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# Editor's Notebook

## X3 in DC

By Andrew Parker



aparker@accessintel.com

Despite the traffic, humidity, political gridlock and so on, living in the Washington, D.C., metro area has its advantages, including for the aviation and defense industries. Cultural diversity is another major attraction, as just about every big act that goes on tour will come through the D.C. area.

Such is the case for Eurocopter's recent "summer tour" of the X3 that began June 20 in Texas and showcased the performance of the prototype hybrid helicopter to military and commercial operators. The U.S. summer tour—which started with a June 20 ceremony in Grand Prairie, Texas and included trips to the Pentagon, Redstone Arsenal, Fort Bragg, Davison Army Airfield and Manassas Regional Airport in Virginia. I caught up with the X3 test



Eurocopter test pilots with Stephen Mundt of EADS NA.

pilots and mechanics, as well as Stephen Mundt, vice president of business development for EADS North America, on July 24 at Manassas Airport as the aircraft returned from Davison. They noted that the X3 just went over 100 hours flown earlier in the day, with about half of that time logged since arriving in the U.S. More than 40 pilots flew the aircraft as part of the U.S. journey, with *Rotor & Wing* Editor-at-Large

Ernie Stephens becoming the second U.S. pilot to fly the X3 (see Ernie's Pilot Report in the August issue on page 26).

Mundt, who piloted the prototype himself twice, described the reaction to the aircraft from both military and commercial operators, noting that many of the pilots came out of the cockpit with smiles on their faces. "You watch people walk out to this aircraft, and they're not sold. They're going, 'yeah, yeah, yeah, listen, I don't know if this is going to work for me.' They get in, and when they get out, they say, 'Wow, I could think of so many ways to use this aircraft!'"

Experimental test pilot Herve Jammayrac, who's been involved with the X3 from its start as a "clean sheet of paper" less than five years ago, says that "we've done a lot of the work" related to engineering and design required to turn the X3 prototype into an offshoot commercial or military production variant. But he cautioned that there are a lot of additional issues such as certification, maintenance support, training and tooling related to a production aircraft, adding that the X3 is still in the demonstration phase. "Clearly there's an interest in the commercial market," said Mundt.

"Time is money, and it's not just how fast it goes, but the thing that's constantly talked about is that it flies cheaper than a conventional helicopter."

Operators, he continued, are getting "at least a 25 percent savings overall.

It costs a little bit more, but it goes 50 percent faster, so you're actually saving money in the long run by the seat mile." Lower operating costs are "something unheard of" when considering compound helicopters, Mundt added. "Most compounds that you talk about cost more to operate. This is actually going to be cheaper. So from a commercial perspective, VIP/corporate, offshore, EMS—they were like, 'Can you sell me one tomorrow?'"



The military involves a different set of requirements. "There are all sorts of militaries around, looking for different technologies. Here in the U.S., they're looking at Future Vertical Lift, with a target of 2030," Mundt said. But with the X3 and Sikorsky's X2, "they're starting to say, maybe there is technology to get the kinds of capabilities [needed]. It's not necessarily going to take us 20 years to get there."

According to Jammayrac, after returning to Eurocopter for a Family Day in August, the X3 will travel to France in early September and then to Germany for the Berlin Air Show later in the month. At that point, there will be a few more tests, "but that's pretty much it," he said, with retirement of the prototype scheduled by the end of 2012. ✈



Photos by Andrew Parker

Eurocopter's X3 prototype finished its U.S. trek in July before flying to Richmond, Va. for a ferry flight back to Europe, where it will retire in late 2012.



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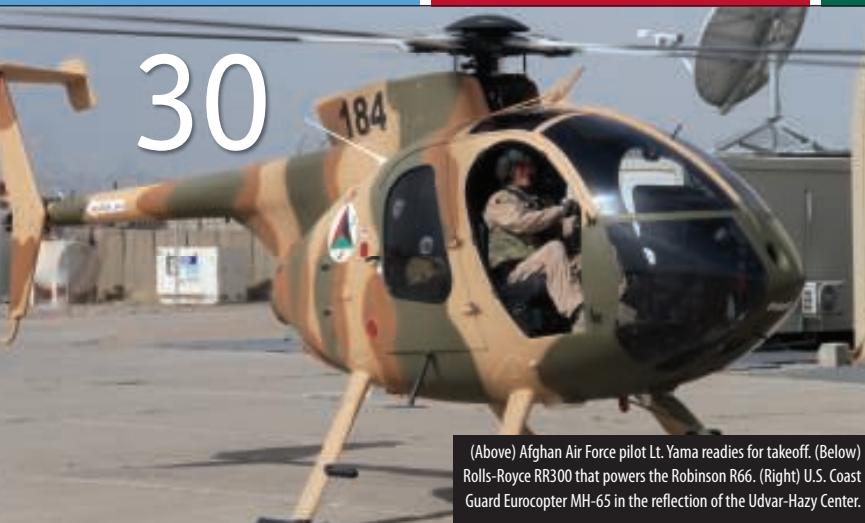
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(Above) Afghan Air Force pilot Lt. Yama readies for takeoff. (Below) Rolls-Royce RR300 that powers the Robinson R66. (Right) U.S. Coast Guard Eurocopter MH-65 in the reflection of the Udvar-Hazy Center.

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**On the Cover:** MD600N with NOTAR. Cover design by Gretchen Saval. Photo courtesy MD Helicopters.

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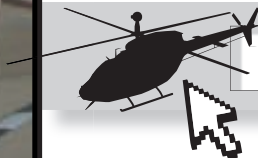
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## WHAT DO THE EXPERTS THINK?

- Ask questions to three experts on the topics of helicopter aerodynamics, AS9100 quality management systems audits and night vision goggle (NVG) certification at [rotorandwing.com](http://rotorandwing.com). Che Masters, certification engineer for NSF-ISR, discusses aerospace quality registration. Frank Lombardi, test and evaluation pilot, provides insights about the science behind helicopter flight. NVG certification expert Jessie Kearby fields questions about NVGs for both military and commercial uses.

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# Feedback

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## Mastering the Routine

*Rotor & Wing's* "Question of the Month" for August 2012 asks us to describe our training regimen; this may be the best query to date because regimen is defined as "a way of life."

Offering operational tips and safety practices are often little beyond technique from a broad experience base that requires tailoring to fit equally broad environments. Though less palpable, I submit some operational philosophies that have guided my 31-year Army Aviation accident-free career now nearing 10,000 flight hours.

Mastery of the routine is my bedrock. Many missions are exciting, ever changing, and easy to hold my attention; but I was mercilessly mentored in my formative years to master the routine of any mission, no matter how mundane or dynamic. Mastery of the routine is the wholesale dedication to disciplined, checklist-led, and aircrew collaborative actions that begin at mission briefing and end at the post-mission debrief; a veritable way of life.

The junior aviators observing the "long beards" sustaining that discipline, mastery of the routine, is precious to mentorship and its operational value to safety is priceless. To be more specific, I'm talking about a nearly obsessive dedication to standardization, standing procedures, checklists, and even the expected albeit unstated method of performing prescribed tasks. The following quote is attributed to Coach Bum Phillips: "The only discipline that lasts is self-discipline." Therein lies the hardest part and that critically essential personal responsibility. Mastering a routine is a matter of integrity; integrity is who I am when no one is looking.

In closing, I'd like to share my philosophy on aircrew coordination; often called cockpit risk management. All that matters in life is that we matter. I strive to integrate every member of my aircrew into every appropriate aspect

## R&W's Question of the Month

### What did you think of the British Queen's "jump" from an AgustaWestland AW139 during the Olympics?

*Let us know, and look for your and others' responses in a future issue. You'll find contact information below.*

of the mission. I want them to fully understand that they matter; that the success of this mission, moreover our very lives depend on the quality of their decisions and subsequent actions and they don't only have the right to speak up and assert their contribution, they have the obligation to do so.

I must acknowledge my two greatest aviation mentors: CW5(R) Charles Bos and CW4(R) Michael Wheeler; embodiments of Masters of the Routine.

CW5 Bryant Fontenot  
State Standardization Officer, ALARNG  
UH-60/OH-58C SP/IE  
Ozark, Ala.

## Rotor as a Gyroscope

I saw the comment that Mr. Lancaster made "*Gyroscopic Precession*," in the August issue (page 8) regarding a rotor acting as a gyroscope, and I respectfully submit that Mr. Lombardi was correct in saying that a rotor produces gyroscopic tendencies. Gyroscopes respond to forces and moments just as Newton's laws say they should, and those laws apply equally to rotor blades regardless of whether the forces and moments imparted to the blades are from aerodynamics or hub moments. In the flight simulation industry rotor modeling is quite detailed and complicated, and the top-level equations used to determine the movement of

individual blades are exactly the same equations that would be used to model the motion of a gyroscope. The differences only reside in how the forces and moments are generated that get transferred to the rotor blades.

Just wanted to let you know my thoughts on the subject and that I think Mr. Lombardi's original article was just fine the way it was.

Christopher Alan Lyon  
Principal Aeronautical Engineer  
Frasca International, Inc.

## Agreement on Law Enforcement

I read Ernie's column every chance I get, and sometimes he and I do not see eye to eye (remember a couple of years ago?) However, this time, in "*Searching for Pilots & Medics*" (July 2012, page 66), you are right on the money. As a former law enforcement pilot, I lived every one of Ernie's points over and over throughout my 18 years in law enforcement. His final point, however, sums up the reason I retired early. If your boss does not appreciate you or the work you do, it's time to move on. Supervisors, you are successful only because of the hard work of your subordinates that support you. Again, great job Ernie.

Craig McConnell  
Kauai, Hawaii

*Do you have comments on the rotorcraft industry or recent articles and viewpoints we've published? Send them to Editor, Rotor & Wing, 4 Choke Cherry Road, Second Floor, Rockville, Md. 20850, USA, fax us at 1-301-354-1809 or e-mail us at rotorandwing@accessintel.com. Please include a city and state or province with your name and ratings. We reserve the right to edit all submitted material.*





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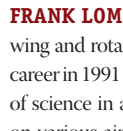
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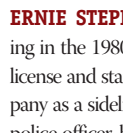
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**Jennifer Luceford**  
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## ■ TRAINING | SIMULATORS

# Sim Report: 'Flying' the CAE 3000 Series Sikorsky S-76C++ Full-Motion Trainer

Canada-based simulator provider CAE has been in the business of developing simulation training since 1947. Billed as the world's largest supplier of helicopter synthetic training devices, CAE has delivered more than 120 of them, modeling a variety of helicopters from nine original equipment manufacturers (OEMs) in both the civil and military markets. In mid-July, CAE hosted *Rotor & Wing* at company headquarters in Montreal for the unveiling of the first full-motion 3000 Series helicopter flight and mission simulator. The simulator models the Sikorsky S-76C++, and was scheduled for shipping to Zhuhai Flight Training Center in China by the end of July.

During the event, Philippe Perey, senior director of global business development and strategic initiatives at CAE explained, "The 3000 Series has been optimized for civil helicopter training needs, by bringing the highest fidelity simulation to the market at the lowest cost to operators." The 3000 Series might be considered mid-level when placed in line with CAE's full spectrum of training devices, yet still displays the higher fidelity required of U.S. FAA and European Joint Aviation Authorities (JAA) Level D certification. In researching the civil helicopter market requirements, CAE noted that statistically, almost 25 percent of all civil helicopter accidents occur during training. Traditionally, simulation train-

ing has largely focused on cockpit procedural training. In retrospect, CAE felt that a shift from task-based to mission-based scenario modeling was required. The company's goals have shifted to focus on reducing the helicopter accident rate through realistic simulation training in the environment and scenarios that helicopter operations routinely occur. For this to be effective, the visuals had to be more immersive, the flight modeling more accurate, and the databases more expansive.

The 3000 Series simulators accomplish this by combining the robust CAE "Tropos 6000" visual image generating system with commercially-available off-the-shelf projectors and the latest



Photo by Frank Lombardi

CAE's Series 3000 Sikorsky S-76C++ simulator approaches a virtual oil rig in preparation for landing.



The 3000 series features a 210-degree horizontal by 80-degree vertical view for training.

video processors found in today's high-end gaming platforms for a low-cost solution. However, exceptional visuals alone do not make an effective simulation. According to Alberto Costa, vice president of global business development, CAE was the first to use "blade element theory" when modeling rotor aerodynamics in the 1980s, and the company continues to employ it today, albeit with the help of more powerful processors. Blade element modeling is a mathematical process of breaking up a rotor blade into small pieces, calculating the aerodynamic forces on each piece, then adding up all those pieces, providing a very accurate flight model. Combining this with advanced modeling of wind dynamics over mountains, turbulence around structures and vessels, and artificially intelligent vehicle and personnel movements results in more realistic scenario-based training. This technology is already present in all of CAE's fixed-base 3000 Series helicopter flight training devices (FTDs), however I was anxious to find out how the addition of motion (making it a full flight simulator, or FFS) would affect the experience.

## Into the Cockpit

Entering the simulator room, the larger screen real estate necessary for the helicopter visuals was apparent from outside the sim by its tall globe-shape. The 3000 Series boasts a 210-

degree horizontal by 80-degree vertical field of view. Marc St-Hilaire, CAE's vice president of technology and innovation, explained that eight projectors are used to display the image directly on the screen, providing high-resolution imagery throughout the entire field of view.

