first 4-ship CV-22 formation—at the time this required generation of 100 percent of the existing fleet. Many pictures of the CV-22 you may have seen in magazines and on web sites to this day were taken during that flight. We also landed a CV-22 at the Air Force Academy for the first time to give future Air Force officers and Air Commandos a taste of what could lie in their future.

We also did things that every squadron does but was being built in this new unit. We had our first squadron Christmas party—challenging since we had \$0 in our bank account upon squadron activation. My incredible wife, Lori, and all



**Special Tactics airmen fast-rope from a CV-22 Osprey during training at Hurlburt Field, May 22, 2007.** (Photo by CMSgt Gary Emery)



**Take a Bow:** An unusual feature of the CV-22 that a rotary wing aircraft can't do is hover nose-low. You just rotate the nacelles all the way back and hold the aircraft in place with forward stick. This looked like "taking a bow" to an outside observer. This is me performing that maneuver upon completion of my fini-flight in May 2007. (Photo courtesy of the author)



**Lt Col James Cardoso** being presented the original plank with 71st SOS plankholder names on it by Jim Teeple, Bell-Boeing CV-22 Business Development lead (also retired USAF Lt Col and former MH-53 pilot). The plank hangs in the 71st SOS Heritage Room. (Photo courtesy of the author)



**Giving up command** on 22 May 2007. Shown from left to right: Col Lenny Smales, 58 OG/CC, Lt Col Jim Cardoso, outgoing 71 SOS/CC, and Lt Col Todd Lovell, incoming 71 SOS/CC. (Photo courtesy of the author)

the spouses made a conscious effort to ensure the families knew that they were not just coming into a squadron, they were laying the foundation for the Osprey culture, to include the family support that Air Commandos are known for. We organized a Spouse Fly day so the families could see up close and personal what their military members were spending such long hours doing, and to let them ride in this unique machine. Integrate, Process, Family, Culture—that intent interwove efforts to sow the seeds of not just a training program, but a whole new institution for AFSOC.

I could easily fill this entire volume of *ACJ* with events and memories from that time. It's rare to be in position to really start something, and to know that you are laying a foundation that will have impact for years to come. I cannot remember a day where I was not excited about going to work, about the prospect of what that day held in our march towards establishing a new and unique combat capability for the Air Force and our joint special operations community. And while I won't presume to speak for anyone else, my sense is everyone involved with the 71st SOS in those early days felt the same. They demonstrated a dedication and professionalism that was unsurprising considering their background and experience, but I marveled at it nonetheless. I humbly apologize now for the many names I did not include in this article – blame my own gaps in memory coupled with article length limits.

I recently had the opportunity to visit with the 20th SOS at Cannon AFB, to help celebrate their 10th anniversary as a CV-22 squadron. To say the 20th SOS has a storied history is a vast understatement, and I am personally proud of my time with them flying the MH-53M Pave Low at Hurlburt Field. It was an honor to catch up with guest speaker Lt Col (Retired) Frank Lazzara, once an initial cadre MV-22 instructor who was the fourth commander of the 20th SOS in its CV-22 era. The men and women of the current 20th, commanded by Lt Col Mark Hamilton, comprehend both the enormity of Green Hornet lore and their current role in shaping where it goes from here. They are young, but already battle-hardened Air Commandos who have taken the CV-22 to operational capabilities we could only conceive of on 20 May 2005. They are exceptionally well-trained, well-led, and as cohesive a team as I've ever seen. They work hard, play hard, and know, be it active-duty member or spouse, they can lean on each other when times are tough. So in the end, while we could not envision exactly what the future CV-22 community would look like while designing the formal training program over 15 years ago, it's an honor to have been a part of what it has become.



*About the Author: Colonel James L. Cardoso retired in June 2018. During his career he flew the T-38 Talon, MH-53J/M Pave Low, and the CV-22 Osprey and served two staff assignments with USSOCOM. Colonel Cardoso commanded at the squadron, group and wing level and completed his career as Commander and Professor of Aerospace Studies, AFROTC Detachment 158 at the University of South Florida. He currently is Director of Air Force Strategy and Business Development at CAE USA in Tampa, and is President of the Tampa Bay Chapter of ACA and a lifetime member.*

# AMBUSH OVER SOUTH SUDAN

## 8th SOS Crews and Their CV-22s Survive to Fight Another Day

*By Rick Newton, Lt Col, USAF (Retired)  
Brett Cassidy, Lt Col, USAF  
William Mendel, Maj, USAF*

No one wants to insert themselves into the middle of a bloody tribal conflict, but in December 2013, three CV-22 Osprey crews from the 8th SOS were asked to do exactly that during Operation OAKEN SONNET I. South Sudan, a country that had only been in existence for two years since gaining independence following a horrific, 20-year liberation struggle to separate from Sudan, was falling apart again and was embroiled in a new civil war.

The troubles in South Sudan had been at a slow roil since independence and the United Nations peacekeeping force in South Sudan was the second largest contingent in the world. In April 2012, five peacekeepers and seven UN civilians were killed, and nine others wounded, when rebels ambushed a UN convoy. South Sudan's president, Salva Kiir an ethnic Dinka, fired his entire cabinet in July 2013, and accused the vice-president, Riek Machar from the Nuer tribe, of an attempted coup. In early December, rebels opposing the government shot down a UN helicopter near the city of Bor. The spark that finally ignited the civil war happened on 15 Dec 2013, when internecine fighting began within the multi-ethnic Presidential Guard. Within days there was open fighting in the streets of Juba, South Sudan's capital, roughly along tribal, Dinka versus Nuer, lines. To complicate matters, though, there were also independent armed militias taking advantage of the turmoil to further their own interests. The security situation in Juba was

out of control.

South Sudanese civilians and international expatriates began to flee the capital, seeking safety in the UN compounds or outside the city. By week's end, more than 20,000 civilians had crowded into the two tiny UN compounds in Juba. Hundreds of thousands of South Sudanese left the cities to take refuge in the bush.

Ethnic fighting spread beyond the cities, including a tank-on-tank battle in the Jonglei province, the western, oil-rich part of the country. In Bor, 90 miles north of Juba, over 14,000 US, international, and South Sudanese civilians were seeking refuge on the small UN base there. By 19 December, anti-government, predominantly Nuer, soldiers had taken control of Bor, but the city was surrounded by Dinka-aligned government forces. Atrocities begat reprisal atrocities by both sides, and during the week before Christmas, international aid groups were suggesting that the death toll was already in the tens of thousands.

Back in Washington, DC, the US State and Defense Departments were still agonizing over the September 2012 attacks on the US consulate in Benghazi, Libya. During that incident, Ambassador J. Christopher Stevens and a key member of his staff were killed when Ansar al-Sharia terrorists overran the compound. As a precaution, the US ambassador to South Sudan, Susan Page, began reducing the staff at the embassy in

Juba soon after the outbreak of violence, while also increasing force protection measures at the embassy compound. In mid-December USAFRICOM sent a contingent of soldiers from its East Africa Response Force to reinforce the embassy and protect the remaining staff members. Over 450 US and dual-nationality citizens, in addition to all non-essential staff, had been evacuated by the third week of December.

On 18 Dec 2013, the crews from a flight of three CV-22 Ospreys assigned to the 8th Special Operations Squadron (SOS), two MC-130P Combat Shadows from the 9th SOS, and accompanied by a rescue HC-130 and a conventional C-130H, took off from Camp Lemonnier, Djibouti, for the almost 1,000 mile flight to evacuate US citizens from Juba. The crews and their aircraft had been based out of Combined/Joint Task Force-Horn of Africa (CJTF-HOA) to support US missions in the region.

Initial planning indicated that the two conventional C-130s would be sufficient to relocate the number of Americans needing transport to safety. The Ospreys were launched just in case the situation on the ground prevented the Americans getting through the city to the airport and also because a late intelligence report suggested Juba International Airport's runway had been blocked by tanks to prevent aircraft from landing. Sending the entire air flotilla ensured the American Airmen were prepared for whatever the situation happened to be when they arrived over Juba.

