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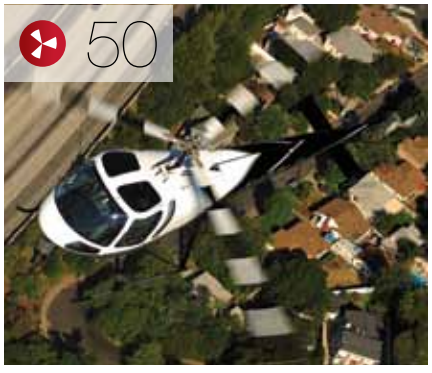

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Cover

A Sikorsky CH-53K at the company's Development Flight Test Center in West Palm Beach, Florida. The U.S. Marine Corps has ordered 200 of the aircraft to replace the CH-53E Super Stallion.
MIKE REYNO PHOTO

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COLUMN

FOCUS ON PROFESSIONALISM | **TONY KERN**

GOOD QUESTIONS

A few months ago I was reading a detective thriller about some cops trying to solve a crime in which someone had stolen two rare tigers, apparently in order to kill them and sell their body parts on the black market. In one particular scene, the detectives think they have their guy — a middle-aged, drug-addicted veterinarian, living in a small house on the outskirts of Minneapolis.

They approach the house stealthily in the dead of a cold winter night, slowly creeping up and ducking below the windows so they won't be seen. They don't expect the old druggie to put up much of a fight, and their mood is somewhat festive as they prepare to close the high-profile case. They joke about what they will say to the reporters at the press conference the next day.

As they prepare to make a forced entry, one of the men whispers, "*Hey, I wonder if those tigers are in there with him?"* The others stop cold and look at him, suddenly realizing they may not have conducted a full analysis of the situation. The lead detective sums up the new reality. "Well *that's* a question nobody's asked."

Cool line, and one that led me to thinking about the value of good questions, and even our ability to frame them.

To me, good questions are far more beneficial than good answers. Good questions stimulate the mind and potentially reset the situation. Good answers do just the opposite: they satisfy the intellect and usually reinforce the status quo. Good questions leave us wondering what might be. Good answers convince us we know what is going on.

Questions humble us. They attack our certainty. They keep us small, which is a very good thing in the risk-laden world of first responders. Good questions can destabilize us momentarily, opening the door to the vastness of things we do not yet know. They feed our curiosity and can help us develop the ability to deal with the abstract, a rare skill in today's *if-then*, plug-and-chug monotony of work and life.

Framing the right question is tough, so let me begin by suggesting one to ponder while developing a few of your own. It is simple, yet opens a host of insights we might want to think about, especially in the dynamic world of aviation. Here it is.

What if things are not as they seem?

Far too often, we assume things in life will remain stable and predictable. We believe that someone we have worked with or known for years will perform today like they did yesterday. Even worse, we believe the same of ourselves. Or perhaps we have operated in the same environment for so long, we think we have seen every variation of it, and lose respect for its ability to mutate into something dangerous.

This question is designed to challenge our assumptions of what we know, or, more accurately, what we *think* we know. It works to drive us out of our intellectual and operational comfort zones and promote vigilance.

Aviation professionals are typically checklist-driven, logical thinkers. We base much of our decisions and actions on our past experience, which can be a good thing. But it can also set us up for *expectation bias*, the belief that we will hear and see what we expect to hear and see, based upon our past experience in similar circumstances. In aviation one thing is certain, and that is that *nothing is certain*. The smallest of overlooked details can absolutely ruin our day.

What if things we believe to be true are not as they seem? What if the tigers *are* in there?

Questions humble us. They attack our certainty. They keep us small, which is a very good thing in the risk-laden world of first responders.

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HAA CORNER | **BILL WINN**

WHAT YOU CAN'T MEASURE

For the past few years, I've been focusing on the way that the risks inherent in the complex system in which air medical transport services operate can sometimes combine "just wrong" to lead an aircraft and occupants to their final accident scene. The links in the accident chain can include organizational factors, gaps in the national airspace structure, aircraft limitations, inadequate technology or training, communication failures, and lapses in air medical resource management (AMRM). AMRM is the hybrid form of crew resource management (CRM) used by helicopter air ambulance (HAA) providers.

I have advocated for an awareness of all of these factors and for the implementation of specific controls within every air medical provider's safety management system to counter each potential link in the accident chain.

Over the past few months, I've come to realize that this view of the complexities of the air medical transport universe may fail to adequately address the fact that, at least for those truly preventable accidents that entail human error, the final few links in the chain are virtually always the same: they are the flight crew. And the final link is always the same: it is the pilot.

This is not to dismiss the significance of any preceding systemic causal links in the chain — they are still important. But it is the responsibility of the flight crew, and ultimately of the pilot, to recognize and control those factors. So, why don't they?

At this point, I feel like I should send an apology to Tony Kern over there on page 8. I recently re-read his book, *Blue Threat*, published in 2009, and realized that it is all about those last few links in the accident chain. As a retired U.S. Army aviator, I recognize that the "Red Forces" represent the enemy elements that are actively opposing our own "Blue Forces." The "Blue Threat" is the many ways that we sabotage our own internal activities by the commission of errors.

The mistakes we make may be errors of commission or omission, of inaccurate communication or the complete lack of communication. The important point here is that nearly all human error is avoidable. But first the what-why-and-how of the errors must be recognized and understood. This leads us to that old saying, "You can't fix what you can't measure." So how do we accurately identify the kinds of mistakes that are associated with those final links in an HAA accident chain?

In the 2014 changes to part 135 of the U.S. Federal Aviation Regulations, the section broadly known as the "air ambulance rule" included paragraph 135.607, which gives HAA providers until April 23, 2018, to install an approved flight data monitoring (FDM) system in any helicopter used for air ambulance operations. Although the precise language of the new rule only requires the recording of "flight performance data," also known as inertial data, we would expect that most operators will utilize systems that also provide for cockpit voice recording.

As an "old school" helicopter pilot, if you had asked me about recording my cockpit conversations when I began flying 47 years ago (or even when I retired from the Army 21 years ago), I would probably have said, "Absolutely not! I'm a professional and I don't need Big Brother looking over my shoulder. Besides that, I'm a superior pilot. Well, at the very least I'm an above-average pilot."

(All helicopter pilots are above-average pilots — just ask one.)

But the past 21 years in the helicopter air ambulance industry has completely reversed my opinions regarding FDM and cockpit voice recording. This can be a gold mine of information for the continuous quality improvement (CQI) processes used by any air medical provider organization. While the FDM system monitors the way in which the aircraft is actually flown and reports any exceedances of pre-defined flight limitations, the voice recorder can highlight any miscommunications or shortcomings in CRM (excuse me, make that AMRM).

When used with transparency across the functional domains of an air medical organization and within an environment dedicated to the principles of just culture management and to the protection of the privacy of all persons involved, a well-designed FDM program can be a powerful tool for both quality assurance and quality improvement. It will reveal the error-producing conditions in HAA operations (see chapter seven of *Blue Threat*), as well as the presence of any hazardous attitudes or mental bias that may lead to incorrect decision-making during flight (see chapter eight). This information can feed a structured program of improvement for each individual crew member in the organization (chapter six).

So — thanks, Tony.

Bill Winn is the general manager for NEMSPA and the safety officer for Intermountain Life Flight in Salt Lake City, Utah.

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COLUMN

FOCUS ON SAFETY | **DAN FOULDS**

A MARRIAGE MADE IN HELICOPTERS

Aviation and medicine have a brilliant partnership in helicopter emergency medical services. But like most marriages, this one takes some work.

Are you old enough to remember the television adverts created for Reese's Peanut Butter Cups? They pointed out that sometimes putting things together can make them better — combined — than they could ever be individually. When physicians decided to use helicopters to transport victims from accident scenes to hospitals, they created one of the most synergistic operational relationships ever.

Injured soldiers were transported to Mobile Army Surgical Hospital (MASH) units by Bell H-13 helicopters during the Korean War. Later, in Vietnam, soldiers were flown in Hueys, inside the cabin versus out, and with a combat medic on board. It wasn't until civil medevac started that we took a trauma nurse and paramedic to the patient.

The first time I became aware that we were flying trauma patients to hospitals in helicopters was when I watched the film *The World According To Garp* in 1982. At the end, star Robin Williams is transported in the ancestor of today's Airbus Helicopters H155, an Aérospatiale SA 360C Dauphin (the French Prince of Belle Air).

While no medical crewmembers are shown in the scene, the most common operating model in the United States — of pilot, nurse, and paramedic — was established early, for good reason. Paramedics are accustomed to "street medicine" and diving into messy situations. Nurses are trained to administer a wider range of medications, and are accustomed to working in hospitals.

It didn't take too long for the aviation and medicine teams riding together in helicopters to rub each other the wrong way and generate friction and heat. As my friend Jeff Stillwagon says, "Any time you get that many type A personalities in one place there is bound to be trouble."

While the number of problems related to mixing aviation and medicine are rare, they do still occur, most often when a medical crewmember questions the decisions or actions of a pilot, and the pilot doesn't successfully handle the challenge. Usually in these scenarios the pilot loses the argument, and finds her or himself looking for another job.

Unfortunately, it's all too easy for a clinician who simply doesn't like a pilot to assert a lack of judgment, skill, or safety. When this happens, the aviation leadership has to expend energy and money to recruit, train, and replace said pilot. This can give aviation managers a bad taste in their mouth anytime anyone suggests that the medical folks be involved in anything more than "climbing in, strapping in, and shutting up." Dealing with people is harder than dealing with cargo, and some aviators wish the medical folks would just behave like self-loading baggage.

And that's a shame. For several reasons.

First of all, aviation is a fascinating, wonderful occupation in which to become engaged. And so is medicine. Both disciplines require long periods of training, the accumulation of vast amounts of knowledge, and the ability to function as a member of a team.

We would be much more inclined to cooperate successfully if we took the time to learn more about each other's specialties. I think we would also be less susceptible to the terrible consequences of a mistake if we spent more time teaching each other our professions. I have had my life, career, and reputation saved more than once by a person who had no formal aviation training.

Yes, I have encountered my share of problem personalities, challenging relationships, and downright evil and ugly medical crew members. I know at heart that these people represent the exception, not the norm. And perhaps I had a part in their ugliness.

Often, when a problem develops between a pilot and her crew, a lack of understanding lies at the root. This can frequently be linked to a problem communicating. Different people, from different backgrounds, with different skill sets communicate differently. Words and actions that are pleasing to some are grating to others. The fact that my behavior irritates some people might be more my problem than theirs.

It's important for pilots to understand this because their jobs may be on the line. It's important for medical crewmembers to understand this because their lives may be on the line.

Inasmuch as the words that come out of our mouths only constitute a small percentage of the messages we convey, we can avoid trouble by open and honest expressions of humility when we hit a patch of rough relationship. If we can avoid flipping the mental cabin-isolation switch, and exhibit a genuine desire to understand exactly what it is that is disappointing the other people we work with, we may just come out looking extremely wise and capable.

Aviation is a service business. In the Army, they use helicopters to take the infantry to the enemy so they can kill them. In the offshore oil and gas markets, they use helicopters to speed the discovery and extraction of energy. In helicopter emergency medical services (HEMS), we use helicopters to get medical professionals to sick people, and then, when able, to get all of them to definitive care.

If you are involved with helicopters, you are at once a servant and a leader. If we can't take pleasure in this endeavor, if we can't temper our resentment and tolerate our teammates, we are in for a long and unpleasant career. HEMS isn't for everybody. But I bet that if you honestly try to be a good teammate, you will find HEMS is just right for *you.*

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Named "Program of the Year" at AMTC 2016, CALSTAR has safely transported more than 62,000 patients to hospitals and specialized treatment centers. **Skip Robinson Photo**

CALSTAR honored as 'Program of the Year'

California Shock Trauma and Rescue (CALSTAR) was named Program of the Year at the 2016 Air Medical Transport Conference (AMTC) in Charlotte, North Carolina.

The recognition was one of a number of Community Awards presented by the Association of Air Medical Services (AAMS) at its annual conference and trade show. The conference took place from Dec. 13 to 15 after being postponed from its originally scheduled dates in September due to local unrest.

The annual Program of the Year Award recognizes an emergency medical services program that has demonstrated superior levels of safety consciousness, patient care, quality leadership, and community and industry service. It was presented to CALSTAR by Jennifer Hardcastle, air medical sales manager for Airbus Helicopters Inc., the award's sponsor.

Founded in 1983, CALSTAR is now a leading provider of emergency medical transport services for critically ill or injured patients in California and Northern Nevada. Headquartered in Sacramento, California, CALSTAR has safely transported more than 62,000 patients to hospitals and specialized treatment centers.

Lynn Malmstrom, president and CEO of CALSTAR, said an excellent safety and service culture helped the company grow from humble beginnings to one of the most respected air ambulance providers on the West Coast. "Our company began 32 years ago with a strong culture of safety and a commitment to providing excellent medical care to our patients," he said. "Today, that culture and commitment continue to thrive, thanks to the hard work of our employees."

Airbus also presented the Jim Charlson Aviation Safety Award to BJ Miles, director of safety and risk management for Life Flight Network in Aurora, Oregon. The award is presented annually to an individual who has made significant contributions promoting aviation safety within the air medical transport community.

At Life Flight Network, Miles has strengthened the organization's safety measures and helped shape the provider into a leading example of a comprehensive safety program. Miles led Life Flight to become the first air medical operator in the world to receive

Helicopter Association International's Accreditation Program of Safety, while simultaneously achieving the International Business Aviation Council's International Standard for Business Aircraft Operators.

Meanwhile, the Airbus Helicopters 2016 Vision Zero Aviation Safety Award, including a $10,000 check, was presented to PHI Air Medical for its development of a unique and innovative safety initiative designed to address the workings of the human brain and improve mindfulness among employees.

Working with a team of psychologists, neuroscientists, anthropologists, and human brain experts, PHI developed and launched the Life-Saving Thinking initiative across the company. The new program is a complement to Life-Saving Behaviors, a program PHI initiated in 2015.

Life-Saving Behaviors aims to improve human performance by addressing behavioral actions employees should take to ensure their safety. Life-Saving Thinking pushes the initiative one step further and challenges employees to understand how their brains work so they can adapt a conscious, hyper-vigilant mindset when performing critical tasks.

Other AAMS Community Award winners include Craig Yale, who received the Marriott-Carlson Lifetime Achievement and Leadership Award sponsored by Bell Helicopter; Don Wharton of REACH Air Medical Services, who received the AAMS Excellence in Transport Leadership Award also sponsored by Bell Helicopter; Larry Trout of Metro Aviation and MedFlight of Ohio, who received the Transport Mechanic's Award of Excellence sponsored by Leonardo Helicopters; and Nicklaus Children's Hospital LifeFlight, which received the Neonatal/Pediatric Award of Excellence sponsored by Airborne Life Support Systems Transport Incubators.

CALSTAR was also recognized with the AAMS Excellence in Community Service Award, sponsored by PHI Air Medical, for its "Every 15 Minutes" program, which educates high school students about the dangers of driving while distracted or under the influence of alcohol or drugs. Phoenix Air Group received the Fixed Wing Award of Excellence sponsored by LifePort, Inc., and Vitalink Critical Care Transport received the Critical Care Ground Award of Excellence sponsored by the International Board of Specialty Certification.

Ornge wins 2016 Sim Cup

Ornge, Ontario's provider of air ambulance and related services, won first place at the 2016 Air Medical Transport Conference (AMTC) simulation competition in Charlotte, North Carolina, in December.

The Ornge team consisted of Mike Longeway and Justin Smith, two Toronto-based Ornge critical care flight paramedics, and Rob Teranishi, also a critical care flight paramedic and the team's alternate.

The Ornge paramedics competed in an intense, real-time simulation scenario. The team had to use their knowledge and training to treat and transport simulated patients in a challenging environment.

"I am extremely proud of our team," said Dr. Andrew McCallum, president and CEO of Ornge. "The competition amongst various teams from leading air medical transport services across North America gets stronger every year. Winning this year's competition shows that Ornge paramedics are among the best in the world."

The Sim Cup is an annual critical care skills competition that utilizes the latest in patient simulation. The event features 10 teams competing head-to-head to showcase their real-time, real-situation skills in front of a live AMTC audience.

Ornge paramedics took top honors in the 2016 Sim Cup competition at AMTC 2016. **Mike Reyno Photo**

ASU sponsors new Chairman's Award at AMTC

Aviation Specialties Unlimited Inc. (ASU) sponsored the first-ever MedEvac Foundation Chairman's Award at the 2016 Air Medical Transport Conference (AMTC) in Charlotte, North Carolina, in December.

The winner of the award was Mountain Area Medical Airlift (MAMA) out of Asheville, North Carolina, a pioneer in the use of night vision goggles (NVGs) in civilian air ambulance operations. Pilots Dutch Fridd and Mathew Witt were recognized at a ceremony on Dec. 13 at the NASCAR Hall of Fame.

"This new award is just one way for us to continually honor the helicopter air ambulance operators and the numerous men and women that save lives every day across the country," said ASU president Jim Winkel. "The MedEvac Foundation does great work taking care of families that have lost loved ones, providing education opportunities and other critical things within the Association of Air Medical Services."

"The MedEvac Foundation Chairman's Award allows the recognition of extraordinary contributions to the medical transport industry, and with AMTC located in Charlotte, North Carolina this year, it seemed particularly fitting to honor North Carolina-based program MAMA and their pilots," said MedEvac Foundation international chairman Dave Thomson. "Their work in gaining FAA [Federal Aviation Administration] approval for NVG technology took tremendous effort and commitment, and has had a lasting impact on safety in the air medical community. It is an honor to have ASU sponsoring and supporting this award, underscoring the significant role that MAMA, Fridd, and Witt have played in our shared history."