Also noted was the absence of any hydraulic-based motion system or associated plumbing. Instead, electro-mechanical actuators provide more accurate roll and pitch cueing, while at the same time are less maintenance intensive, more environmentally friendly, and much more energy-efficient than hydraulics, which according to St-Hilaire, are only five percent efficient.

Strapping into the pilot's seat of the highly representative S-76 cockpit, I was immediately struck by the closeness of the screen to the cockpit windows, providing an immersive, wraparound view as advertised. With Barry Silver, CAE simulator validation pilot in the left seat, we started out in front of the windsock at Lake Charles Regional Airport. I performed a rolling takeoff, as I was a bit apprehensive to pick it straight up into a hover—one of the most difficult regimes of flight to model. Silver immediately suggested I bleed the airspeed down to zero and see how it felt. It may have been a combination of good actual aircraft handling qualities, simulation modeling, or both, but the machine quickly felt manageable, providing me with only a little passing feeling of vertigo—a

usual side effect of the motion effects not matching up with the visuals in the highly-complicated aerodynamic realm of hover flight.

After a couple of coordination-building hover turns around the windsock, we flew some approaches to the Wall Street helipad in New York City, and then through some quick key-strokes, flew a few more to an oil rig in the Gulf. The graphic detail increased noticeably as we approached to land, right down to the rust stains on the New York pier, and the sloshing of the ocean on the legs of the oil rig. The wraparound view allowed me to use all the visual cues I would in actual flight, even turning my head down and to the right for vertical reference as I made a steep approach. The vibratory and aural



Photo by Frank Lombardi

A closer look at the CAE Series 3000 instrument panel.

cues were on point as I transitioned the airspeed range to hover and landing. Other features that were demoed included moving cranes and changing sea states at the oil rig, a scene medevac complete with personnel on the ground reacting to the landing aircraft, and the rescue of survivors from a life raft.

For any simulation to provide quality training, there must be a certain "suspension of disbelief" in order to achieve maximum impact. For this to happen, the pilot can't become focused on how much they must fight the machine to actually fly it.

At a quick glance, CAE's 3000 Series S-76C++ Full Flight Simulator seems to accomplish this with a well-harmonized, feature-rich, economical package. The next step in safer flying through safer training seems to have arrived. —By Frank Lombardi



## ■ COMMERCIAL | OFFSHORE

### Bristow Goes with FreeFlight RANGR for AW139 Tracking in the Gulf

FreeFlight Systems has agreed to provide Bristow Group with the RANGR FDL-978TX ADS-B Out system for its fleet of AgustaWestland AW139s in the Gulf of Mexico. The system enables Houston air traffic control to track the helicopters outside the range of conventional radar, eliminating the need for flight crews flying in IFR conditions to supply manual position and direction reports. The ADS-B Out system received a supplemental type certificate (STC) earlier this year. 🚁

## ■ TRAINING | MILITARY

### Cobham's FB Heliservices Trains Albanian Defense Ministry



The Albanian Ministry of Defence has contracted Cobham Aviation Services' joint venture FB Heliservices for helicopter flight training. The two-year contract covers familiarization with glass cockpits, flight with instruments, multi-engine type conversions, and search and rescue (SAR) training. FB Heliservices will train pilots on AgustaWestland AW109s and Bell 412 HAR2s. The training is in preparation for the Albanian Air Force's new Eurocopter AS532 Cougars. 🚁

## ■ PUBLIC SERVICE | LAW ENFORCEMENT

### St. Louis, Kansas City Order MD500Es

MD Helicopters has received an order from the St. Louis County Police Department's Metro Air Support Unit for a 500E. The order represents the fourth 500E for the Unit's fleet. The new helicopter will perform search and rescue (SAR) missions and assist first responders. The Kansas City Police Department (KCPD) has also added three new 500Es to its fleet. KCPD's helicopters feature infrared cameras, mapping systems, night vision goggle (NVG)-compatible cockpits, searchlights and video downlinks. 🚁

## ■ PRODUCTS | NVG

### Night Flight Hosts Awards at ALEA

The Night Vision Awards, hosted by Night Flight Concepts, recognized law enforcement organizations during the Airborne Law Enforcement Agency's (ALEA) Annual Trade Show and Convention in Reno, Nev.

The Atlanta Police Department, Florida's Broward County Sheriff's Office and the Royal Canadian Mounted Police (RCMP) received five-year service awards, with the RCMP becoming the first Canadian law enforcement organization to win a Night Vision Award.

The RCMP also received recognition for community awareness for its work during the 2010 Winter Olympic Games and leading the use of night vision goggles in Canada. California-based Butte County Sheriff's Department was awarded the 10-year service award and the Las Vegas Metro Police was given the Mark of Excellence Award.

The Association of Air Medical Services annual convention (AMTC) will host the next round of Night Vision Awards later this year in Seattle, Wash. 🚁

## ■ SERVICES | MAINTENANCE

### Peru Opens First Eurocopter Center

Eurocopter has partnered with Servicios Aereos de Los Andes to establish its first Peruvian service center in Ayacucho. The center will provide Ecureuil AS350B3 operators with operational and intermediate (O&I) certified maintenance.

Component replacements and up to 600-flight-hour inspections will also be performed at the center. While Ecureuil variants make up most of the Eurocopter aircraft flown in Peru, the center will service all Eurocopter variants. 🚁

■ COMMERCIAL | AIRFRAMES

## AgustaWestland's Spagnolini Bonds with Russian Helicopters as the Bear Looks Over His Shoulder

AgustaWestland has a "deal with Russian Helicopters to develop a new technology 2.5-ton single engine helicopter for the export and internal markets," said CEO Bruno Spagnolini, speaking on the second day of the Farnborough Airshow in the UK.

"This is a great opportunity to expand the cooperation that we already have with Russian Helicopters where we have established a joint venture for the final assembly of the commercial AW139 in Moscow." The new aircraft is likely to be assembled at the HeliVert facility which was established to assemble the AW139 for the Russian market.

This move is part of a larger plan to move its business to go where the markets are becoming strongest: "We are trying to grow our network of cooperation worldwide. We are trying to move our presence where the market is and there are opportunities to cooperate."

However, before Spagnolini even spoke, the ever-slicker presentation from Russian Helicopters a couple of hours earlier had talked about boosting their own helicopter annual production to previously unheard of levels. Russian helicopters are already reputed to form 14 percent of the global fleet broken down into a 22 percent share of military rotorcraft but only 9 percent of civilian helicopters. The latest version of the world recognized Mi-8/17, the Mi-171A2,

will hit the markets in 2014 after its expected EASA certification. And the following year several additional projects are likely to have been announced. The Russian industry has also recognized its previous weakness in worldwide support centers and claims to be in the process of putting that right.

"We have been traditionally strong in defense and weaker in the civil market," said one Russian commentator. "We are putting our priorities now into the consolidation of S&T and R&D." —By Andrew Drwiega, Military Editor

### Russian Helicopters Output Per Annum

2006:	94
2007:	102
2008:	158
2009:	186
2010:	214
2011:	262
2012:	300-plus (forecast)
2015:	450 (predicted)

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## ■ COMMERCIAL | OFFSHORE

### UTair Finances Eurocopter AS350s, Receives Mi-171 Trio

Russian airline UTair has obtained a seven-year, \$45-million financing package from British bank HSBC on a security from French insurance agency COFACE to purchase 19 Eurocopter AS350s and AS355s. The agreement represents the first time that UTair has secured financing and insurance from an international export agency. Plans call for UTair, which already operates five AS350/355s, to take delivery of four additional helicopters by the end of the year, with another 10 coming during 2013. Russian Helicopters subsidiary, Ulan-Ude Aviation, has handed over three Mi-171s to UTair. The helicopters will operate out of Peru for UTair's HeliSur operation. The three Mi-171s represent the initial deliveries of a 40-helicopter order between UTair and Ulan-Ude in 2011. UTair currently operates more than 40 Ulan-Ude produced helicopters. ✈

## ■ MILITARY | MAINTENANCE

### General Dynamics, L-3 Win Contracts

Boeing has issued contracts to Ottawa-based General Dynamics Canada and L-3 Communications MAS of Mirabel to provide in-service support for the Canadian Forces' CH-147F Chinook fleet. L-3 Communications will supply support and test equipment. Boeing selected L-3 earlier this year to supply technical publications for the Canadian helicopters. General Dynamics will perform contractor maintenance support and assemble a maintenance-training suite. ✈



Photos by Sgt. Kiasia DiGregorio



The North Carolina National Guard joined the paratroopers of the 407th Brigade Support Battalion, 2nd Brigade Combat Team, 82nd Airborne Division to conduct a sling load training exercise. Support specialists hooked up water blivets and Humvees with grounding rods to a hovering Sikorsky UH-60 Black Hawk during the exercise.



■ SERVICES | CERTIFICATION

## FAA OKs Aspen Display for R44

Aspen Avionics has received FAA approval for its H-series primary flight displays (PFDs) and multi-function displays (MFDs) on the Robinson R44 and R44 II. Certification of the solid-state digital replacements for R22 models is also underway. Western Avionics is handling EASA approval for the displays in Europe. ✈

■ MILITARY | UTILITY

## Army Extends Swedish Support

The U.S. Army's Contracting Command at Redstone Arsenal has issued a \$41.9-million contract extension to Sikorsky Aircraft for logistics support and program management services for 15 UH-60M "green" helicopters. The agreement also covers aircraft warranty, maintenance and software loading services for the Swedish Armed Forces. The contract runs through the end of 2014. ✈

■ PUBLIC SERVICE | EMS

## Utah AirMed Adds Eurocopter EC145 to Bell 407, PC-12 HEMS Fleet

American Eurocopter has handed over an EC145 to the University of Utah's AirMed program. The EMS provider's fleet currently consists of four Bell 407s and two fixed-wing Pilatus PC-12s. United Rotorcraft's facility in Denver, Colo. will complete the helicopter for Utah AirMed, and Air Methods will operate the EC145. ✈

Air Methods will operate the University of Utah's new Eurocopter EC145 for its AirMed unit.



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■ COMMERCIAL | AIRFRAMES

## Russian Medium Twin Kamov Ka-62 to Fly in One Year



The Ka-62, a civil derivative of the military Ka-60, features new elements such as Turbomeca engines, a Transas avionics suite and a crashworthy fuel tank.

Russian Helicopters is planning on flying the Kamov Ka-62 medium twin in August 2013. The new helicopter, which bears some resemblance with the Eurocopter Dauphin, will be in the 12 to 15-passenger category. The manufacturer is targeting a very aggressive price, at \$8.5 million.

Four aircraft will fly in the test program, according to Anatoly Mezhevoy, deputy executive sales director. Interstate Aviation Committee certification is planned for the fourth quarter of 2014, just before deliveries begin in 2015. EASA certification is in the cards, too, as the company is considering it for 2018.

The Ka-62 is a civil version of the Ka-60 Kasatka military multi-role helicopter. Kamov developed the latter in the mid-1980s. It will be marketed for a range of roles, including EMS, search and rescue, law enforcement, border patrol, training and corporate/VIP transport. Offshore oil and gas passenger transportation is seen as a major application. "Evacuation

is fine for 15 passengers, thanks to four large emergency exits," Mezhevoy told *Rotor & Wing*.

Asked about competition against the AW139, which AgustaWestland and Russian Helicopters are to produce jointly in a new factory near Moscow, Mezhevoy said the Ka-62 is introducing new technology. He mentioned a built-in self-check capability for aircraft systems.

St. Petersburg-based Transas will supply the KBO-62 avionics suite. It is built around two 12.1-inch TDS-12 primary flight/navigation displays and two 8.4-inch TDS-84 multifunction displays. Also included are the TTA-12H terrain awareness and warning system, two TNC-1G flight management systems with built-in Glonass/GPS sensors and a four-axis autopilot. The helicopter will also be equipped with a health and usage monitoring system (HUMS).

A number of new elements, compared to the Ka-60, can be found on the Ka-62. Turbomeca is powering the aircraft with two Ardiden 3G turboshafts of 1,680 shp each. They are controlled by dual-channel FADECs. A fuel tank protection system helps prevent damage in case of hard landing.

Also new are the five-blade main rotor, secondary hydraulics system, energy-absorbing landing gear and seats, and reinforced fuselage and engine mounts. Both the main rotor and the shrouded tail rotor's gearboxes will be able to run "dry" for 30 minutes. Austria-based Zoerkler will provide the gearboxes. Mtow stands at 14,300 lbs, for a maximum payload of 5,290 lbs. Maximum range is said to be 405 nautical miles. The Ka-62's maximum cruising speed is 157 kts. —By *Thierry Dubois*

## Russian Helicopters Mulls Mi-8/17 Replacement

Russian Helicopters has completed a "feasibility study" for a Mi-8/17 replacement, dubbed the Russian Advanced Commercial Helicopter (Rachel). CEO Dmitry Petrov said market research conducted with operators helped identify "the key features of the advanced helicopter." One priority is thus to minimize direct operating costs and work out an "acceptable" price, Petrov said. In the 22,000- to 26,000-lb category, the multi-role commercial helicopter will be able to seat 21 to 24 passengers. It will have a longer flight range and higher cruising speed than the Mi-8/17.



The Rachel project aims at replacing the Mi-8/17 in the 22,000- to 26,000-lb category.