About halfway along the flight route to South Sudan, the Ospreys had completed their first inflight refueling from the Shadows. Not long after the refueling, the formation received word that the runway at Juba International had been cleared and there was no need for the CV-22s and the MC-130s to continue. The AFSOC crews held outside the city, beyond visual range, until the two conventional C-130s had picked up the civilians and were again airborne, just in case the tactical situation went badly. With the Herks safely heading to Nairobi with 120 civilians on board, the AFSOC crews headed home. The MC-130Ps accomplished a second inflight refueling, to ensure the CV-22s had sufficient fuel to reach Djibouti, and both Shadows diverted to Entebbe, Uganda, to refuel before heading back to Djibouti.

Upon returning to Camp Lemonnier, the CV-22 and MC-130P crews began planning for a second, more risky evacuation, this time from Bor. The airport at Bor had not been surveyed, which ruled out any fixed-wing operations. Because of the confusing situation in and around the city, the embassy could not tell the AFSOC crews how many Americans would need to be evacuated, so the crews had to plan for multiple trips between Bor and the safe location at Entebbe, 500 miles away. And, just to make things a bit more pucker-worthy, US and UN officials were uncertain as to the status of the fighting and were unable to confirm who, if anyone, was controlling the airport area.

Even with the uncertainty, the leadership and crews were assured that representatives on the ground had coordinated the evacuation with the opposition forces and that they would be flying into a permissive environment. Based on the premise that the evacuation would not be opposed, CJTF-HOA directed a daytime pick-up. Still, the crews remained cautious.

At about 0330 local time on Saturday, the 21st of December, the three CV-22s: Rooster 73, 74, and 75, and two MC-130Ps: Agile 21 and 22, took off from Djibouti, heading back to South Sudan. On board the lead Combat Shadow was Lt Col Mark Newell, the 8th SOS director of operations who was serving as the mission commander for the deployment. On board the CV-22s were US Navy SEALs to provide security on the ground during the evacuation, pararescuemen (PJs) in case medical support was needed, and a State Department liaison to coordinate the evacuation once the Ospreys were on the ground. As the formation headed south, the CV-22s topped off their fuel tanks with gas from the MC-130s.

Due to the minimal intelligence they had received about the area, Maj Mittelstet, the flight lead, had the Ospreys drop to low altitude as they approached Bor so they could fly down the dirt airstrip next to the UN camp to evaluate the situation and ensure the conditions were safe to land. The runway was clear, so Rooster 73 and his two wingmen circled around for the landing. On final approach, with the engine nacelles in the vertical position for landing, the air erupted with small arms, rocket-propelled grenade, and anti-aircraft fire. Bullets began tearing up the lead CV-22. Close behind, Rooster 74 and 75 also began taking heavy weapons fire. Maj Mittelstet called over the radio, "Go around, go around, go around, we are taking fire!" The second two Ospreys also took rounds in their hydraulic and fuel systems. Number 2, Rooster 74, took more hits than the lead aircraft, but the redundant aircraft survivability systems were able to control most of the damage. Rooster 74 visually confirmed being fired at by a rocket propelled grenade (RPG) as it was evading the firestorm.

According to MSgt David Shea, the flight engineer (FE) on Rooster 73, enemy gunfire hit the flight control, electrical, hydraulic, and fuel systems. "Fuel," said MSgt Shea, "was spewing from the only spot in the fuel lines that could not be isolated."

Rooster 74 and 75 also took hits to their fuel systems, but the self-sealing fuel tanks worked pretty much as designed. The holes in Rooster 74 were still big enough that it continued to leak fuel for the duration of the mission.

Rooster 73's FE was on the CV-22's aft ramp manning the .50 caliber machine gun used to defend the aircraft from ground attack. He was knocked backwards, onto the floor of the Osprey, when a round hit him in the chest. His armored chest plate saved his life. When he got back up on his machine gun, MSgt Shea could see tracers reaching up for Rooster 74 and 75 and the other two CV-22s taking aggressive evasive maneuvers to get out of harm's way. He could also see muzzle flashes coming out of the crowd as the rebels fired at the three aircraft. Opposition soldiers had embedded themselves among the civilian refugees, knowing the Americans would not fire into the crowd.

At this point, evacuating the civilians from the camp was no longer an option. The threat situation was too high and the three aircraft were too damaged to try again. The crew of Rooster 73 had their hands full keeping their battle-damaged aircraft flying. In the MC-130Ps, at the holding point south of Bor where the Combat Shadows had been waiting to "pass gas" to the Ospreys after they picked up any Americans,

the radio chatter was alarming. This was not the way it was supposed to have happened – the embassy had reported the situation as permissive. As the mission commander worked to sort things out, Lt Col Newell discovered there were three wounded SEALs aboard Rooster 73. The assessment was that one of the SEALs was in critical condition and two were in serious condition. By the time the Ospreys landed, though, all three SEALs were in critical condition. And in a curious twist, after landing at Entebbe, a fourth SEAL discovered he had been shot but had not known it until he was exiting the aircraft.

The nearest suitable medical facility was at Nairobi, Kenya, but that would require some innovative fuel management and it was still unknown if Rooster 73 was airworthy enough to make it to Entebbe, much less Nairobi. Capt Rolf Place, the aircraft commander for the lead Combat Shadow, offered a detailed description of how the MC-130P crews addressed the fuel planning dilemma in *Air Commando Journal*, vol. 4, issue 2, in 2015.

Once the crew got Rooster 73 flying straight and level they began dealing with the wounded and their damaged aircraft. Fuel streaming from the ruptured line was making it hard for the SEALs and the crew in the cabin to breathe. Closing the aft ramp eliminated the fuel vapors and let everyone clear their heads, but the damage to the auxiliary hydraulic system allowed most of the hydraulic fluid needed to operate some of the Osprey's systems, most importantly the landing gear, the refueling probe, the aft ramp, and the brakes, to spill overboard once the ramp stowed in the up position. The implications of this damage would play out as the crew limped the stricken Osprey to Entebbe.

The worst hit of the wounded SEALs was the team leader. MSgt Shea and the team medic applied a tourniquet and packed the wound with gauze to try and stop the arterial bleeding. With the team leader's bleeding slowed, but not stopped, the crew needed to get him and all the wounded to medical care as soon as possible. MSgt Shea would stay with the team leader for the remainder of the flight, keeping pressure on the artery and holding up an IV bag providing fluids to the injured SEAL.

Complicating Rooster 73's medical situation was the realization that the three USAF PJs were on Rooster 74, the second aircraft in the formation, and there was no chance of landing until the Ospreys reached Entebbe. The pilots of Rooster 73 and 74 coordinated the wound diagnoses, treatment actions, and blood types with the PJs and also with Lt Col Newell on board Agile 21. The PJs determined that if the sailors were to survive the almost two-hour flight, they were going to need blood as soon as they landed. Unable to physically tend to the wounded, but desperate to help, the PJs came up with an ingenious solution – a "flying blood bank." Once the PJs had the needed blood types, they drew blood from healthy crewmembers. Within minutes of the three Ospreys landing at Entebbe, the PJs were administering life-saving transfusions to the wounded SEALs.

When the Combat Shadows heard the Rooster flight being ambushed, they immediately left the holding pattern where they had been patiently waiting for the inflight refueling that was supposed to have gotten the Ospreys and evacuees to Entebbe. Now, the MC-130s were trying to close the distance



**Crew of Rooster 73: Capt Brett Cassidy, TSgt David Shea, SSgt Christopher Nin, and Maj Ryan Mittelstet** (Photo courtesy of Lt Col Brett Cassidy)



**Crew of Rooster 74: SSgt Kenneth Zupkow II, Capt William Mendel, SSgt James McKay, and Capt Arjun Rau** (Photo courtesy of Lt Col Brett Cassidy)



**Crew of Rooster 75: MSgt Jeremy Hoye, MSgt Alberto Delgado, Maj B. Taylor Fingarson, and Capt Daniel Denney** (Photo courtesy of Lt Col Brett Cassidy)

between the formations and ensure the CV-22s had a source of fuel to replace that which was leaking from the damaged fuel systems. And, because “Murphy” will normally take any opportunity to make bad situations worse, the KC-10 tanker that had been scheduled to support the mission and provide inflight refueling for the Shadows cancelled. The MC-130s were now the Ospreys’ only source of desperately needed fuel.