New scanning device helps prevent medication errors in the air

BY ELAN HEAD

Air medical crewmembers must routinely dose medications under pressure. Now, they and their patients stand to benefit from a new product called SafeDose Scan, which eliminates mental math to ensure safe, accurate dosing every time.

Launched by the eBroselow company at the 2016 Air Medical Transport Conference (AMTC) in Charlotte, North Carolina, the handheld device uses Honeywell scanning technology to scan the U.S. National Drug Code barcode of any acute medication. It then instantly displays the contents of the vial, and automatically calculates the correct dosage for a given patient's size. Warnings and other relevant administration information are also provided.

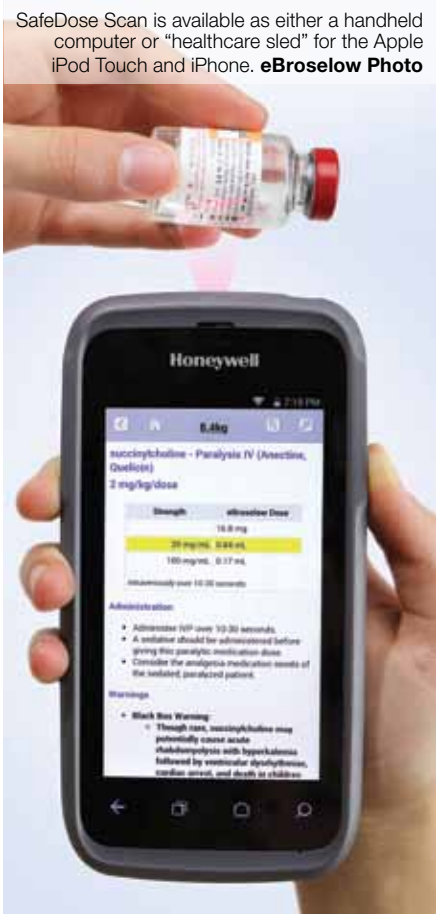
"Healthcare can never be high reliability when people are doing math on a bed-sheet in the middle of the night," the inventor of the device, Dr. James Broselow, told *Vertical 911* at AMTC. "Nobody wants to do math in the middle of the night and have someone's life depend on it."

Broselow has a longstanding commitment to improving reliability and eliminating errors in healthcare. Originally board certified in family medicine, Broselow was moonlighting as an emergency room doctor in the 1980s when he realized how challenging it could be to treat children in the ER.

Along with Dr. Robert Luten, he developed the Broselow Tape, a color-coded measuring tape that relates a child's height to his or her weight to quickly provide proper dosing and airway information. The tape became a standard in pediatric emergency care.

As drugs became more numerous and complex, Broselow began thinking about new clinical tools for treating children and adults. He and Luten launched eBroselow in 2010. The company's flagship product is eBroselow Web, a comprehensive, customizable database of drugs and indications that can be accessed via web browser. It is also accessible on mobile devices through an iOS and Android app, SafeDose Pro, which can operate in airplane mode once loaded.

SafeDose Scan pairs the eBroselow Web database with professional scanning technology to further reduce the potential for human error. It is available as either a self-contained handheld computer, for $2,495, or as a "healthcare sled" for the Apple iPod Touch and iPhone, for $1,800. The purchase price includes a one-year license for eBroselow's mobile software, which is revised frequently.



SafeDose Scan is available as either a handheld computer or "healthcare sled" for the Apple iPod Touch and iPhone. **eBroselow Photo**

"It's not static," Broselow emphasized. "We update this information all the time."

Broselow envisions air medical programs purchasing one device per aircraft for ready access by medical crews. Because SafeDose Scan is mobile, crewmembers can carry it easily from the helicopter into the hospital. The device can also document administration of medications and sync this information to eBroselow Web.

"Our goal is for this to become a national standard," Broselow said. "What I really believe is in 10 years, people are going to say, 'Can you believe we used to give meds without scanning them?'"

A new scholarship honors the memory of late Boston MedFlight CEO Dr. Suzanne Wedel. **Sikorsky Photo**

Sikorsky establishes MedEvac Foundation scholarship

Sikorsky, a Lockheed Martin company, presented a $5,000 donation for the first annual Dr. Suzanne Wedel Scholarship for award by the MedEvac International Foundation. The scholarship donation was presented at the Air Medical Transport Conference in Charlotte, North Carolina, in December.

"Dr. Wedel was a recognized expert and true leader, pioneering flight solutions for the air medical community for nearly 30 years with patient care always her priority," said Jeanette Eaton, Sikorsky sales executive for North America and Canada. "This STEM (Science, Technology, Engineering and Math) scholarship will allow the foundation to give back to the community in the name and legacy of Dr. Wedel to support the advancement of air medical transportation through professional education and research.

"Suzanne was a beloved friend, skilled physician, and tremendous leader who will be missed by many," said Eaton. "Her legacy, vision and commitment will have an ever-lasting effect on this world."

On March 30, 2016, Wedel, CEO of Boston MedFlight, passed away following a long battle with cancer. The late Wedel was a pioneer in the industry, credited with expanding the scope of air medical transportation as CEO for Boston MedFlight for nearly three decades. She also founded the North East Air Alliance, which fosters coordinated efforts among the region's air ambulance organizations.

Leonardo receives 30-aircraft order from China

Leonardo Helicopters and Chinese company Sino-US Intercontinental Helicopter Investment have announced the signing of a contract for 30 helicopters in emergency medical service (EMS) configuration, including AgustaWestland AW139 intermediate and AW169 light intermediate twin-engine models. The aircraft are expected to be delivered in 2017, and will be operated by Kingwing General Aviation, the parent company of Sino-US.

With this contract, the presence of Leonardo in China grows stronger with more than 180 helicopters sold to Chinese customers to date, and with 2016 setting a new record with more than 20 helicopters delivered to China during the year. The order follows a contract signed by Sino-US earlier this year for 25 AW119Kx helicopters, which paved the path for the establishment of the largest EMS helicopter program nationwide in China.

Sino-US Intercontinental has so far placed orders for over 80 helicopters comprising AW119Kx, GrandNew, AW169, AW139, and AW189 models. According to Leonardo, this growing fleet is reinforced by a similarly growing customer support presence, recently confirmed by the opening of a major warehouse facility in Shanghai.

Utah's AirMed program joins Metro family

Metro Aviation recently welcomed the University of Utah's AirMed program to its family of operations customers with the recent delivery of three Bell 407GX helicopters and a Pilatus PC 12-45e, and assumption of flight operations in November. With the addition of the new aircraft, the AirMed fleet consists of five Bell 407GXs, an Airbus Helicopters EC145, a PC-12/47E, and a PC-12/45.

"Metro's operational customers are truly a family. We share information, lean on each other for support and make each other better," said Metro president Mike Stanberry. "We look forward to supporting the University of Utah and are excited for the knowledge they bring to the Metro table."

AirMed uses state-of-the-art equipment for its flying emergency room, including invasive line management and intra-aortic balloon pumps, as well as cutting-edge airway technology. It services one of the largest geographical areas of any flight program in the nation, routinely transporting patients from Colorado, Wyoming, Nevada, Montana, Idaho, and Utah.

The University of Utah's AirMed program will now be operated by Metro Aviation. **Jessa Lang Photo**

Outerlink receives new STC for EC145e

Outerlink's IRIS system is FAA-approved for use on the EC145e. **Skip Robinson Photo**

Outerlink Global Solutions has announced Federal Aviation Administration (FAA) supplemental type certificate approval of its fully integrated IRIS voice, video, flight data, and broadband sat-com system in the EC145e helicopter.

IRIS provides continuous aircraft and internal data, audio, and video recording. The system can record up to 1,000 hours of data received from over 200 sources, depending on model type. The system also includes internal, always-on wireless connectivity for electronic flight bags or for continuous data downloads.

According to Outerlink, IRIS gives operators the latest communication technology with just one installation. From the ground, crews can monitor aircraft data and receive immediate alerts and warnings when an aircraft exceeds a defined parameter.

In addition, pilots and crew can communicate via talk groups using push-to-talk technology, and the accompanying software suite provides the only integrated time-synced playback of audio, video, and flight data, giving operators insight into how their fleet is being flown.

IRIS is compatible with a full range of aircraft, from older analog models to the newest on the market. In addition, IRIS meets all aspects of the FAA's 135.607 ruling, which requires helicopter air ambulance operators to equip their aircraft with approved flight data monitoring systems by April 23, 2018.

Nightingale Regional Air Ambulance marks 35th anniversary

Norfolk, Virginia-based Sentara Healthcare's Nightingale Regional Air Ambulance program has flown more than 20,000 accident-free missions since its first flight on February 25, 1982. A flying intensive care unit, Nightingale's flight nurses and paramedics provide tertiary-level hospital care while transporting patients from scenes and referring hospitals to the regional Level I trauma and tertiary referral center at Sentara Norfolk General Hospital.

Nightingale operates at a consistent financial loss (US$1.2 million in 2014) as part of the Sentara not-for-profit mission, but continues to invest in new technologies to enhance patient care and flight safety, including onboard ultrasound, an intra-aortic balloon pump and a phased installation of instrument flight rules (IFR) capabilities now underway at airports and hospitals throughout the region.

Nightingale currently operates an Airbus Helicopters EC145, managed by Metro Aviation and delivered in July 2011 after a two-year fundraising campaign by the Sentara Foundation to help defray the $7.2 million purchase price. The campaign, dubbed "Saving Minutes, Saving Lives," achieved its goal of raising $3.5 million through donations from area governments and rescue organizations, corporations and private philanthropies, and contributions from grateful patients and Sentara employees, who were able to contribute through payroll deduction.

Nightingale's flight nurses and flight paramedics are fully integrated into safe aircraft operations. The lead clinician on each flight sits with the pilot outbound, monitoring radio traffic and weather radar and scanning for other aircraft and obstacles. The other clinician observes start-up procedures to look for smoke or anything else visually amiss.

A dedicated dispatch center at Sentara Norfolk General manages more than 1,700 arrivals per year involving medical, Coast Guard, and Navy helicopters. The Nightingale team has conducted more than a dozen training evolutions with Navy and Coast Guard squadrons to help assure clean, safe deliveries of patients on the helipad and effective handoffs in the emergency department and trauma bays. A vertical expansion currently underway at Sentara Norfolk General includes plans for a rooftop helipad with a dedicated elevator to the trauma center.

The Nightingale program maintains excellent relationships with volunteer and paid emergency medical services (EMS) and fire programs in eastern Virginia and northeast North Carolina, and recently established designated landing areas at newly-built EMS stations equipped with helipads to reduce the number of landings required in farm fields and other less-than-optimal sites.

Nightingale recently joined the air medical industry's "Land the Drone" campaign to promote drone safety at scenes where medical helicopters are present. Nightingale and other air medical programs in Virginia have had close encounters with drones and Virginia news media have been receptive to reporting on the issue.

The program also does show-and-tell visits to area festivals and participates with Virginia Beach high schools in the "Every 15 Minutes" drunk driving prevention program several times per school year. Sentara Nightingale presents itself to the community as a regional asset that can mean the difference between life and death for critically ill and injured patients.

Sentara Healthcare's Nightingale Regional Air Ambulance currently operates an Airbus Helicopters EC145, managed by Metro Aviation. **Sentara Healthcare Photo**

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Helijet air ambulance service resumes at hospital heliports in B.C.

Thanks to a new STC, Helijet has been able to resume full service to all hospital heliports in British Columbia. **Heath Moffatt Photo**

Helijet International Inc. announced in early December that it had received the necessary regulatory approvals from Transport Canada to re-establish full 24-hour emergency air ambulance service to all hospital heliports in British Columbia, including Vancouver General Hospital, Surrey Memorial Hospital, and Royal Columbian Hospital in New Westminster.

Questions raised by Transport Canada last spring resulted in Helijet voluntarily suspending its Sikorsky 76C+ air ambulances from landing at up to seven B.C. hospital helipads, pending resolution with the federal regulator. In August, exemptions were granted resulting in the restoration of Helijet flights to five hospitals, but restrictions remained at the Royal Columbian and Surrey Memorial Hospital helipads. B.C. Emergency Health Services (BCEHS) used an alternate service provider for day flights to those facilities.

The matter has been resolved due to extensive work between Helijet, Transport Canada, the aircraft manufacturer, and an independent aviation expert, Maxcraft Avionics. Detailed aircraft data verification was done and a new supplemental type certificate (STC) has been issued by Transport Canada.

This certificate is being permanently added to the S76C+ flight manual documentation and permits the full resumption of landings at all previously restricted elevated hospital heliports.

"This outcome is a real credit to the hard work, collaboration, and support we received from our client, the British Columbia Emergency Health Services, as well as Transport Canada, Sikorsky Aircraft, Maxcraft Avionics, and all the employees at Helijet," said Rick Hill, vice-president of commercial and business programs at Helijet.

"Passenger and crew safety is of utmost importance to Helijet, which is why we voluntarily took steps to suspend some of our air ambulance service while this issue was being addressed," said Hill. "With the additional STC documentation, we have resolved all issues with Transport Canada and look forward to providing crucial emergency care service for British Columbians in need, as we have for the previous 18 years."

Ornge signs support contract for AW139 fleet

Leonardo Helicopters has signed a contract with Ontario air ambulance operator Ornge for an additional six years of logistics support and component repair and overhaul services for its AgustaWestland AW139 helicopter fleet, through Leonardo's performance-based Full Component Plan.

The contract, part of Leonardo's new Service Excellence support offering, solidifies the support partnership between the company and Ornge. It follows operational success in 2015, during which the air medical transport provider flew in excess of 6,000 flight hours in 24/7 operations across seven rotary-wing bases and reached a 95 percent dispatch availability rate.

The Full Component Plan is in place to further support critical care transportation across Ontario by improving spares planning and forecasting and implementing guaranteed logistics performance.

An 11th AW139 helicopter was recently added to Ornge's fleet, following the full reconfiguration of an existing utility aircraft to air ambulance role. The aircraft was modified in less than three months at the company's Philadelphia, Pennsylvania, facility by adding a range of mission equipment, including wire strike protection system, second landing light, SATCOM latitude telephone, V/UHF radio, and a new intercom system in the cabin.

Mike Reyno Photo

The demanding timeline highlights the ability of the Philadelphia completion center to quickly meet new customer requirements. The aircraft now features a full medical interior and has been deployed to a base in Moosonee, Ontario.

Puerto Rico Department of Health selects Bell 429

Bell Helicopter has announced the sale and delivery of a Bell 429 to the Department of Health, Puerto Rico. The aircraft is configured for helicopter emergency medical services and equipped to conduct medical rescue missions throughout the region.

"The Bell 429 has proven its capabilities in a number of mission sets around the world, while offering the most advanced technology available today, combined with industry leading performance and safety mechanisms," said Jay Ortiz, Bell Helicopter's vice president of Latin American sales. "We are proud that our customer has put their trust in Bell Helicopter and the Bell 429, and we are committed to supporting their missions and providing superior support and services for years to come."

Bell Helicopter continues to strengthen its brand in Puerto Rico, with nearly 20 aircraft operating in the region. The region is also home to four state-of-the-art Bell 429s performing a number of mission sets to include emergency medical services, search-and-rescue, and parapublic operations.

Puerto Rico's Department of Health will operate its new Bell 429 as an air ambulance. **Bell Helicopter Photo**

New FOQA course planned for Heli-Expo

The flight data analysis company Truth Data will conduct a new professional education course at HAI Heli-Expo 2017 titled "FOQA and the HEMS/HAA Rule."

Led by Truth Data's Pete Henrikson and Matt Hilton, the course is designed to educate operators on what it takes to implement a successful flight operational quality assurance (FOQA) program. Because the U.S. Federal Aviation Administration's (FAA's) 2015 helicopter air ambulance (HAA) rule will require HAA operators to implement flight data monitoring systems by April 2018, the course will focus on that sector, but it is open to everyone.

Topics will include definitions of common terms, hardware selection, benefits from an insurance perspective, industry best practices and resources, and FAA FOQA program certification. Scheduled guest speakers include the FAA's Jorge Castillo, Jeff Currin of LifeFlight Network of Oregon, and Rob Richardson of Honeywell Aerospace.

More information and online registration can be found at www.heliexpo.rotor.org.

Honeywell, Air Methods sign agreement for Sky Connect Tracker

Honeywell announced it has entered into an agreement with Air Methods, America's largest emergency air medical provider and helicopter operator, to provide its fleet with Honeywell's Sky Connect Tracker III satellite communications and helicopter tracking system.

Under the agreement, Honeywell will upgrade Air Methods' existing Sky Connect Tracker II system to the Sky Connect Tracker III system, providing new units as required and supporting Air Methods with monthly services. The new system will enable phone and text services while in the sky through the Iridium satellite network, giving pilots the ability to stay in touch in remote places with no available cell reception.

In addition, the new system will enable fleet managers to track the location of their helicopters anywhere in the world, while providing functionality for flight data monitoring. Honeywell's solution will allow Air Methods to stay in touch with pilots through voice and text and also to gain access to critical flight data monitoring information they must have under a required mandate from the Federal Aviation Administration for all emergency medical service operators.

Air Methods will also have the ability to collect data from onboard systems to record and communicate aircraft performance and potential maintenance needs, enabling a safer and more efficient fleet.