## ■ MILITARY | UNMANNED

## K-Max Continues Afghan Service

The U.S. Marine Corps has extended the tour of duty for the unmanned Lockheed Martin/Kaman K-Max in Afghanistan. The unmanned aerial system (UAS) has delivered more than 1.6 million pounds of USMC cargo in the combat zone. The agreement elongates the service of the K-Max in Afghanistan by another six months and includes an option to further extend through September 2013. The helicopter began serving in Afghanistan in 2011. According to Lockheed Martin, the K-Max cargo UAS has accumulated 485 sorties over 525 hours through late July, including a "hot hook-up" demonstration in May. ✈

## ■ PRODUCTS | ROTOR BLADES

## Curtiss-Wright Supplies Icing System for S-76D

Sikorsky Aircraft has granted a \$600,000 contract to Charlotte, N.C.-based Curtiss-Wright Controls for ice detection and protection systems on the S-76D. Under the agreement, which could ultimately be worth more than \$12 million with extensions over the next 20 years, Sikorsky will receive two packages—the icing severity detection system (ISDS) and the rotor ice protection system (RIPS)—from Curtiss-Wright Controls Avionics & Electronics (CWC-AE).

When used together, the systems detect ice build-up rates and de-ice the blades by activating rotor blade heaters as needed. CWC-AE's division manufactures the ISDS equipment in Christchurch, UK, and the RIPS equipment is made in City of Industry, Calif. ✈

## ■ MILITARY | PROCUREMENT

## Saudi Arabia Purchases MD530Fs

MD Helicopters has obtained a \$40-million contract from the U.S. Army for the purchase of MD530F helicopters and equipment. The aircraft, part of the foreign military sales (FMS) program, are designated for Saudi Arabia. MD's facility in Mesa, Ariz. will manufacture the helicopters, with completion of the contract expected in July 2013. ✈

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AgustaWestland's "Olympic" version of the AW139. A version of this variant was featured during the Opening Ceremonies of the London 2012 Olympic Games with Daniel Craig reprising his role as James Bond accompanied by Queen Elizabeth II and "parachuting" from the helicopter into the stadium.

## ■ COMMERCIAL | UNMANNED

### Unmanned Little Bird Completes Takeoff and Landing Tests

Boeing's unmanned H-6U Little Bird has carried out 14 autonomous takeoffs and landings from a private ship off the coast of Florida. The optionally piloted Little Bird, which is an unmanned variant of the MD500, had two safety pilots onboard to maintain situational awareness, but did not take control during the testing. Boeing used a commercial-off-the-shelf takeoff and landing system for the flight tests. 🚁

## ■ MILITARY | MAINTENANCE

### L-3, General Dynamics Win Canadian Chinook Contracts

Boeing has issued contracts to Ottawa-based General Dynamics Canada and L-3 Communications MAS of Mirabel to provide in-service support for the Canadian Forces' CH-147F Chinook fleet. Under the agreement, L-3 Communications will provide support and test equipment. Boeing selected L-3 earlier this year to supply technical publications for the Canadian helicopters. The deal calls for General Dynamics to perform contractor maintenance support and supply a maintenance-training suite. 🚁

## ■ PRODUCTS | ENGINES

### Eurocopter Selects TM800 for X4

Safran Group subsidiary Turbomeca has reached an agreement to provide its TM800 engine for the Eurocopter X4 future helicopter, the planned replacement for the AS365/EC155 Dauphin. The formal contract comes five months after Turbomeca CEO Olivier Andries first mentioned the five to six-ton class, 1,100 shp (800kW) powerplant would be linked to the X4 during Heli-Expo in February.

As part of Eurocopter's "two-engine strategy" for all of its in-development helicopters, the manufacturer selected Pratt & Whitney Canada to provide its 1,000-shp PW210E for the X4 as well. Turbomeca will develop and certify the TM800 in parallel with the X4's target entry into service during 2017. 🚁

■ PRODUCTS | NVG

## Latin American Military Receives NVG Upgrades

Aero Dynamix has delivered three night vision goggle (NVG) cockpit upgrades for MD500s to an unnamed Latin American military operator. The modifications include edge lit panels, internal and external component illumination, and internal NVIS avionics. The operator will use the helicopters for night vision training operations. 𠄎



An NVG panel on an MD 500.

■ SERVICES | MAINTENANCE

## Singapore Opens Bell Service Center

Bell Helicopter has established a regional service center in Singapore. The Seletar Aerospace Park facility will provide operators with completions, fulfillment, maintenance and repair services. Bell teamed with Textron sister company, Cessna, to create the 160,000-square-foot facility. 𠄎

■ COMMERCIAL | AIRFRAMES

## Milestone Purchases 19 Additional Sikorsky S-92s for Leasing

Dublin, Ireland-based Milestone Aviation has agreed to buy 19 more S-92s from Sikorsky Aircraft. The contract follows an order for three S-92s placed in February 2012 at Heli-Expo. The combined 22-helicopter purchase is valued at more than \$600 million. The first two helicopters are scheduled for delivery later this year. Milestone has also closed several debt facilities that were worth a combined total of \$400 million. The debt facilities included a Deutsche Bank-led facility worth \$265 million, a \$75-million SEB facility and three separate facilities with Societe Generale worth upwards of \$60 million. Milestone partnered with Deutsche Bank in the transaction, and plans to use the capital to support its partners in the global helicopter market. 𠄎

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■ MILITARY | EVENT COVERAGE

## Royal Navy Hosts European Helos at Yeovilton Air Day

In June, the UK was gripped by the start of heavy rainfall that would continue until the middle of July. The bad weather and preparation for supporting the London Olympics did not deter the personnel of RNAS (Royal Naval Air Station) Yeovilton from hosting another successful air day in the third weekend of June. RNAS Yeovilton (HMS Heron) had been the home of the famous Sea Harrier until its retirement in 2004 but now home to remaining squadron of AgustaWestland Lynx Mk8 and the Commando Helicopter Force (CHF) squadrons.



German Navy Marinefliegergeschwader 3 'Graf Zeppelin' AgustaWestland Lynx Mk 88.

This air show commemorated the 30th anniversary of the Falklands Conflict. The Fleet Air Arm museum also based at Yeovilton brought out a Westland Wessex Mk V, Westland Wasp and Antarctic Patrol Westland Lynx (though the Ice Patrol ship, HMS Endurance was equipped with Wasp at the time not Lynx) and captured Argentinian AB205.

The flying display on the rotary wing side was carried out by a four ship formation of Lynx Mk8, then later on by the Royal Navy Black Cats display team consisting of a pair of Lynx putting themselves through several maneuvers. The Royal Navy's next generation AgustaWestland AW159 Wild-

performed with a mock assault complete with pyrotechnics.

On the static display, the USAFE's only vertical lift element which is the 56th RQS (Rescue Squadron) based at RAF Lakenheath as part of the 48th Fighter Wing, brought along one of their HH-60G Pave Hawk. The pilots and PJs (Pararescue Jumper specialists) demonstrated the different tools available for combat search and rescue/personnel recovery techniques. The German Navy (Marinesflieger) had the Batman nemesis "The Riddler" Sea Lynx Mk 88A from the famous Graf Zeppelin squadron based at Nordholz. All the Fleet Air Arm's aircraft were on display either outside or in the hangars from the CHF Sea King Commando Mk4 to the Sea King ASAC (airborne surveillance and control) as well as the familiar red and gray SAR Sea King Mk6 from 771 Naval Air Squadron. It was 771 NAS Sea King that made history as it delivered the Olympic torch as it arrived at the squadron's home of RNAS Culdroe to Lands End for it to begin its journey around the country. The RAF contribution to the static display was an AgustaWestland Merlin from RAF Benson.



Royal Navy Black Cats AgustaWestland Lynx HM.8 pair doing a crossing maneuver during the air show.

cat made its second public flying appearance. The Army Air Corps WAH-64D Longbow Apache performed its solo routine while at the very end of the day, the CHF squadrons

Finally, the hangars had their own exhibition ranging from the different elements of the air station that supports flying. In the hangar nearest the entrance to the base, SERCO showed off their repair capabilities for the remaining Sea King variants in UK service. In this case it was Royal Air Force (RAF) Sea King HAR.3 SAR fleet of which there were a few inside to be seen, with various panels open or repair rigs around them. AgustaWestland had an AW159 Wildcat on show in another hangar with the proposed weapons systems on display. —By Ian Frain



## PEOPLE



**Joseph Ackerman**, president and CEO of Elbit Systems, has announced plans to retire at the end of March 2013.



**Bezahel (Butzi) Machlis** will succeed Ackerman in the position. Ackerman started at Elbit in 1982 and served as president for the last 16 years. Machlis is currently the executive vice president at Elbit and has worked at the company since 1991.

**Timothy Gowen** has succeeded retiring Navy Capt. John Slaughter as head of the Naval Aviation Center for Rotorcraft



Advancement for the U.S. Naval Air Systems Command. Gowen previously served as the deputy director of the Airworthiness Office for NAVAIR and recently received Senate confirmation as Director of the Joint Staff of the Maryland National Guard. Gowen is a former Bell OH-58 Kiowa and Sikorsky UH-60 Black Hawk pilot with the U.S. Army.

Bell Helicopter has added **Raymond Leduc** as vice president of value streams at its Mirabel, Canada location. He will oversee the manufacturing at Mirabel and take charge of the value stream activities. Leduc was previously the site leader at IBM Bromont, a position he held for the past nine years.

Russian Helicopters has named a new chairman and board of directors during its board meeting in July.

**Andrei Reus**, a board member since 2010, was selected chairman of the board of directors. Reus is the general director of Oboronprom. New board of directors' members include **Aleksei Alyoshin** who replaces **Dmitry Kolodyazhny**, as well as **Jean-Paul Béchat**, **Shiv Vikram Khemka**, **Dmitry Lelikov**, **Alexander Mikheev**, **Pavel Osin**, **Dmitry Petrov** and **Jean-Loup Picard**.

StandardAero has announced that **Tom Roche** will fill the position of vice president of customer support for the maintenance provider. Roche previously served as the company's vice president of turboprops and fleets, and prior to that led the helicopter business unit for almost 10 years. 𠄎



## coming events

## 2012:

**Sept. 4-7: European Rotorcraft Forum 2012**, Amsterdam, the Netherlands. Contact National Aerospace Laboratory (NLR), phone +31 88 511 3165 or visit [www.erf2012.nlr.nl/index.html](http://www.erf2012.nlr.nl/index.html)

**Oct. 22-23: Police Aviation**, Kuala Lumpur, Malaysia. Contact Tangent Link, phone +44 (0) 1628 660400 or visit [www.tangentlink.com/events](http://www.tangentlink.com/events)

**Oct. 22-24: 2012 Air Medical Transport Conference**, Seattle, Wash. Contact AAMS, phone 1-703-836-8732 or visit [www.aams.org](http://www.aams.org)

**Oct. 22-24: AUSA Annual Meeting**, Washington, D.C. Contact AUSA, phone 1-703-841-4300, 1-800-336-4570 or visit [www.ausa.org](http://www.ausa.org)

**Oct. 30-Nov.1: Helicopter Military Operations Technology Specialists' Meeting (HELMOT XV)**, Williamsburg, Va. Contact AHS Intl, phone 1-703-684-6777 or visit [www.vtol.org](http://www.vtol.org)

**Nov. 6: High-Rise Aerial Firefighting & Rescue**, Dubai, UAE. Contact Tangent Link, phone +44 (0) 1628 660400 or visit [www.tangentlink.com/events](http://www.tangentlink.com/events)

**Nov. 6-8: Dubai Helishow 2012**, Dubai, United Arab Emirates. Contact Mediac Communications and Exhibitions, phone +44 (0)1293 823 779 or visit [www.dubaihelishow.com](http://www.dubaihelishow.com)

## 2013:

**Feb. 20-21: Avionics Europe 2013, Munich, Germany**. Call 1-888-299-8016 or visit [www.avionics-event.com](http://www.avionics-event.com)

**March 4-7: HAI Heli-Expo 2013**, Las Vegas, Nev. Contact HAI, 1-703-683-4646 or visit [www.rotor.com](http://www.rotor.com)

**March 18-20: 9th Annual CHC Safety & Safety Summit**, Vancouver, Canada. Contact CHC, phone 1-604-232-7424 or visit [www.chcsafetyqualitysummit.com](http://www.chcsafetyqualitysummit.com)

**March 25-28: 56th Annual AEA International Convention & Trade Show**, Las Vegas, Nev. Contact Aircraft Electronics Assoc., phone 1-816-347-8400 or visit [www.aea.net](http://www.aea.net)

**April 10-14: Quad-A Annual Convention**, Fort Worth, Texas. Contact Quad-A, phone 1-203-268-2450 or visit [www.quad-a.org](http://www.quad-a.org)

**April 16-18: Asian Business Aviation Conference & Exhibition (ABACE 2013)**, Shanghai, China. Contact NBAA, phone 1-202-783-9000 or visit [www.abace.aero](http://www.abace.aero)

**May 16-18: 6th International Helicopter Industry Exhibition**, Moscow, Russia. Contact HeliRussia, phone +7 (0) 495 958 9490 or visit [helirusia.ru/en](http://helirusia.ru/en)

**May 21-23: AHS International 69th Annual Forum and Technology Display**, Phoenix, Ariz. Contact AHS, phone 1-703-684-6777 or visit [www.vtol.org](http://www.vtol.org) 𠄎

## Tech-Tool EC135 & EC145 Windows: A Perfect Fit Every Time

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## DAC International's Solution for Tarsyn on the Bell 212/412 Helicopter

If you have issues with your Tarsyn gyro installation, consider replacing the Tarsyn gyros with the proven Northrop Grumman Litef LCR100 fiber optics AHRS. Installation consists of removal of the existing rate gyro, replacement of the Tarsyn VG/DGs with two AHRS and trays, which mount into the existing Tarsyn position and wiring an additional panel annunciator. Advantages of replacing the Bell 212/412 mechanical gyros with the dual LCR-100 AHRS include Fiber Optic Attitude Heading Reference System—no moving parts; a long MTBF (mean time before failure) equals reduced maintenance and cost; the LCR100 has increased accuracy and less weight than the gyros it replaces; simplified one-time flux valve calibration—no compass rose required and it comes with a two-year warranty. The installation is simple with a kit that includes two Tarsyn adapter trays, one rate gyro jumper/annunciator harness, one panel annunciator and a flight manual supplement. Downtime for installation is minimal. Give DAC International a call today at 1-512-331-5323 to discuss replacing or upgrading your Bell 212/412. Or for more information connect with us at [dacinfo@dacint.com](mailto:dacinfo@dacint.com)



## Elbit All-in-Small Offers Helicopter Self-Protection System

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# NOTAR:

This MD600, along with the MD520N and MD Explorer, utilize the NOTAR anti-torque system. Pilot inputs, however, are the same as those for a conventional tail rotor system.