When Rooster 73, the worst hit of the CV-22s pulled into position on the tanker, it was still streaming fuel. On both Rooster 73 and 74, damage to the hydraulic systems meant the FEs had to manually extend the refueling probes. Rooster 73 encountered a difficult situation during its initial refueling attempt that required them to disconnect from the basket or else risk snapping their refueling probe. Despite dangerously low fuel levels, the refueling systems reset and the CV-22 and Agile 21 accomplished a successful refueling. Rooster 73 took on about 12,000 pounds of fuel, nearly a full load, and headed towards Entebbe International Airport while the second Combat Shadow, Agile 22, refueled Rooster 74 and 75. The MC-130 and CV-22 crews worked some pretty complicated math trying to manage Rooster 74’s constantly changing leakage rate, and both Rooster 75 and Agile 22 needing enough fuel to make it to Entebbe. At one point, Rooster 74 was considering a forced landing in the desert below.



**Three 920th Rescue Wing pararescuemen were part of the most challenging mission of 2013 which led to them being awarded the Mackay Trophy. (From left to right) SSgt Lee Von Hack-Prestinary, TSgt Dan Warren and TSgt Jason Broline earned the award for their heroic efforts to safely evacuate American citizens and provide medical care to the passengers who were critically injured when their CV-22 Osprey came under heavy enemy fire during the mission December 21, 2013.** (Photo courtesy of USAF)

On board Rooster 73 after the refueling, SSgt Nin, the second FE, manually retracted the refueling probe, thinking they would not need it again. About halfway through the retraction, though, the crew realized Rooster 73 was spewing fuel so fast that they were going to need a second inflight refueling if they were to make it to Entebbe. So, the FE cranked the refueling probe into position once again.

After Agile 21 and Rooster 73 completed that first refueling, both the MC-130 and the CV-22 “firewalled” the throttles to get the wounded to Entebbe as quickly as possible.

After Agile 22 finished refueling Rooster 74, the second CV-22 flew at maximum speed to try and catch the first Osprey, knowing they were carrying the flying blood bank the wounded SEALs would need upon landing. Rooster 74 caught up with 73 during the second refueling. After Rooster 75 finished its refueling, it and Agile 22 firewalled their throttles and caught up with the rest of the formation. The entire formation of five aircraft headed to Entebbe.

It was at that point that the crews finally got some good news. It seems there was a US C-17 at Entebbe, fully fueled, and preparing to return a US Army unit and their equipment to the US. Even better was that the US soldiers who were on the C-17 were all part of a field medical unit that had been training with the Ugandans. Lt Col Newell was able to coordinate with CJTF-HOA for a mission and configuration change. The C-17 crew and their surgical teams were ready and waiting when the Ospreys landed at Entebbe. The wounded SEALs were transferred to the C-17, received the blood transfusions arranged while enroute by the PJs, and were being treated by the Army surgeons as the C-17 flew to the medical facilities in Nairobi. All four SEALs survived their wounds.

While the Ospreys never got to Bor and did not evacuate the Americans, what happened that day demonstrated to the world the fortitude of Osprey crews and the toughness of their CV-22s. Despite the critics, CV-22 crews know that theirs is an incredibly versatile and rugged aircraft. The Osprey’s triple redundant systems and combat survivability enhancements have been improved since 2013, making the aircraft an even harder weapon system. As many an AFSOC and Marine Corps airman has attested, “This aircraft has saved my life. I would not want to fly anything else in combat.”

The three Osprey crews: Rooster 73, 74, and 75, were awarded the Mackay Trophy for 2013, recognizing the most meritorious flight of the year by an Air Force pilot or crew.

After the SEALs had departed for Nairobi, the CV-22 crewmen counted a total of 119 hits from different caliber weapons on their three aircraft. Each Osprey lost critical systems, but still managed to carry their crews and passengers to safety. Bell-Boeing technicians spent months in Entebbe after the incident studying the damage and developing solutions to mitigate battle-damage failures in the future. The three damaged Ospreys have been repaired and are now back in service.

#### **Epilogue:**

The Americans at Bor were evacuated the next day to Juba by UN and civilian helicopters, and joined 300 US personnel evacuated to safety over the following days.



*About the Authors: Rick Newton is a retired helicopter pilot and combat aviation advisor. Lt Col Brett Cassidy is currently the commander of the 71st Special Operations Squadron, the CV-22 Formal Training Unit, located at Kirtland AFB in Albuquerque, NM. He was copilot of Rooster 73, the lead aircraft for the Bor, South Sudan, mission. Maj Billy Mendel is currently the Operations Officer of the 71st Special Operations Squadron at Kirtland, and was aircraft commander of Rooster 74 during the Bor mission.*

# CV-22 OSPREY

A CV-22 Osprey aircraft is shown on a beach at night. The aircraft's rotors are spinning, and the scene is illuminated by a red light source. Two green circles are drawn around the rotors, highlighting their motion. The aircraft is positioned on a dark, rocky beach, and the background is a dark sky.

## TEN YEARS OF OPERATIONAL EXCELLENCE

*By Travis Hill, Col, USAF, (Retired)  
Brett Cassidy, Lt Col, USAF and  
Rob Meyersohn, Lt Col, USAF*

At the end of 2019, Air Force Special Operations Command (AFSOC) marked 10 years of combat operations utilizing the CV-22 Osprey and the Air Commando Association thought it fitting to highlight a few moments in the incredible operational history of the Airmen that fly, maintain, and support this high demand and often misunderstood platform. The timing also seems fitting as AFSOC's future-in-the-now platform, its game changing capabilities, and highly qualified crews have and continue to execute missions that no other platform or aircrew are able to do, carrying on the legacy of our Air Commando mantra, "Any Place, Any Time, Anywhere."

Organizationally, AFSOC recently stood up a fourth operational squadron in the US Indo-Pacific Command (USINDOPACOM) area of responsibility, adding complexity to the community's ability to balance enterprise risk, season aircrews in combat, and build pipeline graduates into Air Commandos. Osprey aviators take all these challenges in stride, driving adaptation and change, and carrying on a long history of innovation and calculated risk-acceptance.

Before we begin, it's appropriate to say that this article is

not about highlighting what the CV-22 Osprey is or to convince the reader of its worth. The crews, missions, and history do that. If 30 years of aircraft development, testing, and refinement, and 10 years of operational employment are unconvincing, this article is unlikely to change that opinion. A machine, regardless of its technologically ground-breaking capability, is only a machine. It is the Airmen, whether flying the machine or the multitude of professionals on the ground, who turn the science of aircraft capabilities, performance charts, operating limits, and standards into the art of capturing high-value targets and saving American lives when no one else can. So, no matter where you sit on the Osprey fence, the fact remains that behind this revolutionary aircraft, which has forever changed the battlefield calculus with its combination of vertical lift and C-130 speeds, are professional crews challenging the enemy's calculus on freedom of movement. They're likely doing it this very night, as they have for over 10 years.

The math is simple, twice as fast as a helicopter cuts the transit time in half. Reducing the transit time means more time for friendly forces to assault and clear the objective under the

cover of darkness. This also allows for contingencies and time sensitive follow-on missions that exploit real-time intelligence, condensing exposure time for US forces in denied territory and capitalizing on the element of surprise. In a recent hostage rescue mission, the CV-22s took off approximately one hour after the helicopter assault force and arrived at the objective simultaneously. While the helicopter assault force required three separate inflight refuelings during the mission, the CV-22s only required one which was conducted over friendly territory, reducing the risk to the assault force they carried and the MC-130 refueling crews supporting the mission.

The key to this unprecedented capability is the crews that quickly adjust flight plans, calculate time-on-target, and balance fuel and payload...all on the fly while expecting to land at a blacked-out, unfamiliar landing zone (LZ). On more than one occasion in Operation ENDURING FREEDOM and then Operation IRAQI FREEDOM, the crews successfully pulled injured Airmen, Soldiers, and Sailors out of denied territory for life-saving medical care. With speed comparable to the C-130 and vertical lift capability, the CV-22 rolls the capabilities of two aircraft into one.

This is not to say that there have not been challenges and significant setbacks to employing this game changing capability. Tactics, techniques, and procedures (TTP) continue to evolve and adapt to outpace enemy tactics while accommodating multiple US and international SOF customers. Historically, infiltration and exfiltration operations were limited to long range fixed-wing and short-range rotary-wing options. Combining the need for vertical landing over long distances always resulted in larger force packages, increased mission complication, and substantially increased risk to force.