Rega purchases six new Airbus H145s

Swiss Air-Rescue Rega has signed a contract to purchase six new Airbus H145 helicopters for air medical and rescue work. The new aircraft, which are scheduled to go into operation in 2018, will replace Rega's current EC145 lowland fleet at bases in Zurich, Basel, Berne, and Lausanne.

"With this decision in favor of the H145, we are continuing to renew the Rega fleet with the next generation of aircraft," Rega CEO Ernst Kohler stated in a press release announcing the purchase.

The H145 is considerably more powerful than the EC145, is equipped with a four-axis autopilot, and features cutting-edge avionics and navigation technology. Its spacious cabin will facilitate patient transports with special equipment such as heart-lung machines or mobile incubators.

Rega is investing around 52 million Swiss Francs (approximately US$51 million) for the six helicopters, including medical equipment. This sum has already been earmarked in Rega's long-term financial planning, and the organization's healthy financial position means that this project can be funded without outside capital, according to the press release.

With its decision to purchase the H145, Rega is upholding its two-type helicopter fleet strategy. While the lowland bases will operate the H145, the mountain bases will continue to employ Da Vinci rescue helicopters from Italian manufacturer Leonardo Helicopters (formerly AgustaWestland).

In 2021, Rega expects to take delivery of three new Leonardo Helicopters AW169-FIPS all-weather rescue helicopters. Equipped with a full ice protection system, these helicopters will extend Rega's scope of operation even further. Additionally, three new Bombardier Challenger 650 ambulance jets will join Rega's fleet in early summer 2018.

"It is our responsibility to think about the future," stated Kohler. "With these new aircraft, we are ensuring that in the coming years, too, Rega will be able to come to the aid of patients and people in distress reliably and professionally — both in Switzerland and all over the world."

Air Methods acquires three Airbus H145 helicopters

Airbus Helicopters Inc. has announced that Air Methods Corp. has acquired three new helicopters of the Airbus H145 family, which will replace older aircraft now in service.

Two of the aircraft will be used by St. Louis Children's Hospital and one will be for Virginia Commonwealth University (VCU) Health System based in Richmond. Air Methods will own and operate the aircraft for both hospital systems.

VCU Health is replacing one of the EC135 P2e aircraft in its fleet because it wanted a larger helicopter capable of greater payload and longer range. St. Louis Children's Hospital selected the H145-family aircraft as the most capable to replace its fleet of BK117s.

Completion will include interiors capable of seating up to four attendants; both helicopters are expected to be in service in the spring of 2017.

"All of us at Airbus Helicopters appreciate that Air Methods and its clients, St. Louis Children's Hospital and the Virginia Commonwealth University Health System, have selected these H145-family aircraft to continue providing life-saving services," said Chris Emerson, president of Airbus Helicopters Inc. "Our entire team stands ready to provide round-the-clock support as [they] put these aircraft into service."

London's Air Ambulance appoints new CEO

London's Air Ambulance, the charity that delivers a 24/7 advanced trauma team to critically injured people in London, has announced the appointment of Jonathan Jenkins as its new chief executive officer. In this role, Jenkins will provide strategic leadership and direction for the charity, continuing to ensure it is well administered and builds on growth in both operational capability and revenue.

Jenkins will join London's Air Ambulance in April from Social Investment Business, where he led a number of successful programs, which resulted in over £250 million (approx. US$307 million) of investment into charities and social enterprises. He also has considerable frontline experience, serving as a trustee for a number of charities, including mental health specialist Bright and the Ethex positive investment platform.

"With Jonathan at the helm, our charity is in a strong position to build on the momentum of our existing success," said Mark Vickers, chairman, London's Air Ambulance. "We look forward to seeing Jonathan use his impressive talents to act as an inspirational leader, a key spokesperson, and a passionate advocate for our organization, generating strong and long-lasting relationships with various stakeholders."

Before applying for this role, Jenkins already had a keen interest in London's Air Ambulance. He has previously raised £17,000 (approx. US$21,000) for the charity by taking part in the 250-kilometer (155-mile) Marathon Des Sables desert ultra-marathon and volunteers for bucket collections.

"I have followed the extraordinary progress of London's Air Ambulance over the past few years as it became one of the capital's most iconic charitable brands," said Jenkins. "The charity has already achieved so much, but I am excited to push it even further. I look forward to working alongside both the fundraising and operational teams to take this inspirational charity to new heights."

Trakka Systems launches new camera series

Known for searchlights, Trakka is now bringing its design philosophy to multi-sensor camera systems.

BY BEN FORREST

Trakka Systems is rolling out a new line of gyro-stabilized multi-sensor camera systems created with many of the sensibilities the company brings to its line of sophisticated searchlights.

After introducing a prototype of its new TC-300 multi-sensor surveillance system at HAI Heli-Expo last year, Trakka is planning to make its first deliveries of the product in January through March of 2017.

"There's a look and a feel to it that almost makes it — I'm going to use the word 'sexy' in terms of industrial design," said Andrew Phillips, the company's executive vice president of global business development.

"So we've tried to make it appealing to the marketplace, as well as having good performance and feature sets. But I think obviously the biggest thing that drives us is actually the positioning [of] the product in the marketplace."

The TC-300 is the first new product in the TrakkaCam line, which also includes several legacy models from Swesystem AB, a Swedish camera design and development company Trakka acquired in December 2015.

There are plans to scale the TC-300 up and down in terms of size, adding new models that build on the success of the legacy SWE-LE series, whose prime market to date has been the inspection and utility market, said Phillips.

The TC-300 is a single-line replaceable unit (LRU) system that comprises an innovative, lightweight 300-millimeter (11.8-inch) gimbal and has a total mass of less than 19 kilograms (42 pounds), according to the company's technical data.

It features high-performance, fully digital 4-axis gyro-stabilization and a payload suite with a medium wavelength, infrared (MWIR) thermal imager with continuous zoom, color HDTV with continuous zoom and various laser sensors.

The TC-300 also has a fully-integrated inertial measurement unit/global positioning system and an advanced high-definition video engine with several features, including automatic target tracking, image blending, and haze reduction.

"The value equation is something like we offer 80 percent of the performance of the big gimbals, at approximately 50 percent of the price," said Phillips. "And we're talking about doing that in less than half of the mass and in a size of 300 millimeters versus 400 millimeters. So in an era where budgets are tight and where every kilogram that you put on an aircraft is quite crucial, I think that's quite a good value equation."

The TrakkaCam line is also exempt from International Traffic in Arms Regulations (ITAR), making it widely exportable to countries around the world.

While immediate applications for TrakkaCam systems will be mainly in airborne intelligence, surveillance and reconnaissance (ISR), the company has taken some orders for ground vehicles as well, said Phillips.

"If you imagine, you would put these on an extendable mast on an armored vehicle, and whether it's a SWAT team in the USA or whether it's a military force trying to do IED protection or force protection out in an area of conflict, you can imagine that there quite a few ground vehicle applications of these kinds of sensors as well," he said.

"I think it all goes about being able to see at long ranges and to be able to protect and allow people to keep at arm's length from harmful devices and harmful characters out there."

After debuting the TC-300 prototype at Heli-Expo in March 2016, Trakka also showed the product at the Helitech International tradeshow in October, by which time it had already taken its first launch order, followed by another shortly after the show, said Phillips. The response at both shows was "exceptionally enthusiastic," he said.

"At Helitech … people were seeking us out for our new technology," he said. "It was quite remarkable, and I would say the interest extended not only amongst operators — the forces who would actually use this technology — but also to the aircraft OEMs [original equipment manufacturers] with whom we have very good relationships."

Phillips cited Trakka's use of "disruptive technology" in the searchlight market and said the company is adopting a disruptive approach to its systems in the TrakkaCam range.

"I think we see great business prospects from it," he said. "From the user point of view, they get far more bang for their buck and the ability to actually perform ISR at a much lower price. . . . It's exciting, even in an era of downturn."

Trakka Systems is planning to make its first deliveries of its new TC-300 multi-sensor surveillance system in Q1 2017. **Trakka Photo**

Striking back against laser attacks

BY BEN FORREST

Concern about laser attacks is nothing new among pilots, but the industry continues to search for definitive protection against the potentially disastrous effects of a high-intensity beam.

A new entry in that search is ST Laserstrike, which recently debuted a set of lightweight, high-durability lenses that protect against both green and blue lasers and infrared and ultraviolet light.

"It's something that's a growing problem worldwide," said Tony Reed, the company's president. "We've spent the last several years trying to perfect a product that would protect pilots against that."

The Federal Aviation Administration (FAA) reported 7,347 laser incidents in the United States in 2015, a significant increase from the 3,894 reported the year before.

Apart from a slight dip in 2012, the number of reported incidents has been climbing steadily over the past decade. There were only 384 incidents reported in 2006.

Laser incidents have also been on the rise in Canada, where nearly 600 were reported in 2015, compared with 502 incidents the year before.

"Canadian pilots have the same problems as other pilots around the world with laser attacks," said Reed. "There are fewer overall numbers of attacks in Canada but that quantity roughly tracks the U.S. data when comparing the number of attacks to the number of flights. As in the U.S. and other countries, aircraft operating in Canadian airspace are attacked without discrimination."

A laser attack can distract pilots, cause glare that affects their vision, or temporarily blind them — a huge concern during any stage of flight, but especially during takeoff and landing.

"Several years ago I saw the need for this, and I had this idea," said Reed, who is also a certified flight instructor and commercial pilot with instrument, multi-engine and seaplane ratings. "I began looking around for people who had some specialty knowledge in trying to produce this kind of product."

He found like-minded partners in the United Kingdom and formed a joint venture with them, working together for the last four years to develop the product.

ST Laserstrike's protective glasses come in three different frames and can be fitted with prescription lenses. **Ben Forrest Photo**

ST Laserstrike bills its glasses as the most advanced product available, using the latest lens manufacturing and coating technologies. The product blocks most of the light produced by blue and green lasers, while preserving a pilot's ability to see colors on the instrument panel.

"We've been able to put a true color view," said Reed. "You don't lose any of those colors off the instrument panel with this."

The glasses come in three different frames, including one that resembles typical aviator sunglasses. They are heads-up display and night vision compatible and can be fitted with prescription lenses.

"Helicopters in particular are vulnerable, because they're low and slow all the time," said Reed. "So we recommend that helicopter pilots wear these all the time at night.

"Fixed-wing aircraft — it depends on the flight ops department, but we normally recommend until 10 minutes after departure and then 10 minutes before landing, because that pretty much takes you in and out of the danger zone for that."

ST Laserstrike made its debut at Helitech International 2016 in Amsterdam, the Netherlands, and also had a presence at the 2016 National Business Aviation Association Business Aviation Conference and Exhibition (NBAA-BACE) in Orlando, Florida. The product was well received at both shows.

"Here we've actually been overwhelmed with the response," said Reed in an interview at NBAA-BACE. "It's really gratifying to see how well-accepted it's become."

Reed acknowledged it's difficult to say what the company is projecting in terms of sales, but added the company is encouraged.

"Everyone has just been really supportive," he said. "I think it's going to be difficult to keep up with the initial demand."

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Helinet partners with ALEA for Alan Purwin Memorial Scholarship

Helinet, a diversified flight service company and leading provider of airborne surveillance solutions, has partnered with the Airborne Law Enforcement Association (ALEA) to launch the Alan Purwin Memorial Scholarship. One scholarship will be awarded annually to a qualifying high school senior.

Currently, ALEA provides 17 scholarships to recognize the academic excellence of ALEA members' children. ALEA funds 12 regional scholarships while the remaining five are funded through the generosity of corporate members. The new Purwin scholarship will be an additional opportunity for students to be recognized and rewarded.

"Alan always had a heart for law enforcement, and for the well-being of others. We are grateful for the opportunity to honor Alan and keep his legacy alive in a community he was extraordinarily passionate about," said Kathryn Purwin, CEO of Helinet.

Alan Purwin co-founded West Coast Helicopters in 1987, which became Helinet Aviation in 1998, to fulfill his goal of providing the safest, most responsive, and reliable helicopter services for the medical, charter, production, and electronic news gathering industries. With his extensive work in the aviation community, he saw an increasing need for robust aerial surveillance systems to perform critical elements for public safety and national defense. It was this recognition that led to the formation of Helinet Technologies in 2007.

Since Helinet Technologies was established, the team has been providing solutions for a wide range of clients including the Los Angeles County Sheriff's Department, the New York Police Department, the Texas Department of Public Safety, and many others.

To be eligible for the Alan Purwin Memorial Scholarship, an applicant must be the child of an ALEA member and a high school senior who has been accepted to an accredited college or university. Candidates are encouraged to complete an online application at www.alea.org or submit applications via mail to ALEA headquarters.

Helinet's new scholarship honors the memory of its late CEO Alan Purwin. **Helinet Photo**

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HAI names Salute to Excellence award winners

The Trinidad and Tobago Air Guard will be honored at HAI Heli-Expo 2017 with the Leonardo Humanitarian Service Award. **Mike Reyno Photo**

Leading figures in the airborne law enforcement and search-and-rescue sectors are among the winners of Helicopter Association International's (HAI's) 2017 Salute to Excellence Awards.

Vertical 911 contributor Jack Schonely is this year's winner of the MD Helicopters Law Enforcement Award. A nationally recognized expert on suspect tactics and perimeter containment, Schonely spent more than 33 years in law enforcement, where he dedicated his career to promoting professionalism in airborne law enforcement in the U.S. and around the world *(see p.88, Vertical 911, Summer 2016)*.

Schonely began his career as a deputy sheriff in Berks County, Pennsylvania, before moving to Los Angeles in 1983 and joining the Los Angeles Police Department (LAPD). He witnessed the changes in daily police work firsthand and did exhaustive research on suspect tactics, culminating in his book *Apprehending Fleeing Suspects: Suspect Tactics and Perimeter Containment*.

Working as an LAPD patrol officer, Schonely was involved in perimeter containment on a daily basis. In 1992, he became a K-9 handler within the Metropolitan Division, where he spent the next five years searching for L.A.'s most dangerous criminals.

He worked as a tactical flight officer (TFO) in LAPD's air support division, coordinating tactical operations involving foot pursuits and perimeter containments. He served as chief TFO and then as a command pilot until his retirement in June 2016.

HAI also announced that Bryan Smith, pilot for the Seminole County (Florida) Sheriff's Office, is the 2017 winner of HAI's Salute to Excellence BLR Aerospace Safety Award. Smith has dedicated countless hours to developing and advocating safety solutions for pilots and operators worldwide. A pilot since 1992, he flies rotary- and fixed-wing aircraft for the Seminole County Sheriff's Office, where he serves as safety officer and instructor pilot. Smith is also the Airborne Law Enforcement Association safety program manager and works on the U.S. Helicopter Safety Team, where he has chaired the Safety Management System Working Group and served on the Flight Training Working Group.

The Trinidad and Tobago Air Guard, which was profiled in the Winter 2015 issue of *Vertical 911 (see p.40)*, is the winner of the Leonardo Humanitarian Service Award. Since its founding in 2005, the Trinidad and Tobago Air Guard has provided extensive humanitarian services in response to natural disasters, medical emergencies, and security threats, both within Trinidad and Tobago, and in support of other Caribbean nations. It operates two Metro Merlin C-26B airplanes and four Leonardo AW139 helicopters, with a mission scope that is remarkable for the country's limited size and resources.

Bryan Smith is the winner of the BLR Aerospace Safety Award. **HAI Photo**

Meanwhile, Era Search and Rescue, a service line of Era Group Inc., is the 2017 winner of the Airbus Helicopters Golden Hour Award. Era pioneered the first U.S. commercial search-and-rescue (SAR) program, in partnership with Priority 1 Air Rescue (P1AR). Era's SAR program has responded to more than 1,050 emergency calls from more than 70 companies in the Gulf of Mexico. It is considered one of the world's premier SAR operations, able to conduct emergency response in extreme environments.

Other HAI Salute to Excellence award recipients include Nick Mayhew, senior program manager for L3 Link Simulation and Training, the winner of the W.A. "Dub" Blessing Flight Instructor of the Year Award; Carl Jones, a crew chief for the National Research Council of Canada, the winner of the Rolls-Royce Excellence in Helicopter Maintenance Award; Dr. John Leverton, winner of the Bell Helicopter Lifetime Achievement Award; and Robert Fournier and Trent Vick, winners of the Appareo Pilot of the Year Award.

Vertical 911 contributor Jack Schonely is the winner of the MD Helicopters Law Enforcement Award. **HAI Photo**

Era Search and Rescue is the winner of the Airbus Helicopters Golden Hour Award. **Dan Megna Photo**

Wire strike protection kit developed for Robinson R66

Skip Robinson Photo

Robinson Helicopter Company and Magellan Aerospace have partnered on the development of a new wire strike protection kit for the R66 Turbine helicopter.

The kit consists of two parts. The "provisions installation" comprises a strengthened windshield bow and cabin structure and mount points to which the wire cutters and deflectors are installed. The "wire strike components installation" includes an upper deflector and cutter, two lower deflectors and cutter, and a nose deflector, offering comprehensive protection that will still engage and cut a wire even if the helicopter is turning with roll. The total weight of the kit is approximately 23 pounds (10.5 kilograms).

The provisions installation will be an option on new R66 helicopters and installed at the Robinson factory. The wire strike components will only be available from Magellan Aerospace. At press time, certification of the kit was expected by HAI Heli-Expo 2017, with the price yet to be determined. The kit will be available for the R66 Police helicopter, although the percentage of protected coverage will be somewhat reduced due to the camera on the chin.