Photo courtesy of MD Helicopters

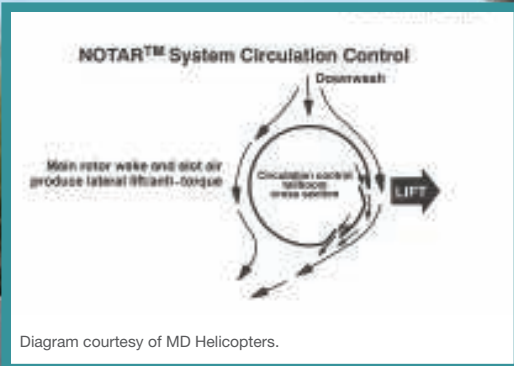
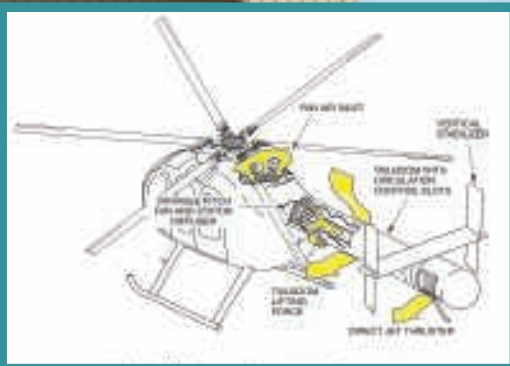


Diagram courtesy of MD Helicopters.

**MD Helicopters gave *Rotor & Wing* a chance to fly the MD600 and a close-up look at the technology that drives the NOTAR system.**

*By Ernie Stephens, Editor-at-Large*

# MORE THAN WHAT IT APPEARS TO BE



**I**t's been a while—about 22 years—since certification was awarded for a helicopter design that then and now gets a second look from many who see it. Aviation enthusiasts stare at it and say, “Oh, I get it,” though they often don’t. And non-aviation types just know that

something is missing, even if it takes them a little while to figure out what.

The technology is called NOTAR, an acronym for “no tail rotor.” And the concept was pretty simple: Get rid of that pesky, noisy, dangerous tail rotor, and replace it with something safer and more effective.

Hughes Aircraft—the developer and original patent holder of the NOTAR, as well as the builders of the model 500 helicopter it was first made available on—would change owners and names several times before being acquired by its current owner, billionaire investor Lynn Tilton, founder of parent company

Patriarch Partners. Tilton retained the most recently used name, MD Helicopters, and continues to offer three aircraft lines with the NOTAR system: the single-engine MD520N, its stretched brother the MD600, and the twin-engine MD902 series dubbed the Explorer. (The company still sells several variations of its tail rotor-equipped MD500, as well.)

Oddly enough, the science behind NOTAR was not new in 1990 when the first MD520N was delivered. In fact, a portion of it predates the first fully functional helicopters ever produced.

To paraphrase Sir Isaac Newton's Third Law of Motion, for every action there is an equal and opposite reaction. For a helicopter, it means that when the main rotors are spinning in one direction, the rest of the aircraft wants to spin in the opposite direction, unless acted upon by some other force. In early helicopters, the "other force" was generated by a smaller rotor flipped vertically, so it would force the tail—and by extension the rest of the airframe—to resist that unwanted torque. Other designers would use a second rotor system located next to, in tandem with, or atop the first, and turn that second set in the opposite direction. But the most popular system has remained the conventional tail rotor or "penny farthing" layout, a term that originally referred to old bicycles that had a huge wheel in the front and a much smaller one in the back.

Hughes engineers, as well as most everyone in the aviation world, were aware of the biggest hazard associated with the penny farthing layout:

People were either getting chopped to bits by inadvertently walking into the tail rotor, or pilots were generating all kinds of damage and injuries if they accidentally struck something with the tail of their aircraft.

At first glance, the NOTAR systems seem to fix that by replacing the tail rotor with a nozzle that directs thrust from the engine's exhaust to the left or right as needed to counteract main rotor torque. But there are actually three things going on that make the NOTAR system work, and harnessing engine exhaust is not one of them.

In 1924, Romanian-born engineer Henri Coanda (1886-1972) discovered that a stream of air will hug and conform to a surface if it passes closely enough to it, and can apply a force while doing so. He called it the Coanda Effect, and in the 1930s received a French patent for it. The first of the three aspects used by the NOTAR system employs that effect, in that it uses the main rotor's downwash over the tail boom to help keep the aircraft from spinning in the opposite direction.

To make that happen, they installed a fan—dubbed the NOTAR fan—near the root of the tail boom to draw air through an inlet located behind the main rotor mast. The fan forces that air down the inside of the boom and then overboard through long, horizontal slots at the 3 o'clock and 5 o'clock posi-

tions. And while those slots are barely noticeable from the outside, they vent enough air to help lower the pressure of the main rotor's downwash as it hugs the curvature of the right side of the tail. The higher pressure remaining on the left side of the boom creates lift that acts horizontally to the right, thus resisting a substantial amount of the unwanted, clockwise hull rotation induced by the main rotor.

The second aspect of the NOTAR system also uses the airflow generated inside of the tail boom by the fan, but does so by allowing it to escape through the vents on the direct-jet thruster, the signature bobbed tail assembly at the very end of the boom. Quite simply, the air that reaches the thruster passes through a fixed cone that has several stationary, vertical vanes on the left and right. That assembly is enclosed by a rotating cone that has an opening equal to about one quarter of its circumference. A hidden system of pulleys and rollers allows it to rotate around the fixed cone, thus metering air delivered by the NOTAR fan out either or both sides, depending on which way the helicopter is to be yawed and at what rate.

The third and final part of the NOTAR system is the vertical stabilizers. The one on the left works just like a rudder on an airplane: deflect it to the right, it yaws the nose of the aircraft to the right; deflect it to the left, and the nose yaws left. However, the two stabilizers do not work



Photo by Ernie Stephens  
With the tail boom removed, the details of the NOTAR fan on this MD520N are easy to examine. The screened opening of its air intake can be seen behind the main rotor hub.



MD520N with NOTAR.



## Flying the MD600 NOTAR

When you climb aboard the eight-seat MD600, there are no NOTAR-specific switches or gauges, except for the yaw stability augmentation system's on/off toggle switch. So, just follow the prestart checklist, light the Rolls-Royce 250-C47M turboshaft engine, do a before-takeoff check, and pull pitch.

As advertised, the pedal work is exactly like that aboard a standard, tail rotor-equipped aircraft. So, turns, climbs, descents, speed changes and cruise profiles follow the norm. And without a tail rotor that can stall, the MD600 won't complain much on a windy day.

The NOTAR system does, however, make its presence known when passing through effective translational lift (ETL). The reason is because the Coanda Effect accounts for 60 percent of the anti-torque below ETL, while the vertical stabs and thruster are primary above it. Consequently, the shudder experienced in all helicopters as they pass through that 16 to 24-knot range is more pronounced in NOTAR-equipped aircraft, because of the "handoff" of anti-torque duties between the three parts of the system. But it isn't disturbing, nor does it present a safety hazard. You'll just find that you have to move your feet a bit more than normal in that zone.

The flight controls in the MD600 are rigged so that they do not need to be hydraulically boosted. And while it can't be flown well with just one's fingertips, there's no need to wrestle with it, either. The difference between the two results in the ability to feel what the aircraft is doing at all times. However, a motorized trim switch on the cyclic is there, and comes in handy with station keeping. But on the floor, the NOTAR system constantly provides good feel through its pedals, and needs no trim actuator.

in unison. Unlike the left stabilizer, which is controlled by the pilot's pedal inputs, the right unit is moved by a yaw stability augmentation system (YSAS). The YSAS consists of a small electro-mechanical actuator that moves the right stab based on information received from a yaw rate gyro and lateral accelerometer installed in the cockpit. With the switch on, the system counteracts any Dutch roll the aircraft might experience much quicker than the pilot could.

From a pilot's perspective, the main rotor downwash, jet thruster, and vertical stabs that make up the NOTAR system do not create anything terribly foreign to even the newest helicopter aviator. From an engineering standpoint, the three facets of the system work seamlessly.

When the pilot begins pulling in power to lift the ship off the ground, the counterclockwise rotation of the main rotor blades still requires a left pedal input to keep the nose straight. Upon doing so, a mixing unit makes three simultaneous adjustments. First, it changes the pitch of the blades on the NOTAR fan, which increases the volume of air it pumps down the tail boom to the slots and jet thruster. Second, it rotates the thruster cone to pass more air out of the left side of the assembly than the right. And third, the mixer turns the trailing edge of the left stabilizer to the right. The amount of left pedal applied matches the amount of movement applied to each member of the NOTAR system. But this does not mean that the Coanda Effect, the thruster and the vertical fins are playing an equal role.

At any given phase of flight, counteracting main rotor torque requires different amounts of help from the three aspects of NOTAR. In a hover, 60 percent of the anti-torque function is gained from the downwash of the main rotor through the Coanda Effect, while the remaining 40 percent is handled by the thruster. With no airflow passing around them, the vertical stabs, while still following commands from the mixing unit, aren't helping at all. As the aircraft passes through effective transla-



The rotating cone on this MD Explorer remains parked in this position until pedal inputs turn it to direct air in one direction or the other.

tional lift—roughly between 16 and 24 knots—the downwash associated with the Coanda Effect becomes less helpful, forward airflow brings the stabilizers into play, and the thruster continues to provide a significant amount of yaw control. At approximately 60 knots and above, things will change again, as the stabilizers take on most of the anti-torque duties, the thruster helps out, and the Coanda Effect provides only minimal assistance.

In the event of an autorotation, the pilot will work the pedals the way he or she would in any other flight profile, because the NOTAR fan will still be driven by the main rotor transmission, which will be driven by the autorotating main rotor. The thruster and stabilizers will also continue to function because they are mechanically attached to the pedals by cables and control rods. Even the YSAS is helping out, as long as electrical power is still present.

Toward the end of the NOTAR's development, engineers were already happy to find that a NOTAR-equipped helicopter cruising at 110 knots and 500 feet. AGL created a cone of noise that extended only half the distance of other aircraft in its class. This, they say, is due to the elimination of the turbulent air generated by a tail rotor, and makes it arguably the quietest helicopter in the world.

Best of all, NOTAR is a very safe anti-torque system. Even when running at full power, there isn't thing that will hurt ground personnel. Stick the tail in the trees, and you'll only scratch the paint. Come near the thruster, and your hat will be blown off. 🚁

# GREEN SHOOT SUCCESS:

Photos courtesy MD Helicopters

The MD530F was selected for its hot and high performance. Shindand Air Base sits at 3,400 feet.

**U.S. Army's choice of MD530Fs pays off as initial batch of Afghan Air Force pilots pass flight training and progress to careers flying Mi-17s.**

*By Andrew Drwiega, Military Editor*



# U.S. ARMY QUALIFIES FIRST AFGHAN PILOTS IN-COUNTRY

**B**ack on March 16, 2011, the Department of the Army announced that it had awarded MD Helicopters a \$186-million contract to provide six MD530Fs (including critical spares) to be the Rotary Wing Primary Training Aircraft (RWPTA) in Afghanistan. The six aircraft procured for the Afghan Air Force are models s/n 0179FF through to s/n 0184FF. Included in the deal were two flight training device (FTD) simulators from Merlin Simulation based in Michigan.

Contracting officer, William Epps wrote of the decision: "MD Helicopters' proposal was determined to present the offer that represented the lowest price and technically acceptable proposal to the Government and thus was selected for award."

The deal was brokered through the Foreign Military Sales (FMS) program with options for another 48 MD530Fs out to 2015. The U.S. government will continue to own and operate the six aircraft (as well as any options taken up) although a handover to the Afghan military will eventually happen.

By Dec. 13, 2011, the U.S. Army flight instructors at the Shindand Air Base had run through their acceptance checks on the six MD530F helicopters. This involved air and systems checks including onboard radios, GPS, navigation systems, rotor tracking and airworthiness. As part of the contract, MD Helicopters built the hangar facilities. Work began on September 1st and was completed in three months. The whole process of fielding the aircraft from production in Arizona to delivery in Afghanistan took less than 10 months.