The variables were generally the same: winds, weather, distance to the objective, period of darkness duration, minimum time requirements at the objective, assault force load requirements, and fuel. Combining fixed-wing speed and range with rotary-wing vertical landing capability helps mitigate those variables. In these situations, the innovative thinking of CV-22 aircrews shined in their development of high-altitude parachute infiltration options followed by vertical landing procedures. Wind limitations are often unknown until arriving at the actual drop point, which can be hundreds or thousands of miles away and if the winds are out of limits, the CV-22 provides assault forces with an additional option by providing a vertical landing option rather than a parachute insertion. Additionally, the CV-22 can provide an immediate exfil option, post-air drop, at the objective, to expedite recovery of the assault force or injured personnel.

Another game changer is the significant reduction in friendly force exposure time. Limited exposure time doesn't just apply enroute, even though the CV-22 is more than twice as fast as a helicopter, it can slow down and transition to landing in the same amount of time that it takes a helicopter to land. In airplane mode, the CV-22 noise signature is barely perceptible until the aircraft has passed overhead and the time of flight in helicopter mode prior to vertical touch-down is less than two minutes. This significantly reduces enemy reaction time and helping the assault force maintain the element of surprise.

This speed also translates to extended range, opening the door for vertical landing options in previously unreachable locations during a single period of darkness. These are just two examples of battlefield changing TTPs CV-22 Air Commandos provide SOF.

AFSOC's CV-22 community is made up of four operational squadrons: the 7th SOS in Europe, 8th SOS at Hurlburt Field, 20th SOS at Cannon AFB, and 21st SOS in the Pacific. There is also a formal training squadron, the 71st SOS, at Kirtland AFB, NM, 5 associated maintenance squadrons, and 50 aircraft. Each of these squadrons have a long and proud heritage that many of our readers helped create. The Airmen in these squadrons are standing on the shoulders of giants. We'll look at a few recent examples of how these Airmen are fighting an old fight in a new way, creating their own legacy, and expanding our proud Air Commando history.

All Osprey Airmen enter their unique community through the 71st SOS, the CV-22 formal training unit, and train in the rugged, high-desert environment around Albuquerque. Here pipeline aircrew face a demanding year of advanced training culminating in a series of dynamic scenarios simulating the distinct demands of special operations assault aviation. The environment is challenging, and the syllabus is, by design, rigorous. It is built on a training foundation forged by decades of experience in the MH-53 and MC-130 communities.

CV-22 students navigate the high terrain and deep canyons of the southern Rocky Mountains on moonless nights, in formation, using night vision goggles and terrain-following radar to arrive at some of the most challenging, austere landing-zones in the world. Often enshrouded in thick dust at 75-100 feet all the way to touchdown, they learn to land only feet from a target, despite no visual references, within 30 seconds of their planned time-on-target.

AFSOC's need to resource and staff the operational and deployed squadrons first means the 71st SOS conducts this training in the harshest environments with the community's oldest aircraft and a small cadre of battle-tested instructors. These challenges amplify training intensity, drive student attrition rates as high as 30 percent, and ultimately, ensure the operational squadrons receive only the best and brightest aviators, all highly trained to meet the Osprey's demanding mission.

Newly minted CV-22 aviators emerge from their training fully indoctrinated as Air Commandos and introduced to the fundamentals of special air warfare—that unique segment of military aviation requiring aviators to “hang it all out” in support of the nation's elite SOF elements and most demanding missions. Ultimately, the physical, cultural, and cognitive foundation provided at the 71st SOS creates a strategic advantage for the Osprey community, enabling the decade of success by the operational units. We will examine a few of those operational successes now.

The challenging terrain at the schoolhouse in Albuquerque prepares Osprey aircrews for operating the CV-22 in the harshest of environments. In early 2020, in the snow-capped mountains of Afghanistan, two CV-22 aircrews successfully recovered the crew members of an E-11A battlefield communications aircraft



that crashed in a remote, high-altitude district. Due to icy mountain roads and a heavy Taliban presence in the area, the crash site was inaccessible by a ground force. Furthermore, weather limitations prohibited a nearby helicopter unit from responding. As recovery options seemed impossible, the expeditionary CV-22 squadron rapidly planned and executed a high-altitude insertion of recovery forces near the crash site where the team was able to recover and return the bodies of two fallen Airmen. This was the second personnel recovery operation flown by CV-22 aircrew in Afghanistan since 2010, both of which successfully brought service members home when no one else could.

Sticking with the game changing theme the overseas CV-22 squadrons, the 7th SOS at RAF Mildenhall in the UK, and the 21st SOS at Yokota AB in Japan, provide critical partner nation capability development while maintaining US response options for emerging crises across the world. In the wake of National Defense Strategy's new emphasis on global power competition, these squadrons complicate Russian, Chinese, and North Korean strategies by strengthening US alliances and creating close relationships among partner units, while also introducing advanced capabilities for the adversaries to contend with. USINDOPACOM's primary physical challenge, the tyranny of distance, becomes more manageable with partner SOF taking advantage of the CV-22's speed, range, and vertical landing capabilities during exercises, training, and operations.

The AFSOC CV-22 crews and maintainers have taken a revolutionary capability and operationalized it, providing a solution to the long-range infiltration problem that has plagued SOF since Operation EAGLE CLAW in 1980. In support of current contingencies, the community has logged thousands of combat hours in Iraq, Syria, Yemen, and Afghanistan, with an outstanding mission accomplishment rate. Looking forward, overseas squadrons provide leverage for decision makers in the new global power competition between major state actors. All while the schoolhouse consistently produces the best aircrew in the world. This band of Air Commandos has a unique culture that drives the CV-22 to be a game changing option on the battlefield today and in the future.



*About the Authors: Col Travis Hill has been privileged to serve as a CV-22 squadron commander and as commander 1st JSOAC Group. He recently retired after 20 years in SOF aviation and currently lives in Niceville, FL. Lt Col Brett Cassidy is serving as the Commander, 71st SOS Kirtland AFB, NM. Lt Col Rob Meyersohn currently leads the Joint Special Operations Command J-33 office and will assume duties as the operations officer for the 7th SOS in the summer 2020.*

# CLOSING THE LOOP AFTER 50 YEARS



By Lon Holtz, Col, USAF (Retired),  
President, A-37 Association, Inc.

At the end of April 2019, 26 members of the A-37 Association, spouses, and friends had the pleasure of holding a reunion in Wichita, KS, “The Air Capital of the World.” We chose Wichita because it is also the birthplace of the Cessna A-37 Dragonfly aircraft, which members of the Association flew in combat in Vietnam between 1967 and 1972. We wanted the

50 years ago. I was there. Thereafter, however, Vietnam was still going hot and heavy and those of us present at that first meeting got scattered and just couldn’t get another one together. It was only after we retired and got a bout of nostalgia that a second “reunion” occurred in 1992, and we found our friendships and experiences had not been lost over the decades. The

suite at Wichita’s Drury Plaza Hotel Broadview, and regaled us with tales of their experiences. Our members in turn told war stories of how the aircraft had performed in combat and how much we loved it. In addition, several attendees participated in the “Witness to War” program, which allowed us to videotape our individual experiences in combat for posterity and as a record for our families.

We also had the opportunity to listen to a briefing by Textron Aviation on the Scorpion aircraft, which was a candidate for the USAF’s low intensity combat aircraft. At our closing banquet, we were welcomed by Mayor Jeff Longwell of Wichita and Textron’s Brett Pierson, who represented Cessna. In turn, those of us who flew and maintained the bird shared our success in building an outstanding combat record in the aircraft’s five years of combat operations. We also shared a moment of reflection by remembering the 13 pilots we lost in combat over those years.

That success was due to three very important components. Most important were the people at Cessna. Honoring Cessna’s efforts was long overdue as the Dragonfly, the development of which began almost 54 years ago, set new standards as a close-air-support aircraft for US and allied ground forces in the



Members of the A-37 Association gathered after 50 years to honor and thank Cessna. (Photo courtesy of A-37 Association)

opportunity to honor the people of Cessna Aircraft Company, who in August 1966 met the challenge of providing the US Air Force a combat-ready, low-cost close air support aircraft for Vietnam within a year.

This reunion was the second gathering of A-37 veterans in Wichita. The first occurred in July 1970, almost

A-37 Association was formed in 1995 and we have gathered every other year since then at various sites across the country.