Colorado High

A new operator is providing SAR services in the mountains around Durango, Colorado.

BY JEN BOYER

Around-the-clock search-and-rescue (SAR) helicopter support has come to Durango, Colorado. Colorado Highland Helicopters began flying in May 2016 with a unique business model designed to support parapublic law enforcement needs and provide a platform to increase SAR and mountain operations training.

"The basis of our model is to be a commercial operator in the area by providing advanced instruction and utility work so we can support maintaining a search-and-rescue helicopter for the area 24/7," explained Brandon Laird, co-owner and chief pilot of Colorado Highland Helicopters.

Colorado Highland Helicopters was formed by Laird — a helicopter pilot with experience flying high-density-altitude tour flights in the Grand Canyon and emergency medical services (EMS) operations in and around Colorado — and his wife, Dayle Morningstar, an experienced helicopter EMS flight paramedic. Together they purchased an MD 500C helicopter and started the company when their former employer, CareFlite, left Durango.

During their work at CareFlite, Laird and Morningstar experienced the limited helicopter SAR operations in the Durango area, typically performed with the local EMS helicopter. Laird and Morningstar came up with the idea of a unique company designed around SAR availability to provide the critical missing link.

"Our company is two-fold," Laird said. "We have Colorado Highland Helicopters, and we also operate Colorado Highland Helicopters SAR, a nonprofit organization designed to support parapublic agencies with critical SAR, SAR support, extraction, and short-distance medical transport to serve the people who live, work and enjoy this rugged country. The nonprofit allows us to qualify for grants as well as making it easier for agencies to contract with us."

The aim of the SAR nonprofit is to keep prices low, basically break-even, to cover the costs of the aircraft. With costs covered, the duo can afford to keep for-profit operations in the local area only, allowing the aircraft to remain on call and close by for SAR operations year round.

Since the company began, Laird has begun flying a number of SAR missions providing search assist and rescuer insertions. He is in discussions with the local sheriff, Colorado State Patrol and other agencies on developing a self-sustaining helicopter SAR and SAR training program for the area.

In addition to SAR, utility, and advanced helicopter training, Colorado Highland Helicopters wants to provide active shooter and pilot air tactical training. Working with local federally licensed gun dealer Colorado Gun Fighter, Laird offers an aerial platform for gun enthusiasts commercially and is working to provide a resource for parapublic law enforcement agencies to train for active shooter scenarios.

As the company reaches the end of its first year and looks to the future, Laird is hoping to solidify SAR and active shooter training programs and begin finalizing potential contracts to increase helicopter SAR.

"Right now, calling a helicopter is [a] last resort, and training to use a helicopter is practically nonexistent," Laird said. "My goal is to provide the training needed for pilots to learn best practices and skills in SAR, and the mountains in general, while also increasing the success of our region SAR operations. I'd love to see agencies call out the helicopter immediately now. We're available and can help save lives."

Colorado Highland Helicopters was formed by husband-and-wife duo Brandon Laird and Dayle Morningstar. **Jerry McBride/Mountain Motion Media Photo**

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Air Rescue Systems receives approval for Heli-Ops harness

The 338 Heli-Ops PCDS is designed for use in a variety of helicopter rescue operations. **ARS Photo**

Air Rescue Systems Corp. (ARS) has announced Federal Aviation Administration approval (TSO C-167) of the 338 Heli-Ops Personal Carrying Device System (PCDS). A Class III harness, the 338 Heli-Ops PCDS delivers safety and ease of use for a number of advanced helicopter rescue techniques, including hoist/winch, short haul, skid insertion/extraction, and heli-rappel operations.

The 338 Heli-Ops harness is described as functional, comfortable, durable, and distinctive as the lightest Class III, TSO C-167 PCDS harness in the world. At a weight of just under four pounds (1.8 kilograms), the 338 Heli-Ops harness is unrestricting and moves with the wearer through demanding operations.

The quick-donning harness has a single-person maximum load rating of 310 pounds (140.6 kilograms). According to ARS, the harness has been tested and vetted through thousands of field insertions, extractions, and rescues.

U.S. Army awards support contract to Airbus Helicopters Inc.

Airbus Helicopters' support contract for the UH-72A Lakota has a potential five-year value of nearly US$1 billion. **Skip Robinson Photo**

Airbus Helicopters Inc. has been awarded a Contractor Logistics Support (CLS) contract by the U.S. Army to provide spare parts, material, and engineering support for the Army's UH-72A Lakota fleet of utility and training helicopters.

The contract includes a base year and four one-year options, with a potential five-year value of more than US$967 million. Airbus Helicopters Inc. will provide the support at Army and National Guard bases in 43 states, as well as in Kwajalein, Guam, Puerto Rico, and Germany. The U.S. bases include Fort Rucker in Alabama, where the UH-72A is operational as the Army initial-entry training helicopter.

An initial contract installment of $17.4 million has been exercised.

The CLS contract with the Army is one of the largest performance-based support contracts managed by Airbus Helicopters worldwide. The new agreement is a follow-on contract to successful completion of 10 years of CLS support by Airbus Helicopters Inc.

"This contract shows that the people of Airbus Helicopters have proven that we can and will meet our commitments to provide high-quality helicopters and outstanding support to the men and women that serve our country in the U.S. Army," said president Chris Emerson. "For a decade we have continuously delivered helicopters, spare parts, and other support to the Army on time and on budget. We will continue to meet the Army's requirements."

"We are honored that the U.S. Army has chosen to renew its support and services contract with Airbus Helicopters Inc.," said Matthieu Louvot, executive vice-president, customer support and services of Airbus Helicopters. "This contract underscores how Airbus can provide the highest service level to deliver the fleet availability rate required by the demanding missions of the U.S. Army."

Management of both UH-72A production and logistics is conducted out of the company's headquarters in Grand Prairie, Texas, with production performed in Columbus, Mississippi.

To date, 393 UH-72As have been delivered to the Army and are in use in support of vital missions including training, air medical transport, and search-and-rescue, with Army National Guard units flying Lakotas in support of Customs and Border Protection operations on the Southwestern border.

The Naval Test Pilot School at Patuxent River, Maryland operates five Lakotas and the Royal Thai Army operates six. The Army has contracted for 423 Lakotas, including those for the Naval Test Pilot School and the Royal Thai Army.

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CAE selected as training partner by U.S. Army

CAE USA has been awarded a U.S. Army contract to provide rotary-wing flight training instructor support services. Under terms of the contract, which was awarded as a cost-plus-fixed-fee contract for over US$50 million for the transition and base one-year period, CAE USA will provide classroom, simulator, and live flying instructor support services for the U.S. Army's Aviation Center of Excellence (USAACE) at Fort Rucker, Alabama.

The total value of the contract, including the one-year base contract and then eight one-year options through March 31, 2026, is expected to be more than US$450 million.

"We are honored the U.S. Army selected CAE once again as its training partner to support the instruction required for its new helicopter pilots," said Ray Duquette, president and general manager, CAE USA. "This contract for rotary-wing training instruction follows a major contract awarded by the U.S. Army to CAE for fixed-wing flight training that will see us open a new training center in Dothan, Alabama in March. This is yet another example of CAE's strategy to focus on long-term training services that leverage our training systems integration expertise."

The U.S. Army's Initial Entry Rotary-Wing (IERW) training program is responsible for providing the training required to qualify new Army helicopter pilots. Approximately 900 students annually receive academic (classroom), simulator, and live flying training on TH-67 Creek and UH-72 Lakota helicopters. Following graduation from the IERW training program, aviators are assigned to continue helicopter training on one of the Army's frontline combat helicopters (UH-60 Black Hawk, AH-64 Apache, or CH-47 Chinook) or transition to the Army fixed-wing flight training program that is also run by CAE. The Army's IERW program also supports initial helicopter training for the U.S. Air Force.

Approximately 300 people will become CAE employees and will be based at Fort Rucker. CAE will be supported on the program by small business subcontract partners, including Navigator Development Group and Cardinal Point.

Elbit Systems awarded BrightNite contract

Elbit Systems announced in January that it has been awarded a contract to supply its groundbreaking, multi-spectral BrightNite system to an air force in a NATO country. The contract, in an amount of approximately $17 million, will be performed over a 30-month period.

"We are proud to have won this contract, which enables helicopter pilots to gain highly advanced operational capabilities by flying in more than 90 percent of the nights and in adverse weather conditions," stated Bezhalel "Butzi" Machlis, president and CEO of Elbit Systems. "The BrightNite revolutionary solution is suitable for a variety of missions such as special forces and search-and-rescue. Given the important role helicopters are playing in the modern battlefield and the necessity of operating at night, we hope other customers will follow this selection by a NATO country's air force."

Lightweight and compact, BrightNite is a multi-spectral end-to-end panoramic piloting solution that delivers landscape scenery directly to both eyes of the pilot, along with 2D flight symbology and 3D mission symbology, including Elbit Systems' unique brownout symbology. The scenery picture is driven from a multi-spectral sensor that fuses multiple day and night cameras into one intuitive piloting picture regardless of outer light conditions, enabling head-up, eyes-out orientation flight in pitch dark and other low-visibility landing conditions.

Elbit's BrightNite uses a multi-spectral sensor to fuse multiple camera images into an intuitive piloting picture. **Elbit Systems Photo**

Elbit said its system is ideal for low-flying helicopters, which are especially vulnerable to threats such as difficult terrain, enemy fire, and obstacles in the flight path. In contrast to night vision goggles, the BrightNite system provides pilots with a more complete field of view even in total darkness, poor weather conditions, brownouts, whiteouts, and sandstorms.

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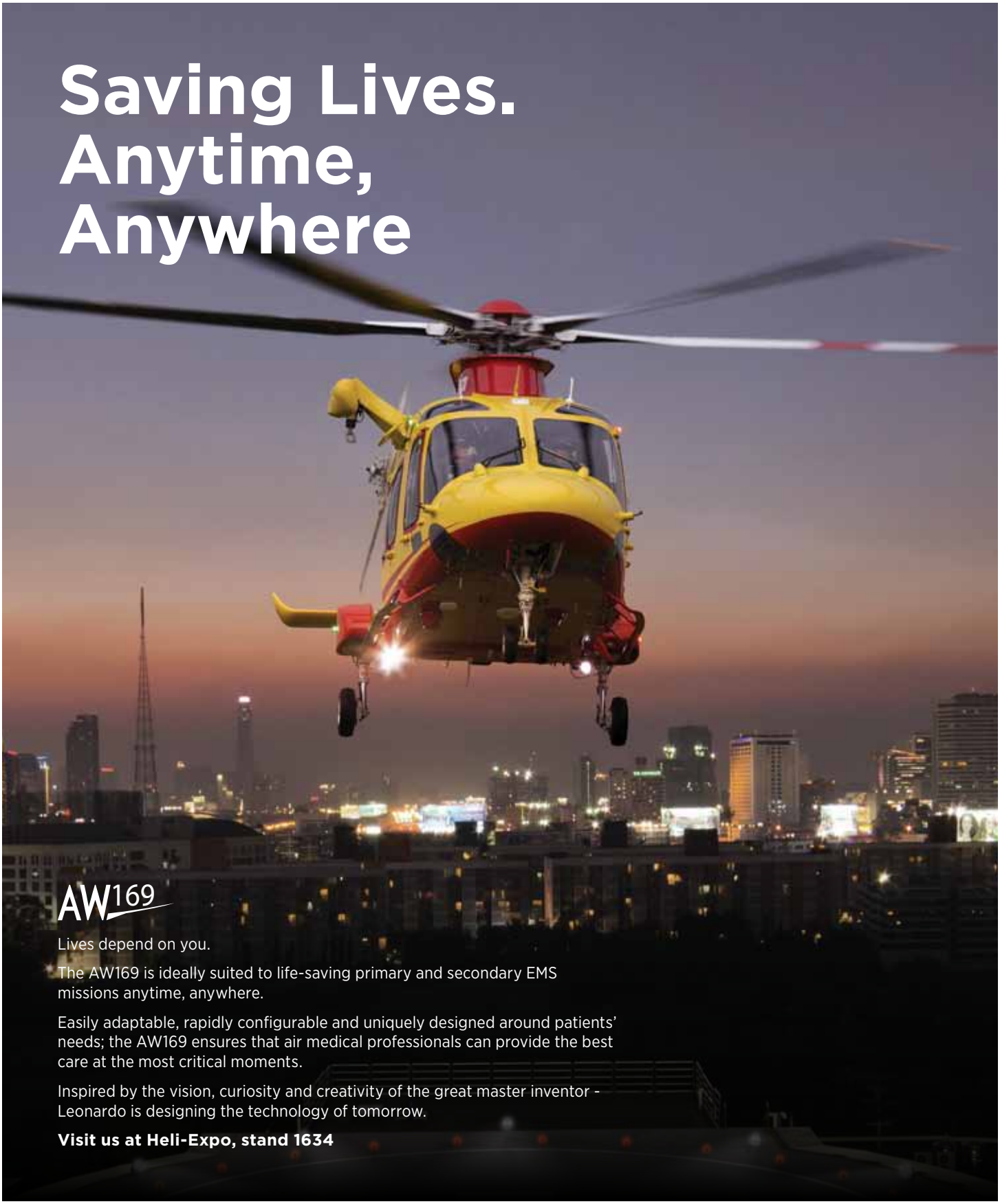

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At an avalanche rescue mission in Austria with ÖAMTC's Christophorus 8, an Airbus Helicopters EC135.
Robert Niederwolfsgruber Photo

From **Paul Sadler**, a shot of a Leonardo Helicopters AW139 operated by Toll Air Ambulance, which launched its new service in the southern zone of New South Wales, Australia, in January 2017.

Anytime, anywhere. **Chris Pitcher** captured this shot of a NAS Whidbey Island search-and-rescue crew conducting training with a Sikorsky MH-60S Seahawk in northwest Washington state.

A flight of specially marked CH-46Es from HMMT-164 do a tactical formation flight near Twentynine Palms, California.

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REMEMBERING THE PHROG

A look back at the CH-46's five decades of service with the U.S. Marine Corps.

Story and Photos by Skip Robinson

The Boeing-Vertol CH-46E helicopter is now retired from the U.S. Marine Corps, but this long-serving aircraft will not soon be forgotten.

The CH-46 traces its legacy to the company that pioneered tandem-rotor helicopters, Piasecki Helicopter, which later became Vertol, and then Boeing-Vertol. In 1956, the company began work on a new twin-turbine tandem-rotor helicopter called the Vertol V-107, which made its first flight on April 22, 1958.

The U.S. Army signed a contract for 10 models of a production version designated as the YHC-1A, the first of which flew in August 1959. After testing the YHC-1, however, the Army decided it needed a larger aircraft, which led to the development of the well-known CH-47 Chinook series of helicopters.

Meanwhile, the U.S. Marine Corps had a requirement to replace the popular but aging Sikorsky CH-34 with a new-technology, twin-turbine, medium-lift assault helicopter. At the same time, the U.S. Navy was looking for a new utility and vertical replenishment helicopter with essentially the same capabilities.

Following a competition between the Sikorsky S-61 and the military version of the V-107 (with the company designation of V-107M), the Marines decided that the Vertol, although it cost more, was the aircraft that best fit its desired specifications and program schedule. In early 1961, the Marines awarded Boeing-Vertol a contract for the 107M, or HRB-1 "Sea Knight" as the Marines designated it. The Navy also decided on the 107M for its new medium-lift ship-based utility helicopter.

Following the first flight of the Sea Knight in August 1962, the Navy and Marine designation was changed to CH-46A. After modifications for the Navy's vertical replenishment role, and continued testing, the service introduction of Marine and Navy UH-46As began in November 1964. These aircraft were delivered with a pair of 1,250-horsepower General Electric T58-GE8-8B turboshaft engines providing the power to lift 4,000 pounds (1,815 kilograms) of external cargo or carry up to 18 passengers internally.

A standard CH-46 crew consisted of two pilots, one crew chief, and one gunner/observer. Having a rear ramp was a selling point for the CH-46A, and over the years proved to be an extremely useful feature for the aircraft during parachuting and over-water troop drops. The ramp also allowed the CH-46 to do "main-mount" (rear gear only) landings to unload the aircraft when the nose gear couldn't be utilized.

The CH-46A, like most helicopters of the time, had teething issues, including fatal crashes that required additional engineering

The CH-46E worked daily until the end of its military service. Here, a CH-46E performs a tactical landing to pick up troops during a movement at the Marine Corps base at Twentynine Palms, California.

> **EVEN WHEN NEAR RETIREMENT, THE CH-46E'S AVAILABILITY AND UTILIZATION RATES WERE AT HISTORIC HIGHS.**

development. Eventually, however, the helicopter became a mechanically sound and useful aircraft. This was important because the CH-46A was being deployed with Marine Medium Helicopter (HMM) squadrons to the Vietnam War theater in increasingly large numbers.

The trial of Vietnam combat showed there was a requirement for a more powerful version of the CH-46. The aircraft were being required to carry armor and heavy defensive machine guns. Add in the hot, high, and mountainous conditions in country, and the CH-46A's performance was suffering to the point that its payload was decreasing substantially.

Beginning in 1966, an improved version, the CH-46D, began to be delivered to the Marines. More powerful 1,400-horsepower T58-GE-10 turboshaft engines and improved rotor blades gave the CH-46D the ability to lift 7,000 pounds (3,175 kilograms) of cargo or carry 25 troops.