The MD530Fs are being used to train ab initio Afghan Air Force pilots at the Shindand Air Base located in the western Afghanistan in Herat province, seven miles northeast of the city of Sabzwar. This is the first time Afghan helicopter pilots have been trained for 30 years and the program should lead to the Afghan Air Corps being able to train, maintain and sustain its capability without foreign military assistance.

Classes began in January 2012 for the first batch of potential Afghan Air Force pilots, as the aircraft became operational a couple of weeks ahead of schedule. Actual flight training began on February 21st. The initial eight-week flight screening process was conducted with the Cessna 182. This included basic aerodynamics, physiology and an introduction to flight maneuvers. Following this, the five-month Under-





graduate Helicopter Pilot training course involved a mix of classroom instruction, simulator sessions and flight training in the MD530Fs.

Lt. Col. Jeffrey Bouma hails from the Army Security Assistance and Training Management Organization (USASAT-MO) and is the director of operations regarding the training of Afghan pilots. At Shindand his command forms part of the 444th Air Expeditionary Advisory Group (AEAG). Bouma takes up the story:

“Here’s a very basic overview of the program: Afghan officers are identified to attend flight training—generally while they are in their National Military Academy. The officers must score an 80 on their English Competency Level (ECL) exam—if not they receive additional/intensive English language tuition. Officers that achieve an 80 on their ECL come to Shindand Air Base and begin initial flight screening (IFS), which is an entry level program to identify their flight aptitude.”

After that, the course involves “seven weeks of academics and 33 hours of flight training in a Cessna 182. Once they have completed IFS they have the option to select either the rotary wing track or continue in the fixed wing track,” continues Bouma. “Our rotary wing track is built off the IERW model used at Fort Rucker, where students receive approximately 180 hours instruction in the MD530 then move to the Mi-17 for their advanced aircraft instruction before joining a line unit.”

Bouma considers the MD530F to

be “a very agile and forgiving helicopter and the perfect platform for initial rotor wing flight training in Afghanistan.” With Shindand air base located at 3,400 feet above sea level, a helicopter with good “hot and high” performance was one of the central requirements. In the cockpit, the instrument panel has been minimized to include only the essential instrumentation and navigation systems—a configuration that better suits the trainee Afghan pilots.

While the training could not be compared to the intensity at which U.S. Army aircrew are trained at Fort Rucker, Ala., Bouma considers that the Afghan pilots would require around 15-20 hours on the MD530F to show real progress. “With our assistance we can help the Afghans build a program that they can take sole ownership of in

just a few years,” he said.

The helicopter is powered by a 650 shp Allison 250-C30 engine and its high altitude capability is largely due to the fact that its main-rotor blades are six inches longer than those on the MD500E. The tailboom is extended eight inches and the tail rotor blades are longer to contribute more thrust and directional control at altitude. This performance is likely to be a factor in MD Helicopters’ other FMS sales of the MD530F to the Saudi National Guard and the Jordanian armed forces who have placed orders for 12 and six helicopters, respectively.

Matt Swisher, director of military programs for MD, said that hot and high performance was what clinched the deal with the U.S. Army. U.S. Special Forces already operates a similar type of

U.S. Army instructors Chief Warrant Officer 3 Randall Jaynes (left) and Lt. Col. Jeffrey Bouma (right) from the Army Security Assistance Training Management Organization, stand beside the first Afghan Air Force pilot candidates training on the MD530 at the Rotary Wing Flight Training program in Shindand.



aircraft. The 160th Special Operations Aviation Regiment (SOAR) currently use the AH-6 Little Bird, which was based on the MD500 series. The newest version of this, the MH-6M, is based on the MD530F.

By September 2012 the objective is to at least double the number of trainees to between 8-16 students per class. A course for Afghan maintainers will begin in January 2013 with MD contracted to train up to 15 nations per year.

MD Helicopters has 13 of its own people on the ground with the USASATMO team. Other than daily maintenance checks, there are also 100 and 300-hour checks on each aircraft. MD manages the maintenance and supply chain itself, outside of the U.S. Army supply chain. "We recently shipped an engine home for warranty repair," Swisher said, adding that the initial spares package was robust and the system is running well. Every two

weeks a bulk shipment of parts is sent out through civilian-operated DHL or FedEx services to Kandahar. Once there, it is loaded onto trucks and sent to Shindand. Swisher pointed out that this had been a manageable system, although it could be susceptible to a variety of influencing factors en route.

The annual operational availability rate for the MD530F fleet has been in excess of 90 percent and in early August the six aircraft had logged more than 1,300 flight hours between them. "They are flying around 30 hours per airframe per month," said Swisher, although he added the contract was designed to support the aircraft for up to 55 hours per month, allowing for the expansion of the training program.



MD Helicopters

Two flight training device simulators from Merlin Simulation were part of the package.

"This contract has firmly re-established MD Helicopter with the U.S. government and Army as a training aircraft of choice—there is not another in its class," said Swisher.

"This has been an incredibly rewarding experience," Bouma said following the graduation of four of the pilots at the end of June. They will now progress to a six-week Mi-17 conversion and advanced training course before becoming operational with the Afghan Air Force. 𐀀



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Col. Tony Potts with the PEO-Aviation flag.

# SURVIVING DVE: Q&A WITH TONY POTTS

**“We began to focus more on DVE as the major problem rather than just a CFIT issue. We think that if we can solve DVE, in most cases, we can solve CFIT as well.”**

*By Keith Brown*



U.S. Army Col. Anthony “Tony” Potts, project manager for Aviation Systems since April 2008, leads a diverse organization with four unique product offices, more than 40 product lines, and some 400 military, government civilians, and contractors with an annual budget exceeding \$753 million. *Rotor & Wing* had an opportunity to sit down with Col. Potts to discuss the Degraded Visual Environment (DVE) project, its positive impacts on the soldier and aviation systems, and the program’s path forward.

**Rotor & Wing:** You have a fairly large portfolio of programs within your Project Office. Will you briefly describe some of the programs under your purview and how DVE fits within this portfolio of products?

**Col. Potts:** We’re talking about 50 different product lines. We do horizontal integration across platforms for common systems; that’s our core competency. We generally specialize in communications and navigation and surveillance, which have a lot of similarities to what we’re doing with DVE. The other thing that we do across platforms is mission planning. You’ve got to make the link, in my mind, between mission planning and the degraded visual environment for the ultimate solution. If you take our core competency of horizontal integration across platforms, integration of complex systems in the platforms, and the work we’re already doing with mission planning, with some of the symbology sets, we see DVE as a compliment to some of our programs that we have in Aviation Systems.

**Rotor & Wing:** What are the operational conditions that led to the need for DVE capabilities?

**Col. Potts:** The operational conditions that have led to the interest in DVE are

combat operations in austere conditions in unimproved environments. The DVE Helicopter Survivability Task Force at OSD is looking at the number of accidents involving particularly rotor wing aircraft, which covers two realms—one is significant loss of life, and the other is significant loss of material. When you talk about Iraq, Afghanistan, Kuwait and some of the other theaters, you’re talking about theaters that generate a lot of dust, sand, and obscurants that have now basically degraded the pilot’s visual environment, his situational awareness, and his reference points to the ground upon landing. Add to that complex, multi-ship operations because of combat, and we’ve had numerous accidents where the pilot loses his visual reference while close to the ground, strikes a landing gear, and rolls the aircraft over resulting in catastrophic loss of the aircraft, and in some cases, catastrophic loss of life. So, the Army has really looked hard at this and said we’ve got to do something about providing a system where our pilots have the greatest advantage in these degraded visual environments.

**Rotor & Wing:** How did the Army and your team address the OSD study and what was the outcome?

**Col. Potts:** We received RMD700 that told us to conduct a study, so we went out and we put together a multi-functional working group. We put a lot of subject matter experts, including experienced pilots, and involved the Army Combat Readiness/Safety Center, and the Aviation Engineering Directorate, and added some program management folks and stakeholders from Fort Rucker. Together, we did an Army study of all of the accidents from 2002 to 2010.

A lot of the presumptive things that came down prior to the Army study boiled down to the assertion that we were having a lot of CFIT [controlled flight into terrain] accidents. The Army study found what we were really hav-

ing was a significant issue with DVE, and the reason that we made contact with the ground was due to our lack of situational awareness; we had lost our visual reference with the ground. That’s how and where we started. We began to focus more on DVE as the major problem rather than just a CFIT issue. We think that if we can solve DVE, in most cases, we can solve CFIT as well.

**Rotor & Wing:** Are there off-the-shelf technologies that could address DVE?

**Col. Potts:** What we’re finding is, holistically, the answer is no. DVE requires a multi-faceted solution to a problem that has no singular commercial off-the-shelf technology today. When you start flying tactical systems into tactical terrain, and when you add the fact that the enemy gets a vote, and that they can put up wire obstacles, dig trenches, and those types of things, there is really no commercial off-the-shelf technology that can put together a DVE solution at present.



An example of DVE in the battlefield.

**Rotor & Wing:** What makes up a DVE solution, and what conditions will it mitigate?

**Col. Potts:** Our DVE working group has said there are basically three legs to the DVE stool; one is symbology and cueing, the second is sensors and synthetic vision, and the third leg is flight handling qualities—having controls that better stabilize the aircraft. Most Apache guys will tell you that if you combine good flight controls with a



## Sierra Nevada HALS Improves Situational Awareness in DVE

Sierra Nevada Corporation has developed the Helicopter Autonomous Landing System (HALS)—a fully flight-tested DVE system (mentioned during the Col. Potts interview). The HALS system integrates a “see through” fast-scanning radar sensor, digital terrain elevation data (DTED), satellite imagery, image fusion backbone (digital backbone), advanced DVE landing symbology, and command guidance to significantly increase pilot situational awareness and allow safe helicopter operations in degraded visual conditions.

The HALS system’s multi-mode functions and capabilities were developed to specifically address mission requirements for takeoff, en route travel, approach and landing operations in DVE. These capabilities include real-time terrain mapping and obstacle detection, multi-ship simultaneous flight operations, and advanced landing guidance/symbology in near all-weather/battlefield obscured conditions (sand, dust, snow, fog, smoke, etc.) and in GPS-denied environments.

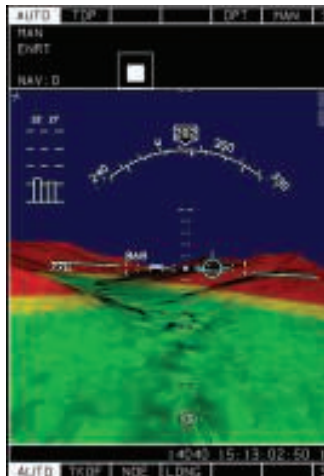
The current HALS system is rated at Technology Readiness Level 7, with a fourth generation system under development with U.S. Army funding. This effort will result in a more rugged, reduced size and weight, fully environmental and electromagnetic interference/electromagnetic compatibility (EMI/EMC)-tested system packaging, and delivery of multiple systems for Contiguous/Outside Contiguous United States (CONUS/OCONUS) operation.



Col. Potts during an exclusive interview with *Rotor & Wing* about DVE.

good set of symbology, you’ll mitigate most of the issues. Well, what if I land on something that I don’t know is there? That’s the piece in the middle where we think you need some type of active sensor that can penetrate the environmental obscurants. That’s why we think it’s a multi-faceted solution

HALS flight testing, showing an approach to a confined landing area. Display coloring and guidance overlays provide the pilot with all the information necessary to land in this confined area, even in degraded visual conditions.



that includes symbology, sensors and synthetic vision, and flight control that, collectively, we think will create the right DVE solution.

**Rotor & Wing:** On the sensor side, is there a detection technology that stands out and why?

**Col. Potts:** We’re looking at a 94 gigahertz millimeter radar. It’s really good at penetrating dust and obscurants. Given the fact that we have an Operational Needs Statement, and that we’re trying to get something into the field in about 22 months, and given the technology readiness levels of where we’re at, we believe that’s the most promising radar technology for penetrating dust and obscurants that we can use for a near-term DVE solution.

**Rotor & Wing:** Is there currently an approved requirement or need from the requirements community or Department of the Army?

**Col. Potts:** We have a validated CENCOM Operational Needs Statement, and that’s what we’re working the current program from. From a validated requirements perspective,

the Aircraft Survivability Initial Capabilities Document has been approved and it contains DVE.

**Rotor & Wing:** What is the acquisition strategy for DVE? Is there a program of record?

**Col. Potts:** No, we don't have a program of record. We are moving towards a Material Development Decision in the first quarter of FY13, and that will start the formal program of record. We're leveraging Sierra Nevada's 94 gigahertz millimeter radar technological investment—that was really the one system that gave us the opportunity to really make a near-term impact into the DVE issue. They've taken it from a 160-pound system and repackaged it to a 125-pound system. They have a road-map to get to about a 60-pound system. We want to leverage the lessons learned from the operational needs statement to help technologically inform us of the specifications for the program of record. What we want to do is technologically inform that program of record, and at the same time go forward with our operational needs statement focusing on a UH-60.

**Rotor & Wing:** How many systems will be acquired?

**Col. Potts:** For the program of record, we don't know today. For our limited user assessment and the ONS, the development integration work is being done by Sierra Nevada. We'll buy five systems, of which three will be installed on aircraft. A lot of the test work is going to be done by AATD. RTC is going to do some of the EMI and EMV work on the system. In the end, we still have to evaluate the value of the system as it comes out. After the first five, our plan is to have an option to procure additional systems, if required.