This year’s reunion lasted three days and we actually found a few retirees from Cessna, who had worked on the aircraft those many years ago, and they visited the Association’s hospitality



**Members of the A-37 Association during their 2019 reunion in Wichita, Kansas.** (Photo courtesy of A-37 Association)

Southeast Asian theater, logging over 75,000 combat sorties. So we wanted to close the loop and allow Cessna to hear directly from us our appreciation for the dedication of the people who worked so hard to provide the aircraft we took to war.

In July 1966, Secretary of Defense Robert McNamara approved a plan to replace the aging A-1Es of the South Vietnamese Air Force with four squadrons of 25 A-37s, and two squadrons of F-5s. The directive further stipulated that the A-37 be evaluated in a combat environment to facilitate introduction of the aircraft into the VNAF. In addition, the plan included replacing the aging USAF A-1Es as the USAF's primary close air support weapons system for US and allied ground forces in theater.

In August, Headquarters USAF directed that "an A-37A weapons system evaluation be conducted in Southeast Asia" under Project Combat Dragon. With that direction, a team of USAF officers, including Colonel Heath Bottomly (Director of Project Combat Dragon), Lieutenant Colonel Lou Weber (USAF Fighter Weapons Center), and Cessna specialists visited the Military Aircraft Storage and Disposition Center at Davis-Monthan AFB in Arizona and selected 39 retired T-37s for modification to combat standards and requirements mandated for the A-37A. Work began on those aircraft in September 1966.

The A-37A was to be nothing like the venerable T-37 training aircraft, which had a maximum gross weight

of 6,574 pounds. Previously, in 1963, the Air Force had tested for a possible counterinsurgency role two YAT-37D prototypes with General Electric J-85 engines, which were more powerful than the training version's Continental J-69s (the dog whistle so familiar to many



**Cessna factory floor.** (Photo courtesy of A-37 Association)

USAF pilot trainees). The J-85 produced 2,400 pounds of thrust, more than twice that of the J-69. After testing was completed, however, it was determined the YAT-37D's were not needed at that time and the first prototype was sent to the USAF Museum in December 1964. With the August 1966 USAF directive, however, that prototype was brought out from the Museum to expedite testing for the A-37A. (When that testing was completed, the aircraft was returned to

the Museum, where it can be seen today.)

Cessna answered the challenge of re-engineering a T-37's airframe to meet close-air-support specifications, including a 13,500 pound maximum gross weight. Externally, plans called for beefed-up wing spars with four armament loading stations under each wing, non-jettisonable 95-gallon fuel tip tanks, reinforced landing gear, retractable screens on the engine inlets, a 7.62mm minigun in the nose, and a camouflage paint scheme (half of the aircraft were green and tan, the rest baby blue). Internally, in addition to the J-85 engines (same as on a T-38, but without the afterburner), Cessna upgraded the instrument panel with new fire control system and avionics package; installed a World War II gunsight; and re-plumbed the fuel lines to accommodate the tip tanks and under-wing drop fuel tanks. These modifications were completed in time for delivery to the Air Force in an astonishingly short eight months, with

the first aircraft dispatched in May 1967 to England AFB, LA, training site for the Combat Dragon Task Force.

To become a fully operational aircraft, however, the A-37A had to meet USAF regulatory requirements by passing critical demands of flight operational testing and evaluation in every conceivable planned role, in a controlled environment. Testing was usually conducted by an Air Force evaluation team well ahead of any

aircraft heading to combat; but to meet the SECDEF directive, the normal mode of business had to change.

The second key component for program success was the quality of officers, enlisted, and civilian personnel selected by USAF to meet the challenge. The Combat Dragon Task Force developed the program and procedures



**Col Heath Bottomly, Director of Project Combat Dragon.** (Photo courtesy of A-37 Association)

for the A-37A to become the first aircraft in Air Force history to be operationally tested and evaluated under actual combat conditions. The aircraft's performance was to be evaluated in six roles: close air support, patrol, escort, FAC, armed reconnaissance, and interdiction. Operational costs were to be examined for maintenance, supply, and manpower needs.

To meet those objectives, Col Bottomly and Lt Col Weber filled out the Combat Dragon evaluation team and re-activated the 604th Air Commando Squadron (ACS) with resources drawn from across the spectrum of Air Force career fields. Lt Col Weber was assigned as commander of the 604th, which, in order to facilitate complete evaluation of the weapons system, was to encompass not only flying personnel, but all support functions as well – a comprehensive plan that granted the unit autonomy over much of its operations during the evaluation.

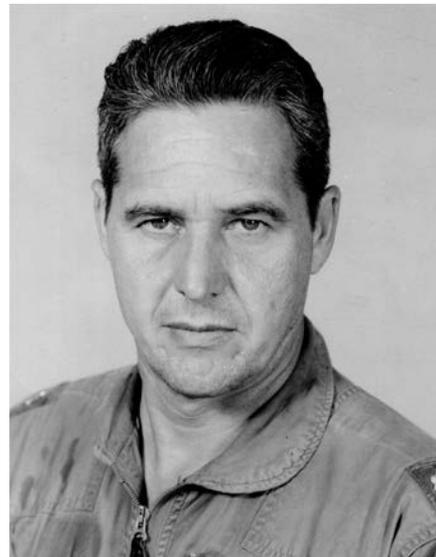
Pilots and ground support personnel, who came from fighters, bombers,

tankers, cargo, rescue, and flight test, were top-heavy in experience in both officer and enlisted ranks. The pilots needed checklists, flight manuals, training materials, and weapons publications. New manuals and regulations for maintenance, armament, avionics, and supply had to be written and a supply chain had to be established. In short, a whole new weapons support system needed to be developed and implemented under the pressure of getting dedicated help to US and allied ground troops in the combat. The selected personnel began arriving at England AFB in March 1967.

After the aircraft completed factory checkouts in Wichita, they were flown to England AFB with the first delivery, tail number 14503, touching down on 3 May 1967. Pilot and ground support checkouts began immediately, with aircraft 503 logging an average six sorties a day. As the next three aircraft arrived, they also averaged six daily training sorties, but as more aircraft arrived from the factory, the sortie rate was reduced to a more sustainable level.

The aircraft was easy to maintain, and the pilots loved how it handled. On 24 July 1967, with initial training and checkouts completed at England AFB and 14 A-37As on hand, 40 officers (including 35 pilots) and over 350 enlisted support personnel began loading their gear, including the aircraft, onto C-141s bound for Bien Hoa AB near Saigon in the Republic of South Vietnam. The first contingent arrived on 28 July and were met by an initial cadre of 604th ACS personnel and Cessna tech reps prepositioned at Bien Hoa AB, who immediately set to work reassembling the aircraft.

At Bien Hoa AB, the 604th ACS was designated as Detachment 1 under the operational control of the 3rd Tactical Fighter Wing, with an authorization of 25 aircraft. After the functional check flights of the aircraft, initial in-country



**Lt Col Lou Weber, USAF Fighter Weapons Center.** (Photo courtesy of A-37 Association)

orientations, and checkouts, the squadron launched its first combat sortie on 15 August, just short of a year after the initial visit to the Davis-Monthan boneyard. Another challenge met.

One year later, on 15 August 1968, the 604th ACS recorded its 15,000th combat sortie – a remarkable record, which, as Lt Col Weber noted, would have been achieved earlier had the aircraft's sortie



**Boarding C-141 bound for Bien Hoa.** (Photo courtesy of A-37 Association)

rate not been reduced by Headquarters 7th AF. That year, however, was highlighted by a successful evaluation under Project Combat Dragon, which ended in December 1967, and active participation in the most significant battles over that period, including Loc Ninh, Dak To, and Bu Dop in 1967 and Tet, Hue, and Khe

Sanh in 1968. In addition, a contingent of aircraft and personnel operated out of Pleiku for several months, including evaluation in the FAC role over the Ho Chi Minh Trail in Laos.

In its final report to USAF (April 1968), the Combat Dragon Task Force concluded that the A-37A was a simple, reliable, and easy to maintain aircraft, with a rapid turnaround capability, lauded as “an effective attack system” in the South Vietnam combat environment. The report solidified ongoing plans to provide an upgraded, made-from-scratch model of the aircraft designated the A-37B, which incorporated upgraded J-85 engines to support 14,000 pounds gross weight, improved avionics, and an inflight refueling capability.