The CH-46D deployed to Vietnam in 1967, giving HMM squadrons a substantial increase in capability and a more reliable helicopter. The aircraft could now carry armor and defensive machine guns, and still have enough lift for fuel and the troops it needed to carry on a daily basis. Unfortunately there were also some design issues with the CH-46D, including tail pylon failures, but these were resolved with further engineering.

The final Marine production model was the short-lived CH-46F. This was built from from 1968 to 1971 and operated untill the late 1970s. The F model retained the D-model's T58-GE-10 engines and had the same performance as the CH-46D. The main improvement from a D model was to be revised cockpit avionics. The F had provisions for the very advanced Integrated Helicopter Avionics system that would give the aircraft internal navigation, a true low-level formation and all-weather flight capability. This system could have been the beginning of glass cockpits in helicopters, but it ended up increasing in cost and being delayed until the program was finally canceled.

When the last CH-46F was delivered in 1971, it was the 624th and final production Sea Knight. CH-46A, D, and F models continued to operate into the late 1970s, when an estimated 275 of them went through a major upgrade conversion program to become the CH-46E "Battle Phrog." This program finished up in 1978. The CH-46E received a more durable drive train, composite main rotor blades and substantially more powerful 1,870-horsepower T58-GE-16 engines. A new electrical system, improved hydraulics, and more crashworthy

Vertical 911 was able to accompany the delivery of a CH-46E to the "boneyard" at Davis Monthan Air Force Base in Tucson, Arizona. Here, a lineup of previously delivered CH-46Es.

A CH-46E from HMMT-164 with a historic paint scheme taxis past a UH-34D once operated by HMM-163 during the Vietnam War era.

Loading troops for an assault mission aboard the U.S. Navy LHD USS Makin Island.

"Flying the barn" with HMMT-164.

fuel system were also installed. On the inside, an updated cockpit, pilot seats, and an additional gun mount were added to the rear ramp.

CH-46Es have received continuous updates over the years. Cockpit avionics were improved, and in the late 1980s, the cockpits became night vision goggle-compatible. The CH-46E fleet was also retrofitted with larger capacity 175-gallon fuel sponsons. In the mid-2000s, the CH-46E aircraft survivability systems were upgraded. These included the missile warning system, infrared missile jamming system, and countermeasures dispensing system.

During the same period, multiple weight reduction efforts occurred, including procuring lighter weight ceramic armor to replace the original Vietnam-era metal armor over the engines and flight controls. Also procured were new lightweight crashworthy armored pilot seats. These two upgrades lightened the aircraft by many hundreds of pounds and gave a notable increase in performance.

Over its lifetime, the CH-46E Battle Phrog's primary mission of assault troop transport never changed. Secondary missions consisted of moving cargo and supplies, medical evacuation of wounded from the battlefield, recovery of aircraft and personnel, support of forward refueling and rearming of attack helicopters, and vertical replenishment when deployed aboard a ship. The HH/CH-46 also flew as a dedicated base rescue helicopter at Navy and Marine bases around the world.

Interestingly, even when near retirement, the CH-46E's availability and utilization rates were at historic highs. The last West Coast squadron to operate the helicopter was HMMT-164 (the "Knightriders"), the last East Coast squadron was HMM-774 ("Wild Goose") and the final Marine operator was VMR-1 (the "Roadrunners"), which operated the search-and-rescue version of the aircraft, the HH-46E.

Vertical 911 had the opportunity to visit with different CH-46E West Coast squadrons over the last years of the aircraft's service life. We were also invited on a trip to Davis Monthan Air Force Base to deliver a CH-46E to the boneyard and see CH-46Es being preserved at the base. Some of these aircraft have since gone on to fly with the Department of State Air Wing operating in Afghanistan. Four CH-46Es have also been purchased by Sky Aviation of Worland, Wyoming, and have been retrofitted and repainted to become firefighting and utility helicopters.

Sky Aviation just completed its first season of operating the CH-46E in its new civilian capacity. The company told *Vertical 911*, "We had our first aircraft, 461WY, out on fire consistently throughout the summer season and also for a late season assisting with the fires in Georgia this fall. We have been extremely happy with the performance of the 46. It has met and exceeded our expectations, and the teams we worked with this summer were very pleased with our range, duration, and lift capacity out on fire. This winter we are continuing to streamline our aircraft, removing weight as needed, and fine tuning it for optimal firefighting with a long line."

Meet the KING

With the CH-53K approaching low-rate initial production, we went behind the scenes with Sikorsky to learn more about this high-tech heavy lifter.

Story by Elan Head | Photos by Mike Reyno

The CH-53 legacy spans more than 50 years, with the YCH-53A having made its first flight on Oct. 14, 1964. The CH-53K may look similar to previous 53 models, but it is a fundamentally different, more capable aircraft.

There are three things you should know about the Sikorsky CH-53K. It's big. It's strong. And it's smart.

Big, because it's a CH-53, so of course it is. The K occupies the same footprint as the aircraft it's replacing, the CH-53E Super Stallion, which is already the largest and heaviest helicopter in the United States military.

But the K will be substantially stronger than the E, thanks to three GE Aviation T408 engines that pack around 7,500 horsepower each (compared to the roughly 4,500-horsepower engines on the CH-53E). Despite retaining the same exterior dimensions, the K will have a maximum gross weight with external load that is 20 percent greater than the E model's. It will be able to carry up to three times the payload in hot-and-high conditions.

And it has brains as well as brawn. The CH-53K features fly-by-wire flight controls with active inceptors and tactile cueing, allowing pilots to anticipate limits while keeping their eyes outside. When there's nothing to see outside — as in brownout or whiteout conditions — the K's advanced software will allow it to essentially fly itself.

Of course, if you've been following the CH-53K program in recent years, you probably know most of this. What you may not have heard is how the aircraft is actually performing, now that the program has logged more than 300 flight test hours.

To find out, we went behind the scenes of the CH-53K program at Sikorsky's Development Flight Test Center in West Palm Beach, Florida. There, we got up close and personal with the K, and spoke with its designers, test pilots, and program managers.

They're biased, of course. But it's easy to understand their enthusiasm for what is certainly one of the largest, most technologically advanced rotorcraft ever built.

"It's just an incredible leap in technology," said Lt. Col. Foster Carlile, who as lead operational test director for the U.S. Marine Corp's Marine Operational Test and Evaluation Squadron 1 (VMX-1) has been one of the first Marines to get his hands on the aircraft.

"The flight control laws and how the aircraft maneuvers and the information that's provided to the pilot is just tenfold what we're used to," he said. "It's really pretty impressive."

FILLING A NEED

There's no question that the Marines — who have ordered 200 of the aircraft —need what the CH-53K has to offer. After years of heavy use in combat and humanitarian operations, the CH-53E fleet has been stressed to the breaking point. Last year, a "Super Stallion Independent Readiness Review" commissioned by the Marines found that the CH-53E fleet suffers from

The CH-53K's main rotor is 79 feet (24 meters) in diameter, and its tail rotor alone produces as much thrust as the main rotor on a Sikorsky S-76 helicopter. "There is nothing small, and frankly there is nothing delicate, about this aircraft," said chief engineer Andreas Bernhard.

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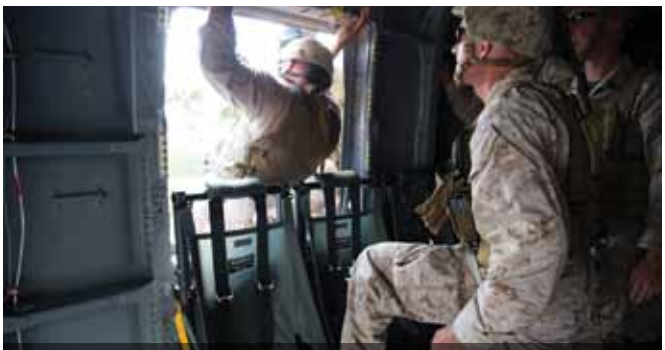
"inadequate inventory; unacceptable availability of the remaining inventory; too many aircraft in maintenance outside the squadrons; and CH-53E aircraft [were] not reset during and after the war."

The findings prompted the Marines to undertake a complete reset of 147 CH-53Es, a process that is expected to take three years. But that's really a stopgap measure to keep them flying until the CH-53K achieves full operational capability, which is currently anticipated in 2029 (with initial operational capability expected in 2019). Only then, according to the Marines, will they have an aircraft that can operate "at distances, airspeeds, and gross weights sufficient to support the full range of military operations."

Really, the Marines needed the CH-53K yesterday, but the program — which was first authorized in 2005 — is now about four years behind its original schedule. In 2011, the U.S. Government Accountability Office (GAO) attributed nearly three years of this delay to early difficulties, including the fact that the program started development before determining how to achieve requirements within program constraints. Since then, early development testing revealed the need for redesigns to the gearbox and other critical components, which have caused the schedule to slip by another year.

As the GAO recently observed, the five-year gap between the CH-53K program's critical design review and its first flight, in October 2015, "is not consistent with best practices." But the CH-53K is not an upgraded E model — it's a brand-new design

The CH-53K has an elastomeric main rotor hub and new composite rotor blades, which eliminate the pressurized spar found in earlier CH-53 models.

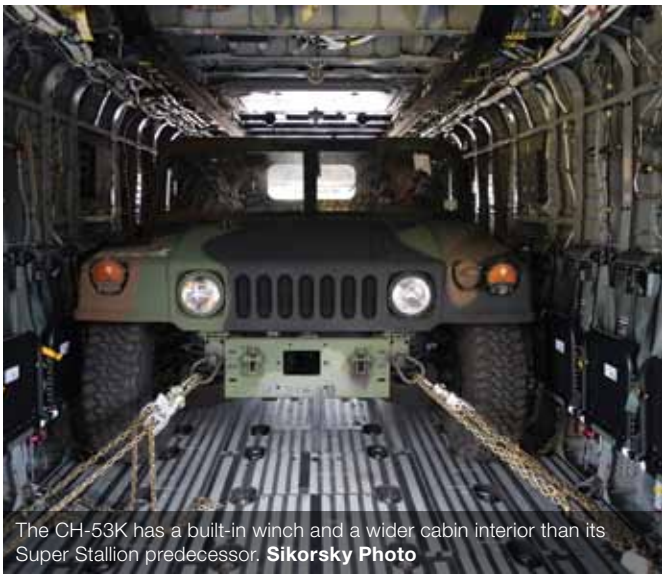


The CH-53K's windows have been enlarged to permit easier exit in an emergency, and its troop seats are fully crashworthy. **Sikorsky Photo**

Chasing the CH-53K during a recent test flight. By mid-December 2016, the program had reached 314 flight test hours.

The tail of the CH-53K features an energy-absorbing strut.

The CH-53K's sponsons are slightly narrower than the sponsons and "bat wing" auxiliary fuel tanks on the E model.



The CH-53K has a built-in winch and a wider cabin interior than its Super Stallion predecessor. **Sikorsky Photo**

that just happens to look like a Super Stallion. That has naturally presented some challenges.

"This is a new aircraft," emphasized Sikorsky's chief engineer for the CH-53K, Andreas Bernhard. "There's no common part number between this aircraft and the old aircraft."

A key performance parameter for the CH-53K is the ability to carry a 27,000-pound (12,245-kilogram) external load over 110 nautical miles at an altitude of 3,000 feet and temperature of 91.5 F (33 C). That's about three times the lifting ability of the E model in similar conditions. Meeting this ambitious goal required not only the three fuel-efficient GE T408 engines, but also a new split-torque transmission system to handle all that power.

It was during bench testing that engineers discovered a problem with a gear retention rod in the main rotor gearbox — the design issue that was responsible for some of the recent program delays. The retention rod was redesigned, bench tested, then tested further in the full-sized CH-53K ground test vehicle before being incorporated into the program's four flying prototypes.

Now, according to Col. Hank Vanderborght, U.S. Marine Corps H-53 program manager, "Our gearbox issues are basically largely resolved. We haven't seen any other problems with the gearbox." The other good news, he added, "is that we did find these things. Because what you don't want to do is find them when the aircraft is already fielded."

Besides the new engines, the CH-53K also gets a performance boost from new composite rotor blades, which as a bonus eliminate the pressurized spar found in earlier CH-53 models. The rotor blades on the CH-53E are a "high maintenance driver" on the CH-53E because they tend to lose pressure from their spars, explained Sikorsky's chief experimental test pilot for the CH-53K, retired Marine pilot Stephen McCulley. With the K, he said, "that failure mode was removed."

Yet the most fundamental technology leap in the K is probably its fly-by-wire flight control system, which enables capabilities that simply aren't possible with the hydro-mechanical flight controls in the CH-53E. According to Bernhard, the CH-53K benefited from Sikorsky's several generations of fly-by-wire development on aircraft including the CH-148 Cyclone and the UH-60M Upgrade Black Hawk.

"We have leveraged quite a bit of that technology and that learning curve," said Bernhard. "So we avoided a lot of pitfalls because of that."

"This is not an attack aircraft, this is a pickup truck. A big, big pickup truck," said chief engineer Andreas Bernhard.

The fly-by-wire system is complemented by active inceptors developed by BAE Systems, including sidearm cyclic controllers that free up the space occupied by a conventional cyclic control. The pilot and co-pilot controls are electronically linked, so that each pilot can feel control inputs made by the other. The collective and cyclic control sticks (inceptors) also provide tactile feedback to the pilots as they approach power or bank limits.

"I can pull up to my 19,000 shaft horsepower, and right before the [rotor rpm starts to drop] I'll get a little bit of a buzz [in the collective], and I can back off from that," McCulley explained. "I can pull through it if I need to, but it gives me cues and feedback with my eyes outside."

SAVING LIVES, TIME, AND MONEY

So what do all of these innovations mean for how the aircraft performs? In his Marine career, McCulley flew CH-53A, D, and E models, in addition to logging time in the MH-53 and CH-53GA (the "German Advanced" variant of the CH-53). "So yes, I've flown them all," he told us. "This so far is my favorite."

According to McCulley, the CH-53K handles like a smaller helicopter, despite its massive size. "I think that's because we've got such a large rotor disc that enables us to do this heavy-lift mission, this 36,000-pound load, that when you don't have that load on there, this thing is very maneuverable, very nimble," he said. "When you're flying at an internal gross weight of 60,000 pounds, it's a sports car."

The full authority fly-by-wire flight control system also enables the aircraft to fly itself very precisely. Pilots can program the aircraft to fly an approach to a specific landing spot, where it will decelerate and roll itself into a hover at 50 feet above the ground. That capability could be life-saving in dusty "brownout" environments like Iraq and Afghanistan (where, as Lt. Col. Carlile put it, every approach into the dust in a CH-53E "would take five years off your life").

"Now I can go into a brownout without touching the controls and come to a hover," McCulley explained. After the dust clears, "I can dial myself down to the ground with my [radar altimeter] or I can fly it myself, but I don't have to go white knuckle on the controls because it will do it for me, and it's got all of the authority it needs to make those adjustments."

The automatic flight control system also enables precise control inputs when positioning over or delivering an external load. "With this system, you can come into a point, and if [the crew chief says] 'left five,' I click it five times," McCulley continued. "I hate to say it, but the aircraft flies better than I do."

In fact, the CH-53K's control architecture opens the door to remotely piloted or autonomous applications in the future. "If they ever want to go no pilot, no problem," said McCulley. "It's not built in; however, because it is fly-by-wire, because it is fully digitally controlled, it's no different than the autonomous aircraft that we're currently flying."

The CH-53K has also been designed to make life easier for cabin and ground crews. Crew chiefs will have wireless intercom systems. The aircraft has a built-in winch, and its interior is wide enough to accommodate 463L master pallets, so pallets won't have to be broken down before loading. "The time on ground between a 53 Echo and a 53 Kilo, for the same payload that you're going to carry, is a fraction," noted Bernhard.

There have also been some safety enhancements in the cabin. The triple hook hell holes have been redesigned to reduce the risk

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If all goes according to plan, the Marine's first CH-53K fleet squadron will be stood up sometime in 2019.

"THIS THING IS VERY MANEUVERABLE, VERY NIMBLE. WHEN YOU'RE FLYING AT AN INTERNAL GROSS WEIGHT OF 60,000 POUNDS, IT'S A SPORTS CAR.

Sikorsky expects the CH-53K baseline flight testing program to last another two-and-a-half years. Marine pilots integrated with Sikorsky's flight test team at an early stage of development.

of people falling into them. Integrated rails will allow crew chiefs to move the length of the cabin while remaining tethered to the aircraft, and the troop seats are fully crashworthy. The windows have also been enlarged to permit easier exit in an emergency.

Meanwhile, maintainers should appreciate the CH-53K's health and usage monitoring systems (HUMS) and built-in diagnostics capabilities. "From the ground up, we've designed the diagnostic system to be self-reporting, so our intent there is to make it easy for the [maintainers] working on this aircraft," said McCulley. "They can come in and download, and it will tell them everything that's broken, down to a line replaceable unit, so they know what to pull out and repair."

The CH-53K has built-in diagnostics for shaft balancing, rotor balancing, rotor track and balance, and tail balance. Automatic engine health monitoring is also built in. "The other beautiful thing here is [the CH-53K] will do its entire mission spectrum, all the way down to the engines being at zero margin," added McCulley. "It's going to be a change for the Marines because they're used to engines that don't have that capability."

And when the engines are changed out, the aircraft will no longer require a full flight control rig, thanks to the full authority digital engine control and fly-by-wire control system. With the CH-53E, McCulley recalled, "that was a full-day effort, to do that rig. [In the

CH-53K] an engine change, if I have to make an engine change, becomes half a shift."