**Rotor & Wing:** What's the end state of the Limited User Assessment and how will the outcome influence future work?

**Col. Potts:** The end state, obviously, is

we're going to go out and do a limited user assessment. We're going to have the option to procure additional systems, and we will have a government owned design with a limited AWR for a specific aircraft, in the event that the Army desires to procure more. The other piece is to technologically inform the program of record. Two of the big things we really want is [first] to use this to push the advancement of DVE technologies across all of our OEMs and vendors who are interested and putting money into it. We also want to come out with a limited user assessment from an independent test agency. That will tell us the good and the bad so we can turn around and put that information into our program of record, and into our specification, so that it technologically informs us as to the best path we need to be on based on the maturity of technologies that are available to us.

**Rotor & Wing:** Are there common DVE requirements within DoD or the Army?

**Col. Potts:** There are, but different mission profiles dictate potentially different solutions. Obviously, our special operations forces would love a multi-role radar that shows changes in the environment from rehearsal to mission execution. The Navy, obviously, with maritime requirements, has somewhat different mission profiles with limited similarities to ours. All services are looking at some type of requirement for degraded visual environment, but the similarities are few because they are based on differing mission profiles. However, even with the differences in mission profiles between and within the services that may drive us to different solutions, there are important technical similarities. That's why we're working with each other, and we're leveraging our resources and investment dollars to make sure there is a coherent strategy from the S&T funding, all the way through procurement. 🚁



UH-60M display with Rockwell Collins synthetic vision system (SVS).

## Synthetic Vision

Rockwell Collins is also participating in this market and began the development and testing of synthetic vision system (SVS) in the late 1990s. Early development programs with U.S. Air Force Research Laboratories (AFRL) and NASA demonstrated the value of improved situational awareness for tactical, low-level flight in degraded visual environments. Rockwell Collins has leveraged the civil certified Pro Line Fusion SVS to create a synthetic vision capability for tactical helicopters. Providing high-resolution, 3D "virtual VFR" imagery with vertical obstacle overlays and brownout sensor fusion capabilities, Rockwell Collins SVS capability will improve flight situational awareness and reduce pilot workload for today's tactical rotary wing operations.



# ROBINSON PILOT ESSENTIAL FOR

*Rotor & Wing* safety columnist visits  
Robinson plant for a first-hand look  
at the facilities in Torrance, Calif.

By Keith Cianfrani

**A**s mentioned in my August column, "Safety Goes Hand in Glove with Mission" (page 52), I had the opportunity to attend the Robinson Helicopter Corp. Pilot Safety Course and fly the R22 and R66 at the end of the program. The course is four to five days long including the aircraft flights. I was assigned the task of taking the course and evaluating it from a safety perspective. Since I have never flown a Robinson product before this trip, I was not sure what to expect. Hopefully, my prejudices over the years flying larger aircraft such as Sikorsky UH-60 Black Hawks and S-76 helicopters would not interfere with my opinion of the R66 and the safety course.

There were approximately 55 students attending the course including many new flight instructors, a contingency of pilots from Mexico (including a Mexican Government aviation certification official), a father and daughter from Massachusetts (the daughter was on her way to the Air

Force Academy), several mechanics with pilot ratings and private pilots who paid their own way (approximately \$500) while looking to learn more about the aircraft and the aviation industry. The youngest attendee was a 19-year-old flight student. Many students were veterans and who took advantage of the post-9/11 GI bill to receive flight training. There were also students from several other foreign countries such as Sweden, Switzerland and Japan.

The doors opened early (7:30 a.m.) with course administrator Mallory Kohler graciously conducting registration and processing. We picked up our books and

headed into the classroom, where introduction started promptly at 8 a.m.

## The Course

The course began with an introduction by Kurt Robinson, president and CEO of Robinson Helicopters and son of company founder Frank Robinson. Kurt welcomed us all to the course and explained why it's important to enhance pilot safety awareness through education and training. He also spoke about why aviation is a dangerous profession and if we don't adhere to the guidelines of the aircraft and other aviation requirements,

# SAFETY TRAINING: REDUCING RISKS

R66 flanks a lineup of Robinson helicopters at the company's headquarters in Torrance, Calif.

making mistakes can be catastrophic with loss of life. This course also serves to renew current CFI certificates and attendees must present their completion certificate to their local FAA representative within 90 days of certificate expiration for renewal. The Robinson Safety Course began in 1983 and was the first FAA-approved helicopter flight instructor refresher course.

The actual instruction began with Tim Tucker, the course manager, who is a former Army pilot with more than 20,000 hours, mostly in Robinson products. Tucker has been working at Robinson

since 1983 and actually took delivery of the first production R22, serial number 003. Bob Muse, another longtime Robinson pilot and the course safety officer, assists Tucker. Mallory coordinates the class schedule, student registration and ensures everything runs smoothly. Tucker also takes the course on the road and has taught it in such places as Russia, Guatemala, Australia, Sweden, Stockholm, New Zealand and Ecuador.

The first day of ground instruction began with a review of aircraft accidents and the tracking of these accidents to review their causes. The instructors

looked at why accidents occur in aviation, including: overconfidence with high-time pilots, student pilots soloing too early, flaring too late, hovering too low (Robinson recommends a five-foot hover), and finally, pilots flying aircraft that should not be (helicopters are not for everyone).

Tucker informed us of the origins of Robinson Helicopters and Frank Robinson's vision of a small, inexpensive helicopter available to the general public and flight training organizations. Frank Robinson is obsessed with weight factors in the aircraft and constantly looks for ways to reduce it.

RHC  
EMPLOYEE  
ONLY  
BEYOND  
THIS  
POINT





Kurt Robinson and the R66.

We then discussed how reviewing and analyzing these accidents helps Robinson develop this course to help pilots with their decision making skills when it comes to flying Robinson products. Prior to the establishment of this safety course the fatal accident statistics in the R22 were approximately:

Student Solo	36%
Dual Instruction	21%
Weather-related	14%
Fuel Exhaustion	14%
Ferry Flights	14%

These accident statistics drastically decreased for the Robinson products after the introduction of the pilot safety course. This represents the true value of the course.

Human error/pilot error causes most (60-80 percent) of these accidents. This includes lack of experience, lack of safety training, poor judgment and poor decision-making, night and bad weather operations, non-instrument rated pilots flying in instrument conditions, newness to the aircraft and non-professional pilots. In my opinion, as a matter of definition, Robinson re-defined the helicopter market by making their product affordable to many aviation enthusiasts. I investigated many accidents in civilian aviation and unfortunately, many aircraft owners have more money than good sense.

Although I had a personal tour of the facility and production operations, our first day also included a tour of the factory. This is important to me, as I always look for examples of safety integration in production operations. Of course, we were given safety glasses along with a safety brief prior to the tour. This tour served to indicate to me that Safety Risk Management (SRM) is alive and well on the factory floor. The buildings were

extremely clean, clutter-free and well-organized.

On the second day, our class separated into two groups—one with pilots qualified in the R22/R44 and the other in the R66. I went with the R66 group. Tim began with a review and discussion of the circumstances surrounding the first flight of the R66 in August 2008 by Chief Test Pilot Doug Tompkins. The R66 received its type certificate on Oct. 25, 2010. Robinson updates changes to their manuals similar to the way the Army does. Then we reviewed the flight dynamics of the R66 and the aspects of autorotation and discussed aircraft dynamics at low airspeeds and low altitude. We also studied the high-velocity charts. It's essential for pilots to review and know this.

On day three, we examined the major components of the R66 with Pat Cooke, chief maintenance technician for Robinson. Cooke has worked for RHC for many years and is knowledgeable with the company's products. He's also a pilot. The R66 has less maintenance requirements with the Rolls-Royce RR300 turbine engine than the R22 or R44. The main rotor system was made simpler, and lighter. The R66 is a result of engineering with information gained from previous accidents and incidents. The turbine engine is angled 37 degrees in the rear to allow for a rear storage compartment and a little more headroom. Some of the attendees flew after the classroom instruction. The rest of the pilots flew the next day. I went up with Tucker in the afternoon. After a pre-flight and a few traffic patterns, we departed the airport and headed for the Long Beach area.

Finally, on day four, the instructors conducted a review followed by an end of course test. Following the test, we once again met with the instructor pilots to prepare for our flights. Tucker made arrangements for me to fly the R22 so I could compare the two aircraft.

## The Aircraft

This was my first time flying a Robinson product. The R66 was easy to start while monitoring the N1 and tempera-

ture gauges. Although I've never flown an aircraft with the famous Robinson "T" handle cyclic, and was not sure I would like it, I found it very easy to get used to. By the way, the reason Frank Robinson developed the "T" handle cyclic was primarily to increase lateral cyclic control (almost 11 inches), although it does make it easier to enter and exit the aircraft.

Sitting in and flying the R22 was a little tight, but the R66 was a real pleasure to fly. It was similar to flying a Jet Ranger. It performed well even during touch-down autorotations. The R66 cabin is noticeably wider than the R44 and interior width of the cabin increased by almost 8 inches, giving passengers more shoulder room up front and a third forward facing seat in the back. The hydraulically boosted cyclic collective will make you feel like you're flying in a larger aircraft. The control offered excellent feedback and response to commands.

## Organization

Robinson employs more than 1,300 people. This includes five production pilots and two safety course pilots. They also employ pilots in administrative positions such as Monica Reich and Pat Cook who fly ferry flights on as needed basis. Robinson recruits other qualified instructors in the Torrance area to fly with the additional pilots in the course.

The manufacturer delivers approximately 11 to 12 aircraft a week. They produce approximately six R66s, four R44s and two R22s per week. Robinson crossed the 10,000-helicopter delivery mark in November 2011. While attend-







Class photo of recent graduates of Robinson's pilot training course in Torrance.

ing the course, I talked to several operators who took delivery of their aircraft and went through the pre-delivery tasks. One was located in Canada and he took delivery of his 40th Robinson helicopter.

When an operator purchases a Robinson Helicopter they must meet strict ferry requirements prior to release of the aircraft. These requirements are an excellent way to ensure pilots are qualified and current prior to accepting an aircraft for flight.

As for the operations, I was very pleased to observe an organization that "lives the safety culture" and does what it takes to ensure a safe working environment. Robinson cares about safety, and recognizes employees for longevity including a helicopter flight at the five and 10-year anniversary of employment. From what the employees told me, working at Robinson is like working for family.

On the last day, I sat down with Kurt Robinson and discussed my findings and opinions. I expressed that I was glad to see a positive safety climate involving his employees. They feel that they have "ownership" in the company and that what they do, contributes to its success. I expressed that the company practices the Army's "Leader Server Concept" where the leaders serve their subordinates and resources them for success, thus making them and the organization successful.

## Final Thoughts

Robinson practices good safety risk management, which is a fundamental part of a Safety Management System (SMS). By doing this, they help prevent personal injury, ensure a safe working environment, sustain public confidence, and help prevent property and environment damage. The Pilot Safety Course is a good example of safety risk

management. This enables the company to sustain profitability.

My overall opinion of the course and Robinson Helicopter was very favorable. The course was conducted professionally and is well organized. The instructors

are knowledgeable and experienced in aviation and Robinson products. The course reminded me of other safety courses I've attended throughout my career with the Army. I learned more than I expected. The overall positive safety attitude of RHC was also impressive. It's very refreshing to see that SMS is alive and well in a production helicopter company. 🇺🇸

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# MANNED OR

## Optionally piloted Kaman/ Lockheed Martin K-Max serves U.S. Marine Corps in cargo role in Afghanistan.

*By Ernie Stephens, Editor-at-Large*

Kaman Aerospace



**T**hanks to the digital age, remotely piloted aircraft barely rate the raising an eyebrow, unless you're on the battlefield and one is about to save the day for you. They have names like Predator, Fire Scout and Global Hawk. And who knows how many are still "black projects" that only a select few people in the military are

aware of? But one unmanned aerial vehicle (UAV) that I've been casually following or several years now has been hard at work in-theater on the other side of the world since November 2011. It is the K-Max unmanned aerial truck (UAT).

I need to stop and clear something up already. The K-Max UAT—a joint venture of Bloomfield, Conn.-based

Kaman Aerospace, and Bethesda, Md.-based Lockheed Martin—isn't always unmanned. Technically, it's an "optionally manned aircraft."

Unlike most other military aircraft that can either fly exclusively with a pilot onboard handling the controls, or exclusively without one, the UAT is the first operational, publicly acknowledged rotorcraft that can switch back

# UNMANNED?

## HOW ABOUT BOTH?

The U.S. Marine Corps has employed the unmanned K-Max in the cargo resupply role in Afghanistan since November 2011.



and forth from manned to unmanned an unlimited number of times, and do so in a shocking 15 seconds or less.

I went up to Connecticut to get more information from the people at Kaman, who designed and built the single-seat, single-engine K-Max. There I met Terry Fogarty, general manager of the Unmanned Aerial Systems group, and Mike Bielefield, program manager

for the K-Max UAT. Both have been with the company for decades.

Founded by aerospace engineer and inventor Charles Kaman (1919-2011), Kaman Aerospace and its 2,300 employees design and turn out components for nearly every make and model of aircraft flying today, listing Airbus, Bell, Boeing and Sikorsky as major customers. Besides the K-Max, Kaman

builds and supports the SH-2G Super Seasprite, a highly capable, twin-engine maritime helicopter in service with several foreign navies.