The third component contributing to the A-37’s success was the in-country forward air controllers (FACs) who were integral to the successful completion of every combat sortie in the theater. The FACs initially didn’t know how to handle or employ the aircraft, because they were unsure of the tactics we used and accuracy we brought to a close, troops-in-contact situation. But it didn’t take long for them to realize that they had a new weapon system ready for the

very happy. Later that year, the 604th ACS’s A-37As were transferred to the Vietnamese Air Force (VNAF). Additionally, the USAF deactivated two of the three A-37B squadrons and transferred those jets to the VNAF as well.

USAF A-37 squadrons fought in all major battles over its operational life in Southeast Asia, including Tet 1968, Hue, An Loc, Loc Ninh, Cambodia, and interdiction on the Ho Chi Minh Trail, all the while supplying close air support to ground units from I Corps in the north of the country to IV Corps in the delta region at Vietnam’s southern tip. Senior Air Force generals, monitoring A-37 operations and results, saw the value of a dedicated close-air-support asset, and began looking at a follow-on weapons system. The result was the A-10 Thunderbolt II, which has built an equally outstanding combat record supporting ongoing operations in the Middle East.



**Lon Holtz in cockpit.** (Photo courtesy of A-37 Association)

closely together to make this small, remarkable aircraft a resounding success. The dedicated people at Cessna put everything they had into an aircraft they knew would be headed to combat with the task of saving ground troops. The ground and air crews met all demands placed on them to provide air cover, and to bring more of those ground troops home. And finally, the forward air controllers (FACs) accepted this newcomer, without any operational history, and with confidence, assisted in building an unbeatable combat record. This proven A-37/FAC team is now, many years later, a very tightly-bound cadre.

That was the story we wanted Cessna to hear straight from the lips of those who flew and maintained the A-37 Dragonfly – even if closing the loop was over 50 years in the making.

Thank You Cessna.



*About the Author: Lon Holtz is president of the A-37 Association. He logged 350 combat sorties in the A-37 serving with the 604th Special Operations Squadron at Bien Hoa, Vietnam in 1968-69. On a second tour in the combat theater from May 1972 to May 1973, he flew F-4Es out of Korat AB, Thailand, completing another 100 missions primarily over North Vietnam, where he was credited with one MiG kill and awarded the Silver Star.*

*Lon ended thirty-two years of military service in 1987 as a colonel with over 4,000 flying hours. He added another 2,000 hours in a civilian career as Director of Aviation for several companies, responsible for worldwide operations in Challengers, Hawker 700s, Gulfstream IVs, and Falcon 2000s. His final retirement was in 1998.*



**First combat sortie airborne.** (Photo courtesy of A-37 Association)

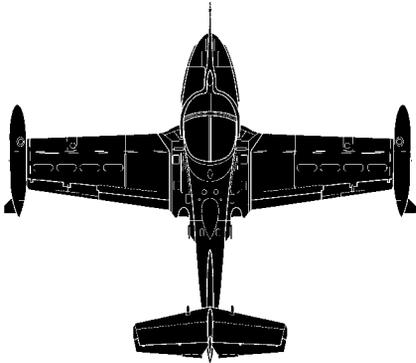
most demanding engagements. Once our credentials were established, the A-37 was the aircraft of choice for the really tough missions, and won the respect of senior Air Force and Army commanders.

By December 1969, in addition to the 604th ACS, the AF had added two A-37B squadrons at Bien Hoa AB. These units replaced three F-100 squadrons, which welcomed the A-37A to the base in August 1967 with some mockery and derision. The ground commanders were

The A-37 gained a reputation as a reliable, accurate close-air-support aircraft, that was easy to maintain and to fly and as a result prompted the US Drug Enforcement Agency, and several allied countries, to order the B-model for their air forces. In all, Cessna produced 577 A-37A and B aircraft, many of which, are still flying today.

My goal and purpose of writing this story was to highlight that the efforts of three critical entities worked

## A-37 Dragonfly



The USAF A-37 Dragonfly was perhaps the most underestimated aircraft of the Vietnam War. Its mix of accuracy, reliability, and maneuverability was ideal for the war in Southeast Asia. Derived from the Cessna T-37 Tweet trainer, the A-37 became an effective replacement for the Douglas A-1 Skyraider ground-attack aircraft, which was suffering high losses.

After evaluating two T-37Cs in the attack role, the Air Force asked Cessna for two prototype YAT-37D aircraft. Each was to be equipped with two GE turbojet engines, stronger wings, huge 95 gallon wingtip tanks, a 7.62 minigun, improved communications systems, and tougher landing gear.

A test program converted some 39 T-37Bs into A37-As with only minor changes. The A-37A

Dragonflies also were well-armed, able to drop bombs, napalm, and cluster munitions. These so-called "Super Tweets" could also fire miniguns and unguided rockets.

In the Combat Dragon evaluation program, 25 A-37As were sent to the 604th Air Commando Squadron at Bien Hoa AB, South Vietnam. Missions included forward air control, ground attack, helicopter escort, and night bombing. A-37A successes led to procurement of 577 newly built A-37Bs—first flown in 1967—with much stronger airframes and bigger engines. A probe-and-drogue refueling system was added, extending both range and loiter time. The Dragonfly flew more than 160,000 sorties, with only 22 losses to combat.

—Walter J. Boyne

**This aircraft:** USAF A-37B Dragonfly—#73-1090—in 1991 when assigned to 412th Flight Test Wing, Air Force Flight Test Center, Edwards AFB, Calif.



### In Brief

Designed, built by Cessna ★ first flight Oct. 22, 1963 ★ crew of one or two (pilot and observer) ★ number built/converted 596 ★ **Specific to A-37D:** two J85-GE-17A turbojet engines ★ armament one GAU-2B/A nose-mounted minigun and hard points for M134 minigun, 20 mm cannon, 30 mm cannon, AIM-9 Sidewinder ★ load seven 70 mm FFAR, napalm tanks, four 500-lb Mk 82 bombs, SUU-14 bomblet dispenser ★ max speed 507 mph ★ cruise speed 490 mph ★ max range 920 mi ★ weight (loaded) 14,000 lb ★ span 35 ft 10 in ★ length 28 ft 3 in ★ height 8 ft 10 in.

### Famous Fliers

**Notables:** John Blaha, Stumpy Bowen, John Bradley, Gene Bywater, Lon Holtz, Lloyd Langston, Robert Macaluso, Ollie Maier, Richard Martel, Wayne Moorhead, Lou Weber. **Test Pilots:** Bob Hagan, Hank Waring.

### Interesting Facts

Nicknamed "Super Tweet" ★ survived collisions with trees and still returned to base ★ flown by Air National Guard until 1990s ★ remains in service in South America ★ used by both Ecuador and Peru in 1995 border war ★ served with South Korea's aerobatic team ★ used by total of 14 air forces ★ captured aircraft flown by North Vietnam Air Force in war with China ★ could conserve fuel by flying on only one engine.



An A-37A firing rockets in Vietnam.

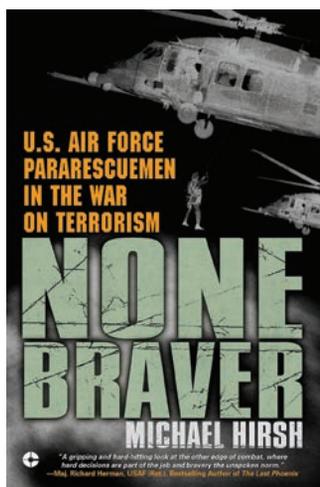
USAF photo

## None Braver: U.S. Air Force Pararescuemen in the War on Terrorism

By Michael Hirsh

Publisher: Penguin Random House, 2004.

We do just about everything. We parachute, we scuba dive, land, air, sea. I think we've got the best mission, to go out there and save lives. It's so much harder to save lives. It's easy to just kill somebody and pull the trigger and that's it. But to plug that hole and make a difference, that's the ultimate rush right there for me. – SSgt Kip Wise, Air Force Pararescueman



If you are trying to determine the next book you should pick up, whether if for professional development or personal enjoyment, I would highly recommend Michael Hirsh's *None Braver*. This book will take you through all of the emotions (I found myself getting angry, laughing out loud, and occasionally tearing up), while providing an understanding of history, leadership, and decision making. The book even offers some insight into the aerodynamics of helicopters and air-to-air refueling. *None Braver* is one of many books that covers

Operation ANACONDA and other early events from the war in Afghanistan. However, it is distinct from the others as one of the first books to do so (printed in 2003), and approaches the topic from the point of view of US Air Force pararescuemen, most commonly known as PJs. Providing a glimpse into the lives of Air Force special operations forces deploying to war, and the occasional controversial perspective regarding senior leadership, this is a book you will find hard to put down.