While the technology in the K should make routine maintenance tasks easier, the real aim is to dramatically reduce the overall maintenance burden compared to the CH-53E, which requires more than 40 maintenance hours per flight hour. Improved components — such as engines with 64 percent fewer parts than the engines on the E model — should help with this goal.

More fundamentally, the CH-53K's integrated vehicle health monitoring system will allow the Marines to track trends across the fleet in order to anticipate and prevent component failures.

"The real power of HUMS is the fleet management capability," said Bernhard. "We can give the fleet user a much better ability to take what used to be reactive maintenance . . . and turn that into preventative, pre-planned maintenance."

LOOKING TO THE FUTURE

The CH-53K program has made strong progress since first flight in October 2015. All four flight test vehicles are now flying and gradually expanding the aircraft's envelope. Already, the CH-53K has flown at an altitude of 10,000 feet, reached an airspeed of 185 knots, and lifted loads up to 27,000 pounds.

In October 2016, the aircraft successfully completed initial operational testing by the Marine Corps, a key step in the transition from development to production. The week-long operational assessment included lifting 27,000 pounds in a hover, and carrying a 12,000-pound load on a 110-nautical-mile mission. Ground evaluations included the embarkation and debarkation of combat-equipped troops, internal and external cargo rigging, tactical bulk fuel delivery system operation, and medevac litter configuration.

"The operational assessment was really the first time where we had a Marine Corps crew fly the aircraft and perform operationally representative mission profiles," said Col. Vanderborght.

Now the program is rapidly approaching the "Milestone C" decision for low-rate initial production, which is anticipated in the second quarter of 2017. In addition to securing the necessary contractual agreements, successful completion of Milestone C requires the program to have reached 400 flight test hours. By mid-December 2016, the program had reached 314 flight test hours and was logging them at the rate of 50 to 60 hours per month.

"We're on a really good path to achieving Milestone C," Vanderborght said at the time.

After low-rate initial production is approved, the flight testing program will continue in parallel. Dr. Michael Torok, Sikorsky's vice president of the CH-53K program, said he expects the baseline flight testing program to last another two-and-a-half years.

"In general, we'll hit most of the envelope expansion probably by next summer, toward the fall," he said. "Beyond that, the rest of the back end of the testing, is filling out the specific details of all

The CH-53K's center hook is rated for 36,000 lbs. (16,329 kg), while the fore and aft hooks are rated for 25,200 lbs. (11,400 kg).

Two of the four CH-53K flight test vehicles are dedicated to general flight envelope expansion. Another will be used for focused testing of the propulsion systems, while the fourth will be used to test avionics and flight controls. **Sikorsky Photo**

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the points, of all the conditions, so that we have a really comprehensive set of data, which will support the aircraft for the next 40 years."

Four CH-53K engineering demonstration models will be used for developmental testing by Air Test and Evaluation Squadron 21 (HX-21) at Naval Air Station Patuxent River, Maryland. Two of these will later be converted into practical job trainers for initial accession training in New River, North Carolina, which is also where the Marine's first CH-53K fleet squadron will be stood up. If all goes according to plan, that should happen sometime in 2019.

The Marines can hardly wait. "One of the primary, if not the primary element to victory in warfare is logistics. And the K is right in the middle of that, it's a key logistical enabler," said Vanderborght. "It's really going to enable the Marine Corps to project power ashore from the sea, and really mechanize those future

With improved fuel efficiency and maintainability, the CH-53K should be less expensive to operate than the CH-53E. "The 53 Echo is an expensive aircraft to fly," said CH-53K chief designer Andreas Bernhard. "For the Marines, it is a serious burden and a hard decision on when do you send the 53 Echo, because it's so expensive."

warfighting concepts that our nation is looking to be able to do in the future."

For the pilots who will be flying the CH-53K in theater, the aircraft's promise is more personal.

"Marines, our whole mission in life is to support the infantry, support the ground units, whatever they need," said Lt. Col. Jonathan Morel of HX-21, who is the chief government test pilot for the CH-53K. "And so if they say, 'We need this,' and you crunch the numbers and you say, 'I can't do it,' that hurts. . . . All of the things [on the CH-53K] are going to let our community be able to say 'yes' much more often to whatever the request is."

Elan Head | An FAA Gold Seal flight instructor with helicopter and instrument helicopter ratings, Elan holds commercial helicopter licenses in the U.S., Canada and Australia. She is also an award-winning journalist who has written for a diverse array of magazines and newspapers since the late-1990s. She can be reached at elan@mhmpub.com.

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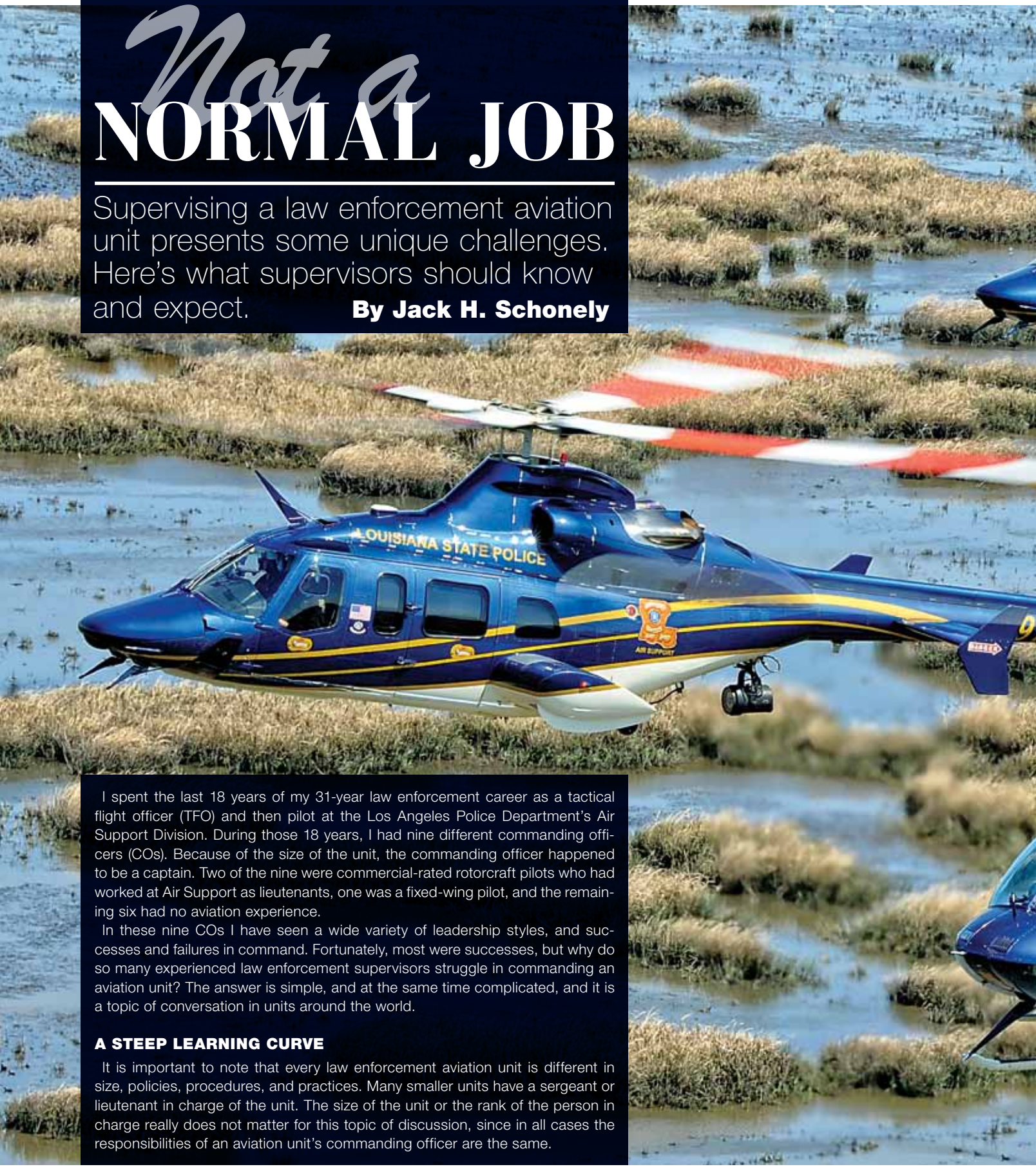
Not a NORMAL JOB

Supervising a law enforcement aviation unit presents some unique challenges. Here's what supervisors should know and expect.

By Jack H. Schonely



I spent the last 18 years of my 31-year law enforcement career as a tactical flight officer (TFO) and then pilot at the Los Angeles Police Department's Air Support Division. During those 18 years, I had nine different commanding officers (COs). Because of the size of the unit, the commanding officer happened to be a captain. Two of the nine were commercial-rated rotorcraft pilots who had worked at Air Support as lieutenants, one was a fixed-wing pilot, and the remaining six had no aviation experience.

In these nine COs I have seen a wide variety of leadership styles, and successes and failures in command. Fortunately, most were successes, but why do so many experienced law enforcement supervisors struggle in commanding an aviation unit? The answer is simple, and at the same time complicated, and it is a topic of conversation in units around the world.

A STEEP LEARNING CURVE

It is important to note that every law enforcement aviation unit is different in size, policies, procedures, and practices. Many smaller units have a sergeant or lieutenant in charge of the unit. The size of the unit or the rank of the person in charge really does not matter for this topic of discussion, since in all cases the responsibilities of an aviation unit's commanding officer are the same.

Law enforcement aviation is complex in many ways, which creates a steep learning curve for commanding officers with no previous aviation experience. **Mike Reyno Photo**

*Download this as a wallpaper **here**!*

Supervisors of law enforcement aviation units must accept the philosophy that "there is no rank inside the cockpit." **Skip Robinson Photo**

An aviation unit is a unique operation within a police department. It is a very specialized unit with a very large budget. Some would say that SWAT, K-9, or bomb squad units also fit into this category. I would agree — up to a point. A SWAT supervisor who was never a SWAT operator is going to have a very steep learning curve to effectively lead that team, but aviation units are even more challenging, for several reasons.

Many new commanding officers have little or no working knowledge of aviation in general, much less law enforcement aviation, which is very complex in many ways. They enter the new position enthusiastically, only to quickly learn that they know virtually nothing about what they need to know.

For example, they may be very acquainted with the rules of the police department, but now they find out that the Federal Aviation Regulations (FARs) control a great deal of what they can and cannot do as they manage the unit. The Federal Aviation Administration does not care what a chief or a sheriff might think when it comes to training, equipment, policies, and procedures. Most new COs adjust to this over time, but some never do, and *that* becomes a problem for mission, safety, and morale.

An excellent example of this occurred with a newer CO listening in on a discussion about whether or not to cancel a training day with SWAT. The sergeant of the cadre brought together the pilots, the safety officer, and the chief pilot to have an open discussion and risk analysis of the training situation for that day. After each individual had given their opinion, it was determined that the training day be canceled for many good reasons and for overall safety of everyone involved.

The CO then spoke up and said, "That's great that you all had this discussion, but on a real mission that won't happen. You just do the mission." Now *that* statement is ridiculous, incorrect, and unsafe. We were all stunned at what we had just heard, for obvious reasons. That was a cop talking, not an aviation unit manager.

The sergeant had to later explain to the captain that in fact we would have that discussion before a real mission as well. It wasn't the captain's fault: he had no aviation training, had never heard of aviation risk analysis, had no knowledge of the FARs, and didn't know our procedures. This is not an unusual example at all. Law enforcement aviators from around the world have told me similar stories.

SOME WORDS OF ADVICE

It is not easy coming from a command where you are very familiar with the rules, supervising young inexperienced officers, and having little or no say in budgeting for the unit. Suddenly you are in a world with rules from outside the department, supervising experienced professionals, and signing contracts for the purchase of multi-million dollar aircraft. Many are not prepared for that and struggle with the transition.

So let's look at some constructive suggestions for new commanding officers about to enter this world of aviation.

You must be willing to learn. A lot of the learning will occur on the job while being around day-to-day operations of your unit, but there are many places to gain knowledge that will help you manage a safe and efficient operation. There are aviation unit manager courses offered by the Airborne Law Enforcement Association, University of Southern California Aviation, and Helicopter Association International. New unit commanders *must* take advantage of these learning opportunities, or they will struggle with this new position.

Commanding an aviation unit is nothing like commanding patrol officers or detectives. I have spoken to many unit commanders after taking one of these courses and the response is always the same:

Commanding an aviation unit is unlike commanding patrol officers or detectives. Professional education can help new supervisors gain the knowledge they need to manage their units effectively. **Skip Robinson Photo**

"Wow, I had no idea how much of the ultimate responsibility rests on my shoulders. I have a lot to learn." These courses change how they look at every decision they make, and that is a good thing.

Personality. Personality has a great deal to do with the success or failure of any leader, but it is amplified when you enter the world of law enforcement aviation. Entering this new command with an open mind, a willingness to listen, a willingness to learn, and being able to deal with the fact that you will never know as much as the pilots and TFOs you are commanding will be a great start. That sounds simple enough and for many it is, but for some personalities it is very difficult.

One of the most common examples of a personality issue is the "change the world" type of command. This type of leader enters this new challenge by wanting to change everything without first having an understanding of how anything even works. Particularly in units that have been around for many years, this style will not work, and it will lead to animosity among the troops. Understanding the history of the unit and all of the things that have been tried long before you arrived as the new CO is vital. You should not feel that you have to do something, anything, to manage the unit. Being patient, listening, and learning is a much better approach.

Depend on your subject matter experts (SMEs). Again, this seems obvious, but for some it is not even on the map. Every aviation unit has experts in a wide variety of fields. Maintenance,

"YOU SHOULD NOT FEEL THAT YOU HAVE TO DO SOMETHING, ANYTHING, TO MANAGE THE UNIT. BEING PATIENT, LISTENING, AND LEARNING IS A MUCH BETTER APPROACH.

New commanding officers should thoroughly understand the history of their unit before attempting to implement sweeping changes. **Skip Robinson Photo**

training, purchasing, safety, flight operations, and personnel selection are just a few areas where SMEs will exist in every unit. These SMEs *must* be consulted by a new CO before making any decision. They are a valuable resource, and they are right there at the unit to use.

For instance, changing how tactical flight officers are selected and trained without consulting the senior TFO or the chief TFO would be a disastrous mistake. Yes, that happened, and yes it was a disaster. I will always look back on that and wonder how a person could completely ignore such a valuable asset at their fingertips before making a major change in procedure.

There is no rank inside the cockpit. For those aviation units who have supervisors or even the unit commander flying missions, this is a very important topic. Most supervisors I have flown with over the years had no issue at all with this concept. They accepted the fact that inside the cockpit it was vital for mission safety that any crewmember could speak freely and not worry about rank. Army pilots and crews have dealt with this for decades and for the most part the concept works well. But it's always vital to emphasize that go/no-go and other critical decisions are made as a crew, considering the totality of the circumstances, and not by the crewmember with the highest rank.

CLOSING THOUGHTS

We have to make difficult decisions every day as law enforcement aviators. Those decisions are made based on experience, a great deal of training, knowledge of the FARs, and unit policies and procedures. All of these same things must be learned and considered by a new commanding officer of the unit.

It is not easy, it will take time, but it can be done. We've all been there: even Chuck Yeager knew nothing about aviation when he got started. New commanders should understand that they have nothing to feel embarrassed about, and that there are lots of resources available to assist them.

Welcome to aviation — it is *not* a normal job.

Jack Schonely | Recently retired after a 31-year career with the Los Angeles Police Department, including 18 years with its Air Support Division as a tactical flight officer and pilot, Jack now teaches tactical classes around the world. He is the author of *Apprehending Fleeting Suspects*. Find more information about his book and professional services at officertactics.com.

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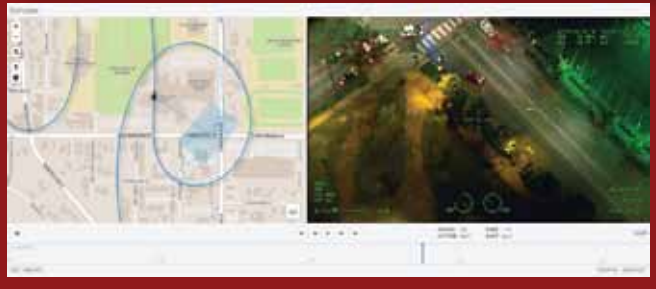

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GUNSHIP TO GO

Two new offerings — the L-3 WESCAM Mission Adaptable Weapons System and the UH-60 Weaponization Alliance Modular Weapons System — can convert utility Black Hawks into armed attack helicopters in a matter of hours. Here's how these programs came together.

Story and Photos by Dan Megna

The brightly painted red, white, and blue Black Hawk helicopter approaching the Yuma International Airport in Arizona that autumn afternoon wasn't anything out of the ordinary. It's likely that nobody raised an eyebrow when it touched down on a remote portion of the airfield and taxied to an isolated hangar on the far side of the runways, or took much notice of the group of individuals watching intently as a tug connected a tow bar and pushed it inside.

When it emerged the next day, however, people were undoubtedly paying attention. The civil Sikorsky S-70 that was pushed into the hangar had been transformed overnight into a menacing armed medium attack helicopter. An imposing array of military weapons had been mounted beneath two small "wings," and an electro-optical/infrared (EO/IR) sensor and laser designator had been installed on the nose.

Was this a prop for a Hollywood movie? No, this was the real deal, and it was about to embark on a mission to demonstrate its lethal capabilities.