“The K-Max was certified in 1994,” noted Fogarty of the aircraft that quickly became the helicopter of choice for forestry, construction, and other long-line applications. “Since then they’ve flown 280,000 flight hours.”



With a basic empty weight of 5,500 lbs. and low direct operating costs, the K-Max impressed its operators with its ability to carry a 6,000-lb. load under its belly, and take 4,000 lbs. to altitudes of 12,000 feet. Its strength is a product of its intermeshing rotor system, which counteracts torque without wasting power on lateral thrust, the way a conventional tail rotor-equipped helicopter does. Those strengths made the K-Max a likely candidate to fill the U.S. Marine Corps need for a battlefield resupply transporter in the Middle East. And with so many of its personnel being killed and wounded along convoy routes in Afghanistan, a relatively small and low-cost helicopter with great lifting capabilities could not arrive soon enough.

But why not take the capabilities of the K-Max and ramp it up one more notch by taking the pilot out of harm's way, too?

Decades before his death, Charles Kaman had envisioned a full-size,

Optionally manned Kaman/Lockheed Martin K-Max in Afghanistan.

remotely operated helicopter, and shared that idea with his engineers, some of whom are still with the company. That idea was revived in 2007 when work began on the K-Max UAT.

Unfortunately, a late-1990s drop in new orders had caused Kaman to temporarily close down the K-Max assembly line, making it impractical to build just a handful of the model for battlefield development. Luck, however, was on the engineers' side.

Congress had given five K-Maxes to Colombia. But after years of under-utilization there, the aircraft went up for sale on the open market. Kaman bought three of them back, and went to work with Lockheed on repurposing them as unmanned platforms.

"The folks at Lockheed are great to work with," said Fogarty. "We have learned some things from them, and they have learned some things from us."

According to Fogarty, as development continued, the engineers found a need to keep the pilot onboard to help monitor the aircraft's performance, and to satisfy the FAA, which was still skeptical about any unmanned aircraft flying in U.S. airspace. With having to keep a person in the cockpit, even when the vehicle was being remotely piloted, engineers realized that they had, in effect, designed an optionally piloted aircraft.

That partnership resulted in the K-Max UAT prototype, which led to a \$45.8-million contract awarded by the U.S. Naval Air Systems Command in 2010 for an unmanned, forward deployable, resupply aircraft.

"The [K-Max UAT] was specifically designed for the battlefield cargo resupply mission," said Dan Spoor, Lockheed Martin Aviation Systems vice president by way of a joint press release. Its capabilities "directly answer the Marine Corps' requirement to augment ground and air logistics operations, supplement rotary-wing assets, and keep warfighters supplied and out of harm's way."

The contract included delivering a pair of K-Max UATs to the Marines

for their assessment by the summer of 2011, which the team did on time and on budget. And after several successful test phases, both were deployed to Afghanistan.

After two deployment extensions, 485 sorties, 525 flight hours and 1.6 million lbs. of cargo delivered, Vice Adm. David Achitzel, commander of U.S. Naval Systems, declared that the K-Max "...eliminates the need for manned ground convoys, reducing the number of our warfighters exposed to improvised explosive devices."

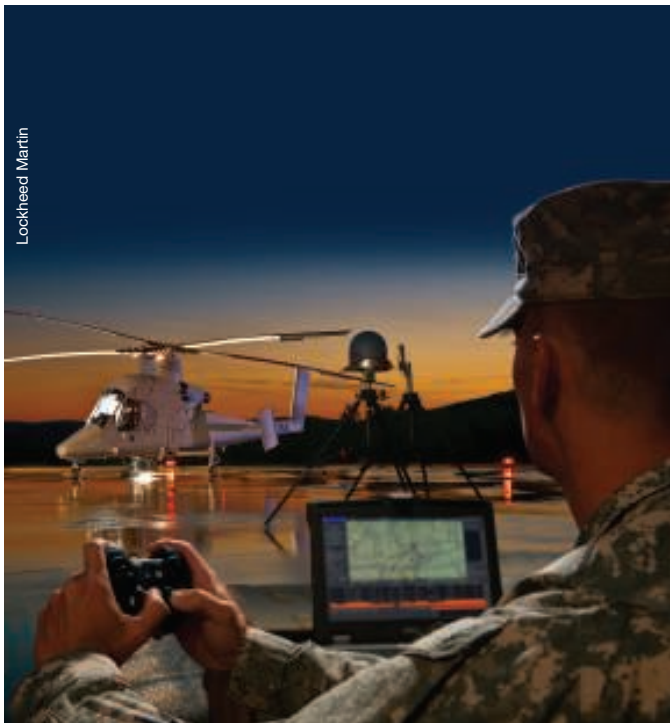
The mechanics of being able to fly a full-size aircraft remotely, yet make it easy to switch back into a conventionally piloted vehicle, was something I wanted to see firsthand. So, Fogarty took me to the other side of the complex for an on-site look at the UAT.

Contrary to the way it looks in the air, the K-Max is a relatively big helicopter, considering its single-seat design. It measures 13 feet, 7 inches tall, and about 52 feet from the forward-most blade tip to the tail fin.

Fogarty and Bielefeld were happy to let me poke around most of the aircraft, but for security reasons they would not let me photograph it. I can tell you, though, that if you didn't already know the aircraft could be remotely piloted, nothing in it would have immediately tipped you off. The actuators that move the flight controls while in remote mode are mounted out of sight, and are engaged by a single, unremarkable-looking switch inside of the cockpit.

Speaking of that switch, which I was asked to not describe, it is the reason the aircraft can be converted from manned to unmanned so quickly. Basically, a pilot climbs aboard the K-Max, completes a number of pre-flight checks, then lights off the 1,800-shp Honeywell T53-17A-1 gas turbine engine. If he will be remaining on board to fly it, he will place the switch in the manned position. If it will be remotely piloted, he will put the switch in the unmanned position, climb out, and walk away. Consequently, the amount of time it takes to convert the K-Max





Lockheed Martin

U.S. Marine Corps controls for the unmanned Kaman/Lockheed Martin K-Max UAT.

UAT from manned to unmanned is based entirely upon how long it takes someone to manipulate one switch and get out of the aircraft.

Of course, the other part of any unmanned system is the communications link. Lockheed Martin handled much of those issues, but input on how to design the remote station was a joint effort between all involved, including the end users.

“The Marines said way back in the beginning, ‘We want something the guys will be comfortable with,’” reported Bielefield. “So, we bought PS2 [video game] controllers, and reprogrammed them!”

But the design teams went one step further in their quest to make the system user-friendly for the young, front-line Marine. Instead of programming the controls to mimic a collective, cyclic and anti-torque pedals, they set the controls to follow an overall instruction. For example, let’s say you wanted to climb a few hundred feet. To make the aircraft go up, push the “up” control. The helicopter will understand

what you want to do, and make the proper power, collective and cyclic inputs needed to make that happen. In fact, takeoffs, landings and hovers are handled by the press of a button.

With no real-world rotorcraft flying skills needed to master the UAT, Bielefield boasts that anyone—regardless of aviation background—can be taught to fly the K-Max remotely. He has personally seen support personnel become quite proficient with the controls in just two weeks.

The other part of the control rests with the computers and base stations. Once mission commanders have decided what routes the UAT should fly, Bielefield says it takes about 20-30 minutes to program those instructions into the computer. Once done, the controller at the primary base will press the takeoff button, engage the flight director, and monitor the aircraft’s progress using a map overlay on a laptop computer. Upon its arrival at each destination, another Marine with a smaller, more local

line-of-site control station will fly the UAT to the exact touchdown point, even if it means selecting a different landing spot.

Dealing with multiple deliveries was engineered into the system, too. A four-hook carousel can replace the single-hook configuration on the K-Max. The flight can then be programmed for the release of the ammunition attached to hook #1 at Alpha Base, the rations on hooks #2 and #3 at Bravo Base, and the medical supplies slung to hook #3 at a field hospital.

And because things in a combat zone can change rapidly, the UAT can be told to halt and hover while new instructions are laid in.

Another thing engineers wanted to design in was a way to deal with a loss of communication between the ground and the aircraft. The software experts took care of that by allowing the UAT to be programmed with radio failure instructions. If it loses its signal, it might be under orders to continue with some or all of its mission, or know that it should immediately land itself back at its home base.

There was one last item the people on the Kaman-Lockheed Martin team had to plan for: an engine failure. Sophisticated sensors were placed aboard the aircraft to detect catastrophic engine failures. Should one occur, the aircraft will automatically enter an autorotation and put itself on the ground. It won’t have the ability to pick and chose a flat surface over an inclined one, though. It will simply land wherever it ends up.

In all fairness to other manufacturers—including those with UAVs on the drawing board, undergoing flight testing, or buried under a cloak of government secrecy—their systems may be equally as capable as the one designed by the people at Kaman Aerospace and Lockheed Martin. But for now, the K-Max UAT, with its innovations and in-theater performance, has amassed a decent reputation with the Marines, and is doing for them what no other platform has done thus far. 🚁

# Public Service

By Lee Benson



## Pilot or Systems Engineer?

**T**he Pilot's Bill of Rights Act, authored by Rep. Samuel Graves (R-Mo.) with a concurring bill offered by Sen. James Inhofe (R-Okla.), has passed both the House and Senate and is awaiting President Obama's signature. Now as long as the politicians that advise the president don't identify 10 stray cats as a constituency that will support him if he vetoes the bill, it should be signed shortly. If that sounded political, opinionated and frustrated, you are quite perceptive. The support of the Helicopter Association International for this bill had drawn my attention and I supported its passage in the May issue of *Rotor & Wing* (see "System Mindset," page 50).

In an attempt to remain relevant to our foreign readers—seems fair, you pay for your subscriptions too—I would suggest a read of U.S. House Bill 3816 to my pilot peers in other countries. It's not a law that requires new funding or people to manage it. The bill only requires transparency and efficiency from the U.S. FAA, translating into greater fairness for the regulated from the regulators. In today's world, that seems like a very good thing.

I sometimes reflect on what it was like to fly helicopters in the 1970s: my fellow Vietnam veterans and I were leaving the U.S. military in droves, jobs where hard to find, but the persistent among us succeeded in the effort. The norm in the helicopter business was long, hard hours and

poor pay. But man did we have fun, what an adventure—you never knew what tomorrow would bring. From 1974 until 1981, I averaged 900 helicopter flight hours per year. One day I was landing on a destroyer, 100 miles offshore, supporting a weapon system test for the Navy, and two days later I was in Utah landing on a 10,000-foot mountain. No, we didn't have all the safety programs and rules and regulations that we have today. At that time you had a chief pilot, whose word was law. The chief pilots I worked for were excellent pilots and if you had a question, you knew you could ask without fear of recrimination. Furthermore, bad decision-making on your part was a quick trip to the unemployment line. The number of helicopter operators was small and they all knew each other, your history as a pilot was a phone call away. Today we have safety programs as far as the eye can see. Modern hiring and termination laws make the process much harder to base on the fact that a pilot is good, or not so. The documentation required to fire someone is exhaustive.

I wonder how many accidents would have been avoided by three words, "YOU ARE FIRED." How many chief pilots have said post-accident: "I was building a folder of documents to take to the human resources department but this happened before I could act." I know I have heard those words.

The other thing we have today is technology, in the cockpit and on the

aircraft that we could only see on *Star Trek* in 1970. Acronyms that go on for days—GPS, GPWS, TCAS, EFIS, the list goes on. Systems like next power parameter exceedance gauges, four-axis autopilots, fly by wire . . . you get the drift. My thought is which system produced the better pilots? The safety and technical systems today are far superior to what was available in the past.

My question is: Has all this modernization created an environment where pilots can become an accomplished pilot or does it lead to a good systems engineer?

I know you're wondering where all this came from, "even Lee is not that deep into the old man and the sea thing." I guess it started at HAI with an engineer that was trying to convince me that touchscreens are the next big thing in helicopter controls. I endeavored to express the frustrations of the touchscreen on my Android cell phone and the shortfalls that this technology would present in a helicopter and how inappropriate it is to think about hitting a helicopter with a hammer. Then I thought, doesn't he get the fact that the controls in a helicopter need to be positive in action and the best controls should let you feel their position without diverting the pilot's attention to look down and see the status? Then I realized I was talking to a systems engineer. I'm going to go study my old Hiller 12E flight manual now. 🛩️



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# Law Enforcement Notebook

By Ernie Stephens



## Where Are You, PIO?

A couple of years ago, I was asked by one of *Rotor & Wing's* sister publications to write an article on how aircraft are painted. So, I called a relatively small outfit with a fine reputation for such work to see if they wanted to be featured in it. To make a long story short, I left two messages with a live employee, plus one on their answering machine, before finally talking to the owner. After explaining that I wanted to build the entire article around his business, which amounts to four pages of free, global advertising, his reply was one of pure disinterest. "Well, uh, I'll call you back," he mumbled. But he didn't. The next call was to the people at a much larger company. They immediately jumped at the chance to show off their aircraft painting facility.

It perplexed me why such a little outfit with very little (if any) money for advertising in a major aviation magazine would ignore such an opportunity, while a large company with enough cash to buy all of the ad space it wants couldn't get me to their plant fast enough.

Now, enter police departments that have aviation units.