To serve as the backdrop for providing insight into the lives of Air Force PJs and the servicemembers who support them, Hirsh tells some amazing stories from the early days of Operation ENDURING FREEDOM. The narrative includes the crash of MH-53 Knife 03; the recovery of Knife 03 by Knife 04, an action which later justified award of the Mackay Trophy; a friendly fire incident when a B-52 dropped a JDAM (joint direct attack munition) on Afghan and American forces, including future Afghan President Hamid Karzai; as well as the crash of MC-130P Combat Shadow, Ditka 03, and the associated recovery efforts. There

are also some pretty engaging accounts of PJs innovatively jumping into the vicinity of a known minefield, an MH-60G Pave Hawk helicopter almost sliding off the side of a mountain, and pararescuemen performing under fire at Takur Ghar during Operation ANACONDA. Interwoven throughout these stories are details about the personal and daily lives of the PJs.

The book's introduction starts on a lighter note, with the author describing some of his personal experiences while gathering stories from the field, beginning with his trip from Moody AFB, GA, to Jacobabad AB, Pakistan. As someone who has deployed in the past, I appreciated the humor and respect given to issues such as bag-drags, bipolar aircraft temperatures, one-minute combat showers in Cadillac units, aircrew wearing Santa hats during Christmas, not-so-smooth copilot landings, and "leaders" who aren't quite as important as they think they are. The introduction is followed by a somber and humbling prologue from the perspective of Maj Vincent Savino, a combat rescue officer and commander of the 38th Rescue Squadron's pararescuemen, as he informs the spouse of one of his PJs that her husband will not be returning from the war. Maj Savino describes briefing his men and their wives before they left to ensure their affairs were in order, and meeting with the wives of the PJs to reassure them that "they'll be fine. We'll take care of the guys." Now, he was driving to the home of one of those wives. The prologue concludes with Maj Savino's wing commander knocking on the door with a somber reminder of the Pararescue credo... "That Others May Live." Less than 15 pages into the book, readers have already been introduced to the range of emotions and literary tones they will experience in the rest of the book.

One of the recurring themes in the book is the issue the author has with incompetent and risk-averse leadership, perhaps a consequence of earning his Combat Infantryman's Badge as a combat correspondent with the 25th Infantry Division assaulting the Cu Chi tunnel complex in 1966. Hirsh's disdain for poor senior leadership is further revealed as he describes "Colonel Hot Lips," a name affectionately given because Hirsh was not allowed to use real names and because she reminded him of Maj "Hot Lips" Houlihan from the TV show M.A.S.H. As Hirsh describes his interactions with the colonel, from her authoritarian demeanor towards a younger female lieutenant, to her self-serving motto of "you don't get anything here unless I say so," the reader

gets a sense that Hirsh has little respect for leadership that has become disconnected from the people who accomplish the mission. While this was one of the more lighthearted examples provided in the book, the actions of Lt Col Buss during the Ditka 03 incident are more alarming.

Buss was onboard one of two MH-47E Chinook helicopters escorted by Ditka 03, an MC-130P Combat Shadow from the 9th Special Operations Squadron. After Ditka 03 crash landed in deep snow, the crew survived with minimal injuries. The decisions allegedly made by Buss delayed the delivery of the PJs and their medical equipment by the other helicopter to the crash site. These decisions, as Hirsh describes them in the book, put the survivors at unnecessary risk with one individual nearly losing his life as a result.

Another recurring theme throughout the book is issues caused by high altitudes and weather in areas where the conflict in Afghanistan occurred. All of the aircraft accidents described in the book were caused in part by the high operational altitudes, paired with the heavy weight of a fully-equipped search and rescue team. These altitudes, along with cold and snow, made the rescue missions much more difficult. Along with the normal combat injuries, PJs found themselves battling hypothermia, frostbite, and others associated with the thinner air at altitude. One of the included stories describes how members were carrying patients on litters while struggling through chest-high snow. You definitely get a sense of the difficulty the PJs were faced with and how much resiliency is necessary to overcome these adverse conditions.

Some of the more entertaining stories highlight the deployed lives of the PJs paired with their –for lack of a better term– unique senses of humor. From their propensity for bending the rules to their unofficial mascot “Charlie the PJ,” Air Force pararescuemen have truly developed a culture of their own. Hirsh describes how their sense of humor and ingenuity helped them make the best of a deployed situation. Surrounded by burn pits, nightly visits from jackals, and streams of human waste (lovingly referred to as “Lake Shittycaca”), the PJs

managed to secure a hardened aircraft shelter and build their own two-story living space inside from plywood. The billeting area included framing in the main door to block wind and dust, an office and storage area, and private sleeping rooms with electrical outlets. It was nice enough that the base’s leadership tried to acquire it for themselves, which the PJs were able to thwart with some impressive networking and bribery.

Some of these stories were told so soon after the fact that some events do not include all of the details that would eventually emerge. Most exemplary is the story of John Chapman, an Air Force Combat Controller who would eventually receive the Medal of Honor (see Scott McIntosh’s book review on *Alone at Dawn*, ACJ Vol 8, Issue 1). Hirsh’s description of what happened to John Chapman that day is summed up as, “That’s when a burst of gunfire hit Chapman, killing him.” Now there are plenty of resources describing the events that occurred at Takur Ghar, the site that would eventually come to be known as Roberts Ridge, and the heroic actions that John Chapman took after that initial “burst of gunfire.” While many of the accounts of the day focus on the actions of Roberts and Chapman, *None Braver* illustrates the heroic actions of SrA Jason Cunningham, a PJ who lost his life at Takur Ghar and earned the Air Force Cross for his actions there.

SrA Cunningham represented everything you would expect from a pararescueman. He was highly motivated and always sought ways to improve himself. He was very Type-A, but was also incredibly selfless and humble at the same time. Even after he was shot, he was able to maintain his composure to direct the medical efforts of those around him and ensure his patients were passed off to another medical provider before he succumbed to his own injuries. Hirsh dedicated a full chapter to describing the sacrifices Cunningham’s family endured after Maj Savino’s team knocked on his wife’s door. Reading these events were eye-opening, as most people probably do not realize the details that go into a high-profile military death. In addition to dealing with the local and national media trying to get a story, the family struggled with the finances and logistics of bringing an extended family together for the funeral. After reading that chapter, I gained even more appreciation for the sacrifices made by the families left behind.

Overall, this book is incredibly easy to read and provides a lot of opportunities for professional and personal introspection. It has a tendency to scatter between stories, but it is very hard to put down. You will want to keep reading into the next chapter to see what the next adventures are for the PJs and their aircrews. Hirsh has provided us with some great historical insight into one of America’s greatest fighting forces in *None Braver*, but the coolest part about this fighting force is its dedication to saving lives and its members’ willingness to put themselves in harm’s way so “That Others May Live.”



About the Author: Maj Travis Neal is a KC-135 pilot and course director at Air University’s eSchool of Graduate PME, Maxwell AFB, AL.