BUILDING ON A LEGACY

The Black Hawk has a distinguished legacy. Introduced in 1972 as Sikorsky's Model S-70 (YUH-60), it was chosen as a prototype finalist for the Utility Tactical Transport Aircraft System (UTTAS) development program, competing against the Boeing-Vertol Model 179 (YUH-61).

UTTAS was a U.S. Department of Defense (DoD) competitive evaluation seeking a new utility/assault helicopter for the U.S. Army to replace the aging Bell UH-1 Huey for air assault, air cavalry, and medical evacuation missions.

By December 1976, the Army had completed the competitive development phase and awarded the contract to Sikorsky. Once delivered to the Army in 1978, the S-70 became known by its Mission Design Series (MDS) designation as the UH-60A. The DoD named it "Black Hawk" after the Sauk American Indian leader and warrior.

Subsequent variants of the Black Hawk provided improved performance, making it highly adaptable to an expanded variety of missions. Today, the DoD has 33 MDS variants of the H-60. They serve throughout all branches of the U.S Armed Forces and with 29 foreign military operators.

The capabilities of the H-60 are also highly regarded by civil operators in the form of the legacy S-70, which has been adapted for aerial firefighting and construction by operators including Firehawk Helicopters of Boise, Idaho. Sikorsky continues to manufacture an international military variant of the Black Hawk, the S-70i, which is

A Sikorsky S-70, here armed with 2.75-inch air-to-surface rockets (at left in the photo) and an AGM-114 Hellfire air-to-surface missile (right), was transformed overnight from a civil utility/firefighting machine into a lethal battlefield warrior.

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The versatility of the weapon systems is showcased in how quickly the aircraft can be configured and the variety of weapons that can be utilized. Here, the S-70 has a nose-mounted laser targeting designator and L-3 WESCAM MX10 EO/IR sensor. It's armed with 2.75-inch air to surface rockets (left) and a fixed forward Dillon Aero DAP-6 gun pod with a M134 Minigun (right).

used by many foreign governments for military applications and VIP transportation.

The U.S Army's 160th Special Operations Aviation Regiment (160th SOAR) was the first operator to adapt the Black Hawk as an armed medium attack helicopter. The MH-60A DAP (Direct Action Penetrator), first fielded in 1989, was configured to carry weapons and used as an armed escort and for close air support missions.

Today's modern variant, the MH-60M DAP, is the only such armed Black Hawk presently serving U.S. military operators. Its weapons include pintle-mounted 7.62mm Miniguns, both crew-served and fixed forward-firing; bore-sighted Orbital ATK 30mm chain guns on fixed mounts; and 70mm rockets. Precision weapons like the Hellfire air-to-surface or Stinger air-to-air missiles are options when integrated with the DAP EO/IR sensor and laser target designator package.

In 2012, the U.S. Army was facing tough decisions regarding its first generation Black Hawks, many exceeding 30 years of service. For these helicopters to remain operationally viable, they would require extensive and expensive inspection, overhaul, and modernization.

To ensure operational readiness, the Army's Utility Helicopter Program Management Office created the Black Hawk Exchange and Sales Team (BEST) program. Over a period of 10 years, the

program will divest 600 to 800 legacy Black Hawks consisting of mostly A and L models.

In its basic concept, the BEST program works as follows: as new UH-60M models roll off the Sikorsky assembly line destined for the U.S. Army, an "obsolete and non-excess" utility Black Hawk is pulled from the Army inventory and demilitarized. These older aircraft then enter a process making them available via sale or exchange, first to federal and state government agencies, and then to Sikorsky. Those aircraft not selected by Sikorsky will be transferred to the Federal General Services Administration to be auctioned off to U.S. and international contractors.

NEW OPPORTUNITIES

The anticipated influx of these UH-60As to the resale market inspired a number of companies to assess how the aircraft might be utilized in their next life. Many believe that, after refurbishment, foreign governments will be interested in purchasing these aircraft to fulfill any number of mission roles.

One such company was Butler National Corporation, a relatively small aerospace firm producing, among other products, weight- and space-saving gun control units (GCUs) for the Orbital ATK line of automatic cannons and chain guns. In 2012, Butler was coming off two important projects. One involved development of a light-weight gun control. The other was an innovative special mission portable weapon system, integrating the M230 30mm chain gun aboard a U.S. Navy MH-60 Seahawk. In considering these projects and the divesture of Army Black Hawks, Butler's engineers recognized an opportunity.

"With the Seahawk program, we developed a carry-on/carry-off weapon system — a portable unit containing all the power and signal distribution in one portable flight box and GCU, cables and harness in a separate carrying case, that could be quickly and easily installed into an aircraft," said Brian Reilly, Butler's VP of engineering. "From this we saw the potential to develop a gun control system that could convert existing utility S-70 and UH-60s into gunships and in a very short period of time."

In early 2015, Butler National teamed with four other companies, each with similar customer interests. They were Fulcrum Concepts, manufacturer of the ARES weapon management system; weapon manufacturer Orbital ATK; aerospace composite specialist AGC

Technicians, engineers, support crew, and pilots from over a dozen companies, large and small, came together working as a team to develop, integrate, and test the weapon systems.

Discussing the Black Hawk, Firehawk's Alex Anduze says, "It's the most durable and versatile and safe aircraft in the industry."

A variety of aerial and ground-based cameras/ infrared imagers were used throughout the testing to record all aspects of the weapon firing on the range.

Technicians install the Arnold Defense LWL-12 lightweight 2.75-inch (70mm) rocket launcher.

Few have as much Black Hawk experience as Firehawk Helicopters senior mechanic Doug Boody, here inspecting the tail rotor gearbox.

Technicians checking the functioning of a secondary weapon control station installed in the rear cabin.

A video monitor was installed in the cockpit and integrated with the EO/IR sensor for monitoring and controlling the weapon systems.

AeroComposites, and defense contractor Raytheon. Together they formed the UH-60 Weaponization Alliance.

The next step was identifying the other companies with the products and expertise to fully develop the complete weapons package, which the Alliance branded as the Modular Weapons System (MWS).

In January 2016, L-3 WESCAM began development of its own portable weapon system for the Black Hawk. This was a scaled-down version of its Mission Adaptable Weapons System (MAWS), which at its core features Fulcrum's ARES weapon management system. Two larger MAWS packages for military fixed-wing aircraft, including the AC-208 Combat Caravan and the heavily armed AC-130 Hercules, have been in use for two years. Similar to the Alliance concept, L-3's venture was intended to be a cost-effective way to rapidly reconfigure a utility Black Hawk into an armed aircraft in six hours.

Paul Jennison, VP of government sales and business development for L-3, said, "Most of our current and proposed international customer base cannot afford dedicated armed or gunship assets like the United States, and arming an aircraft presents significant cost, schedule, and technical risks. WESCAM's solution is to offer an integrated Mission Equipment Package that allows the customer dual-use utility/cargo range-proven mission and armed recon/attack mission combined with reduced cost schedule and technical risk."

By the middle of last year, WESCAM's product was in the early stages of development, but was fully funded and prepared to move forward. However, the company still needed support from other vendors. The Alliance, on the other hand, had already assembled all of its vendors and had over a year's head start in developing its MWS. In the interest of maximizing efficiency and utilizing each other's strengths, WESCAM and the Alliance developed a strategy that benefited both parties.

WESCAM would sponsor an integration test flight and qualification for the newly developed portable weapon system and provide resources for key elements of the test program. This included the range contract with the Army's Yuma Proving Grounds (YPG) and the lease of a civil S-70 helicopter from Firehawk Helicopters as the test platform. (As a longtime S-70 operator, Firehawk had also been part of the joint venture that secured the first restricted-category type certificate for the UH-60A from the Federal Aviation Administration.)

WESCAM would benefit from the sharing of resources supplied by the Alliance. In return, Alliance members would accomplish all of their goals at greatly reduced costs to them and retain ownership of their work on the MWS. They would also be provided with valuable test data gathered by WESCAM. In all, there were more than a dozen participants in the qualification event (*see sidebar, p.61*).

This past October, when the Firehawk S-70 rolled out from the Yuma hangar, it marked the culmination of nearly two years of work on the part of the Alliance and its recent partnership with WESCAM.

A team of technicians and engineers needed just six hours to transform the S-70 from utility workhorse to medium attack helicopter. The process involved installation of an MX10 EO/IR sensor, aiming laser, two Lightweight Armament Support Structure (LASS) external "wings" manufactured by Unitech Composites, Inc. (formerly ACG AeroComposites) and a weapon control station in the rear cabin. The subsequent installation and change out of each weapon system went relatively quickly.

After the installations, a series of systems and weapons checks on the ground ensured the aircraft was ready for the next step — the all-important flight test qualifications at the nearby YPG.

Nose-mounted GPS antenna (left) and laser designator (right).

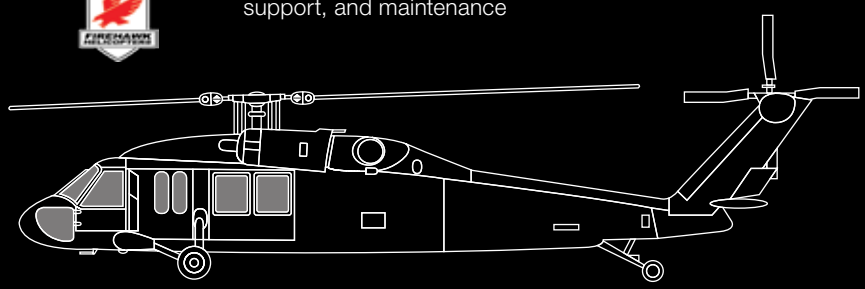
An inert AGM114 Hellfire missile was used to demonstrate target lock-on capability and a simulated firing.

Each weapon installation required a ground check to ensure integration between the weapon and the management and control systems.

The Players

More than a dozen participants collaborated on last year's armed Black Hawk qualification event. They included:

L3 Avionics Systems	MX10 EO/IR sensor and Mission Adaptable Weapons System (MAWS), Cessna Caravan for range/testing support, and overall project management
Butler National Corporation	M230 gun control unit, system integration unit, cables, and fire-control panel
BAE SYSTEMS INSPIRED WORK	Advanced Precision Kill Weapon System (APKWS), which turns a standard unguided 2.75-inch (70mm) rocket into a precision laser-guided rocket
FULCRUM CONCEPTS LLC TEKFUSION GLOBAL, INC.	ARES Weapons Management System (which controls Hellfires, rockets, Griffin A and B missiles, and guns); 10 2.75-inch rockets (three of which were armed with BAE's APKWS and two with Nammo's M282 warhead); an integration team; and an experimental test pilot
GENERAL DYNAMICS	GAU 19/B .50 caliber Gatling gun
Nammo	Two M282 warheads
Orbital ATK	M230 30mm chain gun and feed chutes
UNITECH AEROSPACE	Lightweight Armament Support Structure (LASS) for external weapon mounting
DillonAero	DAP-6 self contained gun pod with M134 Minigun and 10,000 rounds ammunition
ARNOLD DEFENSE	LWL-12 lightweight 2.75-inch (70mm) rocket launcher
MACE AVIATION	Lightweight Hellfire launcher (used for multiple missile systems) and MD 500 helicopter for range support
THALES	Scorpion helmet mounted cueing system
BRAINERD HELICOPTER SERVICE FIREHAWK HELICOPTERS	Civil S-70L helicopter, experimental test pilot, aircraft support, and maintenance



PUTTING IT ALL TOGETHER

During the flight tests, one of the two pilots aboard the S-70 used a helmet outfitted with the Thales Visionix Scorpion, touted as the world's only full-color (24-bit) helmet mounted cueing system. This provided the pilot with a virtual 360-degree heads-up display overlaid onto the rest of his "real-world" environment.

John Daley, Thales director of business development, explained, "Scorpion was integrated into the L-3 WESCAM system to provide video and bore-sight aiming information direct to pilots for continuous eyes-out, on-target sighting over a wide field of regard. This lets the pilot see anything in the sensor's field of regard, just by turning his head in that direction."

Over the next two days, the armed S-70 demonstrated successful target lock-on firing of 2.75 inch APKWS rockets, the M134 Minigun, and M230 chain gun; and a lock-on and simulated firing of the AGM114 Hellfire missile. The MX-10D was also qualified for targeting with a number of missile and rocket systems and the M134 Minigun.

Test data was collected using a variety of methods. Six cameras focused on each weapon recorded fore and aft views during each phase of fire. Accelerometers affixed at critical points on the airframe helped engineers determine weapon frequency impacts on the aircraft and targeting stability. Airborne above YPG was an EO/IR system aboard a Cessna Caravan, plus an MD 500 for additional video recording. YPG provided high-speed ground cameras at the various targets and instrumentation for assessing the accuracy and stability of the aircraft's laser during missile engagements.

At the conclusion of the in-flight test qualifications, the S-70 returned to the Yuma hangar where it was re-configured — from an armed medium attack helicopter back to a "utility" machine — in just one hour and 40 minutes.

When asked about WESCAM's takeaway from the project, Jennison said, "We're able to offer the UH-60 MAWS system for UH-60 operators who want a flyaway kit that allows them to go from utility to shooter in less than six hours, and back to utility in under two hours. Additionally, the lessons learned are also transferrable to other classes of helicopter."

Reitred U.S. Marine Corps General Terrence R. Dake, advisor to the Alliance, stated, "The ability to modify the H-60 with the menu of options we offer with our package makes the MWS extremely versatile. The multi-mission capability that is created increases the usefulness of this workhorse, which is well established around the world. The operational testing we conducted in Yuma proves

The infrared sensor aboard a range support aircraft captures a test firing of the Dillon M134 Minigun. The white-hot plumes show the hot gases from the aircraft exhausts and those emitted from firing the gun. The expended shell casings appear as white specks trailing away below.

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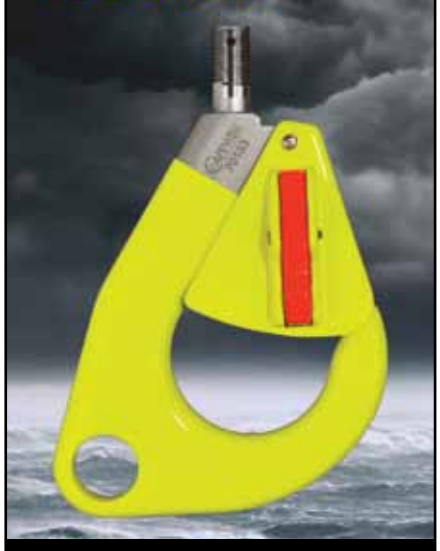

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A camera mounted on one of the aircraft's Lightweight Armament Support Structures (LASS) captures the firing of the 2.75-inch (70mm) rockets.

the concept of a modular weapon system that can be rapidly integrated into an aircraft which enhances its versatility, saving time and money."

The Mission Adaptable Weapons System (MAWS) and the Modular Weapons System (MWS) for the Black Hawk are, for all intents and purpose, the same in concept, capabilities, and hardware. The two packages were developed and tested with participation from all parties, utilize the same major components, and can be integrated with the same weapon systems. They also offer similar latitude for customization options to suit a customer's individual needs.

What is distinctive is the way in which the two systems are sourced. MAWS is available exclusively through L-3 WESCAM. The MSW is available through the UH-60 Weaponization Alliance, specifically Stan Wood at Fulcrum Concepts or Brian Reilly at Butler National Corporation.

Alex Anduze is the director of experimental flight test at Firehawk Helicopters and flew the Yuma flight test qualifications. As a former Army UH-60 pilot and a Sikorsky flight test engineer and experimental test pilot for 17 years, he has a great deal of experience with these types of flight test qualifications.

Of the Yuma testing, Anduze said, "I think this program has a great future in the Black Hawk community. There are many foreign governments looking to have an armed aircraft but they don't want to have an exclusive armed aircraft. They want to use the aircraft in different missions. So I think the concept is great and the way the program, as it was executed, was extremely successful."

Dan Megna | Retired after nearly 30 years with one of Southern California's sheriff's departments, Dan's last 18 years were spent serving in the department's aviation unit, where he logged over 8,000 hours in helicopters as a tactical officer, pilot and flight instructor.

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MADE IN USA

What are the ODDS?

Is being a helicopter air ambulance crewmember really one of the most dangerous jobs in America? What about the risk to patients? The latest data from Dr. Ira Blumen suggests some answers.

By Elan Head

The U.S. helicopter emergency medical services accident rate has been declining in recent years, but crewmembers still face greater risks on the job than do most working professionals. **Dan Megna Photo**

Few sectors of the helicopter industry have had their safety records scrutinized as closely as helicopter emergency medical services (HEMS). In recent decades, the HEMS industry in the United States has been the subject of special hearings by the National Transportation Safety Board and special rulemaking by the Federal Aviation Administration. Newspapers have written exposés. Industry working groups have pored over accident reports. And Dr. Ira Blumen, medical director of the University of Chicago Aeromedical Network, has collected numbers.

Working on the principle that "you can't manage what you can't measure," Blumen began investigating HEMS accident rates in 2000. Since 2005, he has collected detailed flight hour and other exposure data through a survey that now covers more than 85 percent of the HEMS programs and helicopters in the U.S. That's a tremendous achievement for the helicopter industry, in which flight hour data has historically been limited and unreliable *(see p.98, Vertical, Feb-Mar 2016)*. In most sectors of the industry, it's still impossible to calculate an accurate accident rate, or to say whether the rate is increasing or decreasing.