Make no mistake about it, when I call the hangars of law enforcement agencies asking them if I can write something up about them, I always get an enthusiastic response from the men and women who take helicopters into the sky, as well as the people who turn wrenches on them. But, like most everything in a public service organization, people higher than line personnel have to give their approval before a cop-turned-writer can talk to anyone. And while I'm perfectly fine with that, it's during those requests for approval that the wheels tend to fall

off. Law enforcement agencies, both big and small, seem very ho-hum when it comes to free, positive press about the fine work their helicopter unit does.

Case in point: As I was looking for a police department to feature in the July 2012 issue, it occurred to me that a certain agency, which shall remain nameless, would make a great subject for a cover story. And as far as law enforcement readership goes, that issue is seen by more winged officers than any other, because it's the one we also hand out at the Airborne Law Enforcement Association convention each year.

So, I phoned that department's hangar, got the usual enthusiastic response from the rank-in-file, and followed their instructions for requesting approval from their press information officer (PIO). For the next several weeks, I got nothing—not even a "We have your request and will get back to you."

With time running out, I called another operation. Once again, the folks at the hangar were quite eager to be spotlighted, but I also got weeks of dead silence from their PIO. (Truth be told, this happens more times than not, regardless of the size of the agency.)

With time pretty much gone, I phoned the office of Chief Teresa Chambers of the United States Park Police. She was in a meeting, but I was asked to shoot her an e-mail with my request, which I did. Less than 45 minutes later, I found a reply from Chambers herself. The first lines read, "Ernie: Yes, of course, PLEASE pursue this story. Our guys have SO many compelling stories to tell..." It was followed by her own list of some of the things they have done, as well as a "cc" line showing she had simultaneously repeated her blessing all

the way down the chain of command to the hangar level. Five days later the story was done, complete with archival video footage of a recent rescue, which you can see on our web page at [www.rotorandwing.com](http://www.rotorandwing.com).

Now, in all fairness, the PIOs of the first two agencies finally ended up giving me approval to write about their aviation sections. But unfortunately for those two outfits, copies with the USPP on the cover were already being printed. And as Chambers had said, their adventures were excellent!

So, my question is a simple one: In a world where public service budgets are being cut, and people are questioning the bang for the buck they get from police aviation, why does it take so long for those people who sit between the crews and the chief to see the value in a feel-good article about an element of their own department? It amounts to free advertising, as well as a public "atta boy" for jobs well done!

Chambers apparently gets the worth of positive press, and how it might someday serve as documentation that her aviation assets truly earn their keep, even at a time when public funding can be a bit thin. But I'm also betting she knows how morale went through the ceiling at the hangar when they saw how eager she was to have *Rotor & Wing* shine a light on their fine work.

By the way, there are some other agencies out there that respond to article requests quickly, even without starting at the top. And to them I say thanks! To the people I spoke with at those two agencies back in April and May, I know it wasn't you who let the clock run out. And to them and everyone else, I won't give up on trying to tell your stories. 🚁

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# Offshore Notebook

By Pat Gray

## Fighter Intercepts Along the ADIZ

Long before TFRs became so commonplace, those of us who made our living flying in the Gulf of Mexico had, and still have, a flight restriction called the Air Defense Identification Zone (ADIZ). The responsibility for, and response to protecting American real estate from any form of flying mayhem aimed at harming our homeland, rests with the assets of the North American Aerospace Defense Command (NORAD). The 601st Air and Space Operations Center (AOC) at Tyndall Air Force Base in Florida is a huge part of this umbrella. The AOC commander, Col. Randy Spear, states that the 601st is also a major part of the Domestic Event Network (DEN) comprised of the FAA, DoD, Secret Service, TSA and some others. This is a very large communications network that covers the entire U.S. and allows almost instant communication between the various agencies. If you are a helicopter pilot it is not good to become a topic of conversation within that net.

The Airman's Information Manual, along with some other documents, gives very clear and definitive procedures for ADIZ penetration for inbound flights. Voice communication and transponder equipment are the two "must have" basics for flying in, around or through the ADIZ. Seems simple enough. Just make sure to file a flight plan when inbound to the U.S. and provide appropriate information on routes, tail number, time of penetration, altitudes and so on.

Now let's make it more complicated. Place 500-plus helicopters in the north side of the Gulf of Mexico on any given day. Most of them are VFR flights without FAA flight plans. (There is a small percentage that are IFR and those do

have a flight plan.) Let's suppose half of them will be going in and out of the ADIZ multiple times in a day. One helicopter could make as many as 15 penetrations a day. The need is there because a large number of the oil rigs are outside of the ADIZ. It's easy to imagine the confusion and delays that would be involved if all 250 or so helicopters had to file a flight plan for each inbound flight.

So, how is it handled? FAA issues a discreet transponder code for each individual commercial operator flying in the gulf and waives the need for an FAA flight plan. No problem, almost all of the helicopters are on a company flight plan and are flight followed by their company. These codes are proprietary for each company and once activated, they identify the aircraft as belonging to that company. The codes are frequently changed to prevent being compromised.

There is always the potential for a problem to arise using the system. When the helicopter leaves its base in the morning, the pilot is required to squawk a VFR 1200 code and usually when crossing the beach outbound, he/she will switch to the discreet code for his company and keep it on for the duration that he is over water, even if there's no requirement to go through the ADIZ. The problem arises when the pilot forgets to change to the discreet code and continues outbound and through the ADIZ or, after landing at an intermediate stop, fails to turn the transponder on, enters a wrong code or in rare instances, has an avionics failure. To my knowledge, there are no bells and whistles to remind the pilot to switch codes. When he drops the passengers and returns, penetrating the ADIZ inbound, the helicopter becomes an unidentified target. This violation



now becomes the concern of the 601st AOC. The helicopter is now lighting up radars from Corpus Christi to Miami. Because of the slow airspeed and proximity to the oil fields, efforts will be made by the military and the FAA—via telephone—to identify the pilot. There are no assumptions. Usually they resolve the mystery and can identify the commercial operator the helicopter belongs to and that company's dispatchers will take care of the problem.

Year in and year out there is always a percentage that do not get identified through whatever means, therefore NORAD is forced to launch interceptors, either F-16 or F-15 fighter jets. These Air Force jets, normally in pairs, will rendezvous with the errant helicopter, record the tail number and company and return to base, write up an action report and send it up through channels. Of course the bad actors (drug smugglers, etc.) would be handled differently.

Over the past four years there have been more than 40 scrambles for oil field helicopters. There can be several stages of actions related to a scramble some of which will not necessarily result in a flight. It can be exciting for a slow-mover to find a pair of Mach 2 fighters flying in formation with him. In the interests of safety, I remember years ago, during a helicopter meeting with the NORAD pilots, someone asked if it would be possible for the fighters to escort the helicopters using 500 feet per minute climbs and descents. When the dead silence was broken, the fighter pilot replied: "Sir, we do not do anything at 500 feet per minute." Keep your transponders on and the discreet code active! 🇺🇸

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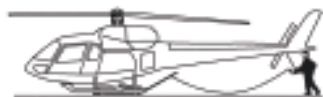
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# Coming Up

in rotor & wing

## October 2012:

**Operator Profile: Metro Aviation**—Editor-at-Large Ernie Stephens travels to Shreveport, La. to get an inside look at the operations of Metro Aviation. The EMS operator and completions provider operates a fleet of 82 helicopters—80 of which are Eurocopter variants—as well as eight fixed-wing aircraft in support of air medical units around the United States.

**Protecting the Olympic Games**—After the spectacularly uneventful London games, Andrew Drwiega reports on the success of the helicopter units and fleets involved and the various roles and missions that were assigned to each.

**Australian Helicopter Association**—Four years after the collapse of the Helicopter Association of Australasia, a new body, the Australian Helicopter Industry Association, is being formed to represent the booming sector. Its formation couldn't come at a better time as the local industry experiences rapid growth at the same time as it grapples with

skill shortages and regulatory issues which threaten its future prosperity and its ability to benefit from opportunities in the Asia-Pacific region.

**Eurocopter EC175**—Military Editor Andrew Drwiega travels to Marignane, France to get a first-hand look at the EC175. Included is an update on the EC225 and the UK's SAR-H program.

**UTair Training Center**—Located in Tyumen, Russia, one of the most important industrial and economic centers east of the Urals and a vast oil-rich region stretching from the Kazakh border to the Arctic, UTair Training Center is recognized for its commitment to safety and excellence. Elena Maldiva visited the facility to learn more about the company's training programs.

**Columns**—Military Insider by Andrew Drwiega; Leading Edge by Frank Lombardi; Safety Watch by Terry Terrell; and EMS Notebook.

**Bonus Distribution:** Oct. 22–24: AUSA Annual Meeting in Washington, D.C. Oct. 22–24: 2012 Air Medical Transport Conference in Seattle, Wash. Oct. 31–Nov.1: National Business Aviation Association (NBAA) 2012 in Orlando, Fla.

## November 2012:

**R&D Report: NACRA**—The Naval Aviation Center for Rotorcraft Advancement has now entered its second phase, or "NACRA 2.0," according to director Timothy Gowen, who says that the second phase will give NACRA a stronger entry into the area of technology development while strengthening ties with research scientists and engineers throughout the military and civil rotorcraft industry. Doug Nelms visited NACRA headquarters and provides an update on T-Rex, or *Testbed for Rapid Warfighter Response and Experimentation*.

**The Dubai Helishow**—Our team of writers will provide a preview of what to expect November 6th to 8th at this year's 5th edition of the Dubai Helishow—the only all-helicopter show hosted in the Mid-East region. Look for news and updates at [www.rotorandwing.com](http://www.rotorandwing.com) leading up to the event and visit [www.dubaihelishow.com](http://www.dubaihelishow.com) for more information. Don't miss our Dubai Show Day coverage at the show and Post-Show digital edition.

**Product Focus: Rotor Blades**—Military Editor Andrew Drwiega takes a look at all the latest developments in rotor blade technology.

**Engine Maintenance**—A helicopter's engine is its biggest component, and represents the single-largest recurring expense for most operators. Mark Robins provides a glimpse into the latest trends in engine maintenance and testing.

**The Evolving Marriage: In-Flight Data Monitoring and Flight Tracking Services**—As long as you have the pipeline between your base and your aircraft installed, what else can you do with it? We'll ask around and get back to you!

**Columns**—Public Service by Lee Benson; Military Insider by Andrew Drwiega; Law Enforcement Notebook by Ernie Stephens; and Around the World.

**Bonus Distribution:** Nov.6-8, Dubai Helishow 2012 in Dubai, UAE.

# Military Insider

By Andrew Drwiega

## Politicians Pander to the Past; Fail Future Needs

Politicians have allowed good old animosities and pointless diplomatic foot-stamping get in the way of good decision making that is in the long-term interest of the United States. As the Russian government continues its support of the collapsing leadership of Syria's President Bashar al Assad, and tries to supply new and/or repaired helicopters to its forces (the ship, the *Alaed* carrying them was turned back twice, in June then July), so the House of Representatives decided overwhelmingly by 407-5 votes in July to halt the \$171-million purchase of Russian-made Mi-17s for the Afghan Air Force. The completion deadline was Dec. 31, 2016.

The passing of the bill confirmed the "break contract" stance to halt the process of taking up further options for the purchase of another 10 Mi-17s from Russian state arms export company Rosobonexport. However, the folly of this act means that it this simply derails an ongoing process started in May 2011 with a \$367-million deal for delivery of 21 Mi-17V5s to the Afghan military. An additional two Mi-17s were bought for spares this summer at a cost of \$46 million.

The architect of this counter-productive bill, Senator John Cornyn, pointed out: "There has never been a competition for supplying rotorcraft for the Afghan National Security Forces. Had there been one, I'm confi-

dent American firms would have done exceptionally well."

Last year however, the Chief of Staff of the Afghan Army Abdul Wahhab Wardak said that the choice of the Mi-17 supported a type better suited by way of simplicity to Afghan aircrew and technical staff, and through experience that it was more suited to conditions in Afghanistan.

Would any western helicopter manufacturer be interested in supplying, and more importantly supporting, a fleet of aircraft over time at a price



addition, U.S. Army personnel are instructing Afghan trainee pilots to be able to fly the Mi-17 when they gain their wings. The Mi-17 is the right aircraft for Afghanistan on many levels and, if being supported for any time by the American taxpayer, is the cheapest option in the long term by far. It is also the helicopter that the Afghans stand a chance of maintaining after American and other International Security Assistance Forces (ISAF) have taken their helicopters home when the drawdown is complete around 2015.

Make no mistake, air power and helicopter support, be it kinetic or logistical, has been a key factor in holding back the Taliban and al-Qaeda. The Afghan National Army will be hard pressed already to continue the counter-insurgency campaign without the high-tech, long reaching ISAF forces. If they can't operate and re-supply from the air, then all of the rural areas that have been so hard won with ISAF and Afghan lives will be quickly



Afghan soldiers boarding an Afghan Air Force Mi-17 during a training exercise in Herat Province.

that could compete with the Russian-made Mi-17s? The western trend has been to increase the sophistication of their systems—not build them to be the equivalent of the AK-47. Not only have the Afghan military operated Mi-17s since the 1980s, well before U.S. forces were in Afghanistan, but the process of supplying them with Mi-17 helicopters by the U.S. Army under the Non Standard Rotary Wing program is well under way. In

vulnerable once again. Road transport becomes vulnerable to Improvised Explosive Devices and other forms of attack; the task to keep these routes open becomes harder and an army barely trained to acceptable standards in most cases will see a crumbling of morale followed by defections. Then it doesn't take too much imagination for the collapse of central government which would leave us all back to the day before 9/11. ☠

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