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## ***The RAF and Tribal Control: Airpower and Irregular Warfare between the World Wars***

By Richard D. Newton

Publisher: University Press of Kansas, 2019, 264 pages

Unquestionably my favorite airpower quote is Thomas Keaney and Eliot Cohen's satirically eloquent observation, "airpower is an unusually seductive form of military strength because, like modern courtship, it appears to offer the pleasures of gratification without the burdens of commitment." I first saw this quoted nearly five years ago in Stephen Wrage's *Immaculate Warfare*, an excellent book about the Kosovo air war, read it in its original articulated form

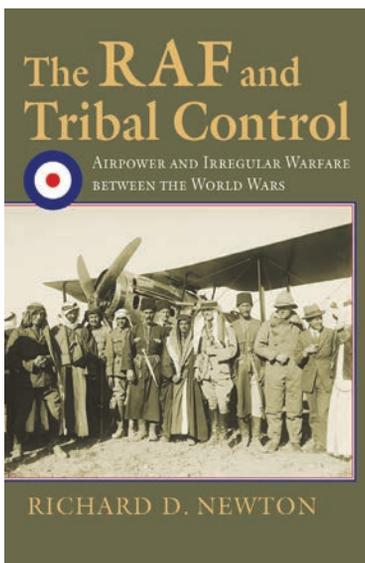
last year, and encountered it anew in Richard Newton's, *The RAF and Tribal Control*. This quote has framed my airpower thinking since I first read it, as it accurately reflects how governments feverishly brandish airpower like a magic wand, expecting results to flow as day follows night. This blind trust in airpower is not entirely the fault of these aforementioned governments. Generations of airpower thinkers and writers have overstated airpower's independent utility, beginning with Trenchard, Mitchell et al., and more recently Colonel John Warden.

into the senior Services. The RAF did everything it could to succeed in this mission during the inter-war period, but Trenchard, for organizational reasons, highlighted the accuracy of bombing and diminished the role of any ground forces in his reporting to Whitehall. The full story of air control has not been told, until now. *The RAF and Tribal Control* is an important addendum to airpower's history, as it tells the true story of how the RAF won success. Crucially, this was not merely a victory for strategic bombing alone, nor was it an unequivocal triumph.

Coercive theories of airpower's historical success have focused on the morale effects (and latterly physical effects, too) of a punishment campaign. Newton, by contrast, identifies with the writings on coercion of Karl Mueller, who postulated that success comes about through a combination of capability, credibility, and communication. The first two of these are ubiquitous in the literature, and reflect Carl von Clausewitz's observation that the power of an enemy's resistance is the product of, "the sum of available means and the strength of his will". The importance of communication, or perception as Newton rebadges it, is hugely underappreciated. This is where Newton's story is centered, with communication, and the untold story of the RAF Special Service Officers (SSOs), who lived among the tribes, gaining an understanding of their strengths, weaknesses, languages and culture.

What Newton goes on to explain is that the SSOs were no mere harbingers of doom for the tribes. In fact, they had an extremely nuanced diplomatic, cultural, and military role little recognized until now. Certainly, the RAF SSOs gave meaning to the actions of their winged comrades. They warned the tribes of the consequences of non-compliance with governmental edict. However, Newton points out that the SSOs were present to understand what the tribes valued, to ensure not only that governmental demands had been understood, but sometimes to mediate between the two entities. This role required the SSOs have an intimate knowledge of the tribes, and an innate sense of justice to resolve inter-tribal squabbles.

SSOs often adopted tribal dress and manners to be more readily accepted. They learned the languages and customs of the tribes, and listened first-hand to their problems, using a leadership-centric approach. Newton relates the experiences of John Bagot Glubb, an early SSO, who was sent out to inform a tribe near Baghdad that bombing would start if taxes were not paid. He learned through two days of talks



One of the primary case studies used to illustrate the mystical power of the air weapon is the Royal Air Force's (RAF) interwar use of "air control" to quell tribal problems in the British Empire and Mandates. In the shortened, and somewhat erroneous version of events, strategic bombing of the tribes worked like a charm, saving the British government millions of pounds and ensuring peace and security throughout the galaxy. The short version of the story has airborne bombing as a lone agent, its moral and physical effects bringing the tribes to heel. The proliferation of this myth is not entirely surprising, as it is the tale Trenchard wished to tell.

As Newton describes admirably, the RAF's air control doctrine was a means to fight for the survival of the independent service, amid a climate of bitter inter-service rivalry. Faced with swingeing defense cuts and a political policy of "No War for Ten Years" the RAF needed an independent mission, or would face being re-absorbed

that the tribe had been starved of water and its crops were not growing. Because the Iraqi government did not regulate the supply of water, the upstream tribes had diverted the river, depriving downstream tribes' crops of irrigation and they, therefore, could neither grow food nor pay taxes. Glubb was able to convince upstream leaders (by scattering the tribe with a show of force, then bombing the sheikhs' houses) to meet the Iraqi Interior Minister. Glubb then brokered a deal to regulate the water, enabling the crops to grow, and the government to receive its remittance. Glubb's understanding of the problems enabled a logical solution in which all parties benefitted.

The broader RAF, too, was highly pragmatic in its application of airpower. RAF doctrine in 1930 stated, "It must always be remembered that the people against whom we are taking [military] action, we have subsequently to govern...It should be the practice once our terms have been accepted, to render medical assistance, wherever such action is necessary and possible." The RAF understood the need to provide 'carrots' as well as 'sticks'. Air Commodore Charles Portal, future Chief of Air Staff, observed in a 1937 lecture that the scheme was incomplete unless aircraft were also, "a means of maintaining contact with the natives and improving their lot." The RAF regulated the use of force, and kept the SSOs firmly in hand, ensuring the minimum application of force to achieve the effects desired. The RAF did this not only because it enhanced the effectiveness of coercion, but because of the ignominious slander being hurled its way by the British Army.

Despite the exorbitant cost of keeping Army divisions in the wider Empire, the British Army had no wish to be replaced by a more modern or more efficient military service. Newton paints a fascinating picture of a service unsure whether to go left or right. Should it professionalize and become ready for the next European war, or return to its frontier responsibilities? Neither was necessarily affordable, since the projected cost of garrisoning Mesopotamia in 1920-1921 was £33M. Churchill, Secretary of State for the Colonies, needed a cheaper resolution, and Foreign Secretary Lord Balfour wrote a report detailing the RAF's future role in the British Empire. The British Army did not take it well, accusing the RAF of being an "instrument of terror" and warning that nothing would come of "bombing women and children." All this, despite the fact that British punitive expeditions by the Army in the 19th

and 20th centuries had been known as "burn and scuttle." The RAF was, in reality, much more humane than the Army had been, though success depended on circumstance.

Trenchard had, from the outset, only seen the advantages of aircraft in isolated rural and desert settings, not within an urban throng. He, therefore, rejected the idea of 'air control' in urban India, Egypt, and Ireland. Newton tells the story of the RAF's first success, against the "Mad Mullah of Somaliland," quelling a long-standing rebellion for around £80,000. He also details successes in Iraq and the Northwest Frontier of India, but balances this with the less successful episode in Palestine. This case study is vital because the Colonial Office actually rejected the advice of air experts who understood airpower's limitations. There were problems with distinguishing friend from foe, with restrictive rules of engagement but, most importantly, there were no SSOs on the ground during this action. The kernel of success lay in the intelligence framework manifested in the SSOs, who only appeared in 1931. More significantly, the root of the problems was Arab-Jewish hatred, not a problem airpower was any more able to resolve than its land-based counterpart. These observations are key to Newton's critique of modern airpower.

Newton brings us back to modern warfare by observing that the importance of the SSOs has been as poorly understood as human communication in modern warfare. Of note, Newton points out airpower is used as a reactive tool, rather than a preventative one. Coercive airpower theory focuses on kinetic effects, but air transport, aero-medical evacuation and supply are all key persuasive tools. Newton is also able to take a side-swipe at modern writers crowing about precision, all weather targeting from stand-off ranges because, in conflicts dominated by the human domain, these improvements are not all that important. Precision does not develop cultural understanding, nor does it build relationships. It cannot mediate between different factions, and bombs can only deter, not reward, behavior on the ground.

Newton has given the reader an absorbing and holistic story of the RAF's interwar experiences. From the political backdrop to the inter-service rivalries, from Iraq to Palestine, and then to India. But it is in its relevance to modern warfare that the book really derives its significance, as Newton fully intended. By telling the full story of the RAF, and how the human element acted as a force multiplier, our understanding of the limitations of coercive punishment as a tool are enhanced. There are salient lessons here for policymakers, as well as a healthy dose of expectation management for those expecting the world from an iron bomb.



*About the Author: Wing Commander Rich Milburn is an RAF officer of 22 years experience, who has served in the Falkland Islands, Iraq, Afghanistan, and with NATO in Europe. He is a graduate of the Air Command and Staff College as well as the School for Advanced Air and Space Studies. He has had articles published by the Parameters and Finest Hour journals. He is currently an instructor in the Department of Strategy at the Air War College and working on a biography of Sir Charles Portal, the Second World War leader of the RAF.*

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