Thanks to Blumen's research, we can now say that the annual U.S. HEMS accident rate has been gradually declining in recent years, from a rate of 4.7 accidents per 100,000 flight hours in 2005, to around two accidents per 100,000 flight hours in 2016 (notwithstanding a spike in the accident rate to 3.1 in 2013). Over the same time period, the fatal accident rate has shown greater annual variation and no consistent decline, ranging from a low of 0.3 fatal accidents per 100,000 flight hours, to a high of 1.8.

To put that into perspective, the average HEMS fatal accident rate over the past 10 years (from 2006 to 2015) is about 500 times the average fatal accident rate for U.S. scheduled commercial airlines over the same time period. That's not a multiple to brag about, but it's vastly better than the figure that has often been quoted in the media — that HEMS has a fatal accident rate 6,000 times that of commercial airlines.

Blumen's data also makes it possible to calculate a figure that is more personally meaningful to HEMS crewmembers: the odds that any one of them will die in a HEMS accident in a given year. That number, however, requires a little more context.

POPULATIONS AT RISK

Calculating odds for real-life events outside of casinos generally requires a lot of assumptions. For example, the odds of dying from a specific cause assume that all individuals in a given population — whether all Americans, or all HEMS crewmembers — have the same risk exposure, which is rarely the case.

Odds are also sensitive to the size of the population. The smaller the population, the greater the impact of each event. For example, in 2014, a fleet of around 6,700 U.S. air carrier aircraft logged approximately 16.5 million scheduled revenue flight hours, according to the Bureau of Transportation Statistics. That same year, according to Blumen, there were about 850 dedicated HEMS helicopters in the U.S. that flew a combined 400,000 flight hours.

Since the HEMS fleet flies many fewer hours, each HEMS accident has about 40 times the impact on the HEMS accident rate as a single air carrier accident has on that sector's accident rate. When it comes to calculating the odds of any one aircraft in its sector being involved in an accident, a HEMS accident has about eight times the impact as an air carrier accident.

Not surprisingly, the odds of any individual HEMS program or helicopter being involved in a fatal accident tend to vary

substantially from year to year. Over the past 19 years, Blumen found that the odds of a U.S. HEMS aircraft being involved in a fatal accident averaged one in 267.

Those odds don't necessarily represent the risk to crewmembers, however, since many fatal accidents have survivors. (Overall, more than 70 percent of the 669 individuals involved in U.S. HEMS accidents between 1998 and 2016 survived their accidents, with nearly 50 percent reportedly uninjured.) Calculating the risk to crewmembers required a bit more work, because when Blumen began his research, the number of crewmembers in HEMS had never been tracked or estimated.

Blumen began by estimating the population at risk. For 2001, when hospital-based programs were the most common business model, he estimated that the average number of crewmembers per helicopter was 22 (four pilots, six to eight nurses as primary caregivers, and 10 to 12 secondary medical caregivers). In 2005, with new data, he revised that estimate downward to 18 crewmembers per helicopter, to account for the lower staffing of programs with multiple aircraft. Since the dedicated U.S. HEMS fleet in 2001 comprised around 400 helicopters, the estimated population at risk was approximately 7,200.

For more recent calculations, Blumen has further revised his estimate downward to an average of 15 crewmembers per aircraft, due to the proliferation of independent providers that typically employ fewer people than traditional, hospital-based programs. But since the fleet has grown, the population at risk has also grown, to around 12,900 crewmembers in 2015.

Crunching the numbers, Blumen found that over the past 19 years, a crewmember's annual odds of dying in a HEMS accident have averaged one in 2,223. For those crewmembers who maintain that they're safer in the air than they are driving to work, that's not necessarily true: according to the National Safety Council, the one-year odds of dying in a motor vehicle accident in the U.S. are one in 8,938 (based on 2013 data).

How does the risk of being a HEMS crewmember compare with other occupations? Because odds calculations can vary so dramatically in small populations, the Bureau of Labor Statistics (BLS) limits its list of high-risk occupations to those that employed at least 40,000 people and recorded at least 30 employee deaths in the base year. Since the U.S. HEMS industry currently employs too few crewmembers for the job to be broken out as a separate occupation, we should use caution when comparing its fatality rate to rates for larger industries, which are typically expressed in terms of fatalities per 100,000 full-time equivalent workers.

Still, the comparisons can give us a useful idea of just how risky HEMS is compared to other ways of making a living. For purposes of comparison, Blumen calculated an average HEMS crewmember fatality rate of 90 per 100,000 employees between 1998 and 2014. That would place it third on the list of high-risk occupations for the same time period, behind the 17-year average of BLS fatality rates for fishers and related workers (who averaged 119.6 fatalities per 100,000 employees) and logging workers (104).

In six of the past 17 years (1998 to 2014), "HEMS crewmember" would have ranked as the most dangerous job in America, with fatality rates as high as 164.1 per 100,000 employees in 2008. (Of course, it's possible that other unlisted subsectors of the fishing, logging, or aviation industries experienced comparable or even higher fatality rates in those years.)

While helicopter air ambulance transport remains a fairly risky

For many years, the number of HEMS crewmembers had never been tracked or estimated. As part of his research, Dr. Ira Blumen estimated the population at risk. **Dan Megna Photo**

> **"WHILE HELICOPTER AIR AMBULANCE TRANSPORT REMAINS A FAIRLY RISKY BUSINESS FOR CREWMEMBERS, ON A POSITIVE NOTE, THE OUTLOOK IS MUCH BETTER FOR PATIENTS.**

"HEMS crewmember" would have ranked as the most dangerous job in America in six of the years between 1998 and 2014. **Dan Megna Photo**

Twin-engine helicopters account for proportionally fewer accidents than single-engine helicopters, but the percentage of twin-engine aircraft in the U.S. HEMS fleet has been declining. **Skip Robinson Photo**

business for crewmembers, on a positive note, the outlook is much better for patients. According to Blumen's calculations, the fatality rate for HEMS patients as a result of a helicopter accident is 0.63 per 100,000 patients flown. Meanwhile, some studies have estimated the patient death rate due to medical errors in U.S. hospitals at between 131 and 292 per 100,000 patients.

As Blumen put it, "Based upon this calculation, one might conclude that there is a far greater risk to the patient of dying from an adverse event once hospitalized than from an aviation accident, when transported by medical helicopter."

MARKET SATURATION?

Blumen's data holds other insights. For example, a disproportionate share of fatal HEMS accidents occur at night: between 1998 and 2016, 49 percent of all HEMS accidents took place at night, but 67 percent of fatal accidents did.

Single-engine helicopters also account for more than their fair share of accidents. Although detailed flight hour data by aircraft type is not available, over the past 14 years, single-engine aircraft have accounted for an average 45.9 percent of the U.S. HEMS fleet, but 59.2 percent of accidents. In 2016, they accounted for 53 percent of the fleet, but 75 percent of accidents.

The U.S. HEMS fleet has grown dramatically in recent years, with single-engine helicopters accounting for much of that growth. Between 1998 and 2015, the total number of dedicated HEMS helicopters increased by 519 (151 percent), outpacing the increase in the number of patients flown per year, which grew by around 135,000, or 80 percent.

Correspondingly, the average number of patients flown by each helicopter in a year has dropped by 135 (28 percent). However, average annual flight hours per helicopter has only fallen by two percent, which Blumen suggested may reflect longer transports due to continuing rural healthcare consolidation.

The trends in the U.S. HEMS industry may be starting to change. Blumen estimates that the average annual number of patients transported by each helicopter is now around 350 — still well below the peak of close to 700 in 1990, but above the low of 315 in 2013.

In 2016, Blumen also recorded a drop in the number of dedicated HEMS helicopters, to 852. The decline was very slight, but it was the first contraction in the fleet since 1991 — a sign that the industry's breakneck growth may have finally peaked.

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Upgrades in technology over the past decade have made helicopter loudspeaker systems more useful and versatile than they were in the past. **Skip Robinson Photo**

COMING IN Loud & Clear

Improved technology has made helicopter loudspeaker systems an increasingly valuable tool for law enforcement aviation.

By Jen Boyer

As recently as 15 years ago, law enforcement helicopter loudspeaker systems were of limited use in most police missions. Operators regularly complained that broadcasts sounded like the "wah, wah, wah" of Charlie Brown's teacher while people on the ground reported they couldn't understand the message. The systems were also heavy; literally not worth their weight.

Upgrades in technology over the past decade brought big changes to law enforcement. Increased wattage and amplification, as well as focus on the specific range of the human voice, have lead to far more useful systems that are now playing large parts in successful missions.

"Years ago, the loudspeaker system was so horrible we didn't even turn it on," said Lt. Clay Lacey, tactical flight officer for the Texas Department of Public Safety. "In 2007, we put the Power Sonix on all five of our AStars, but we didn't think we'd use it beyond calling out suspects from hiding. However, we found it was so clear we could use it to solicit community help in finding lost persons, warning citizens of a dangerous person in the area, calling out to lost people, and warning suspects as a way to satisfy use of force rules around K-9s. We never dreamed we'd use it as much as we do. We use it almost every mission now."

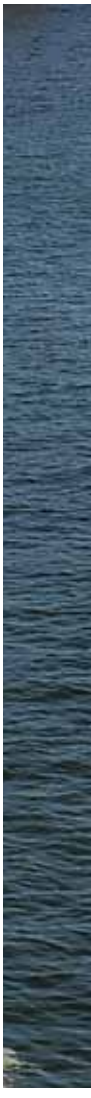
THE BIG CHANGE

Aircraft loudspeaker manufacturers like Anodyne Electronics Manufacturing Corporation (AEM) and Power Sonix heard the complaints of customers in the '90s and went back to the drawing board. The result was more power, lighter systems, and modified amplification.

A helicopter loudspeaker system is primarily made of three parts — the speakers, the amplifier, and the audio controller. The big game changer was improved amplifier equipment.

"Newer amplifier technology allows us to put out more sound at

AEM Photos



When broadcasting over a loudspeaker, pilots should keep in mind where the horn is mounted and the direction in which it's facing. **Malcolm Elwell Photo**

PowerSonix Photos

a lower load on the helicopter, allowing for a much louder, clearer, and more intelligible message than in the past," said Steve Broderick, sales and business development for AEM. "The weight is also much less. The new 600-watt system amplifier is 3.7 pounds [1.7 kilograms], compared to the 9.9 pounds of the older systems."

Additionally, extra focus was placed on making human speech in particular clearer. The Power Sonix system, for example, was designed with the understanding that human speech is a mid-tone sound, not high like Steven Tyler's upper range or low like a bass guitar. The transducer, the compression speaker driver that turns amplified energy from the amplifier into sound waves for the speakers, has to be tuned to that range to make speech as clear as possible. A transducer optimized for mid-range sound was chosen and then customized for the Power Sonix system, said Pat Grady, vice president of sales and marketing for Power Sonix.

BEST PRACTICES

When it comes to operation, Broderick says he noticed the majority of difficulties with successfully using the systems are caused by one of three things: poor equipment, lack of training, or in some cases, the need for ingenuity.

"Once higher wattage equipment is installed, it all comes down to training and finding new and valuable ways to use the system," he said.

Sgt. Craig Evans, a supervisor and pilot at the San Diego Police Department (SDPD) Air Support Unit, swears by his department's system, as long as best practices are observed.

"What [law enforcement departments] need to understand is the need to slow down and get low," he explained. "When you're flying at 80 knots and 1,000 feet, you're dealing with physics of a moving sound source. You sound garbled. We operate at 40 knots and 700 feet when using the system and it's very clear and effective."

When choosing the optimum speed and altitude for your operation, Grady at Power Sonix says it depends on the size of the

aircraft and loudspeaker system. One important item to keep in mind, he emphasized, is the cone of sound, which is plus or minus 30 to 60 degrees of sound. Pilots must ensure their intended audience falls within this cone.

"Think about where your horn is mounted and the direction it is facing," Grady said. "Whether you're making right hand orbits or a SAR [search-and-rescue] grid pattern, you have to keep that 60-degree cone on the audience for the duration of the message."

The message itself should also be short, he added. The quicker you fly, the shorter the message to assure it's heard.

Many operators are also opting for pre-recorded messages, especially in areas where messages may need to be broadcast in two languages.

Sgt. Evans at the SDPD recommends not only recording the message, which most loudspeaker systems allow, to free up the pilot and observer to work, but also to write down what you're going to say in advance.

"You're most often reading off your kneeboard, which keeps your eyes in the cockpit," he said. "Record your message and you only have to say it once, then focus on flying."

Evans' department also regularly has the need to broadcast in English and Spanish, which further utilizes the pre-recording option.

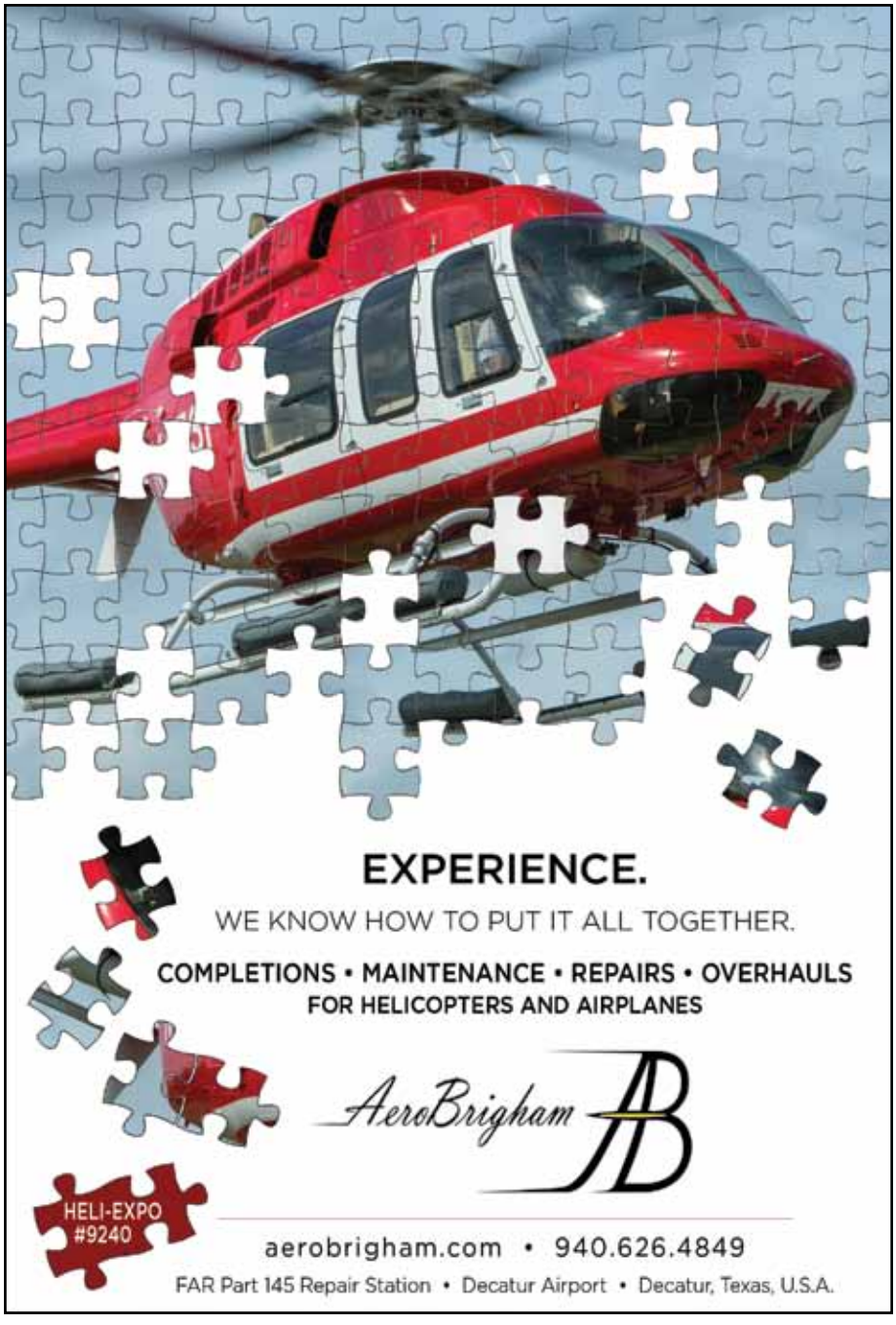
GETTING CREATIVE

At the Texas Department of Public Safety, once the new system was installed, the team put ingenuity to work.

"When folks could finally understand what we were saying, we stared finding new ways to use it," Lacey said. "Generally speaking, people want to help but they don't know what to do. We found a number of ways to help them help us."

In one instance, an eight-year-old boy didn't come home from school. The police received the call and went to work. The helicopter launched and began broadcasting the child's name, age, and description asking people who may have seen him to call in. "It turns out the boy went over to a friend's house and the friend's mom didn't know his parents were unaware of his location," Lacey said. "Hearing the loudspeaker message she called in right away and we could end the search quickly, saving time and resources."

Law enforcement aviation units are increasingly finding new ways to put their loudspeakers to use. **Skip Robinson Photo**



Loudspeakers can be useful in communicating information to people on the ground during off-airport landings and rescue operations.

On the criminal justice side, Lacey's department uses the system to broadcast the description of a suspect in the area on the loose and what people can do to be safe.

"When we do this, we can cover more area than the units on the ground much quicker," he said. "Then we start getting calls that are helpful, from sightings to tips such as a man calling in to say his shed door is now open, but it wasn't before, could we come check it out to see if someone is hiding in there. Nine times out of 10, when we use the system this way, people on the ground find the suspect or offer the tip that helps us find them."

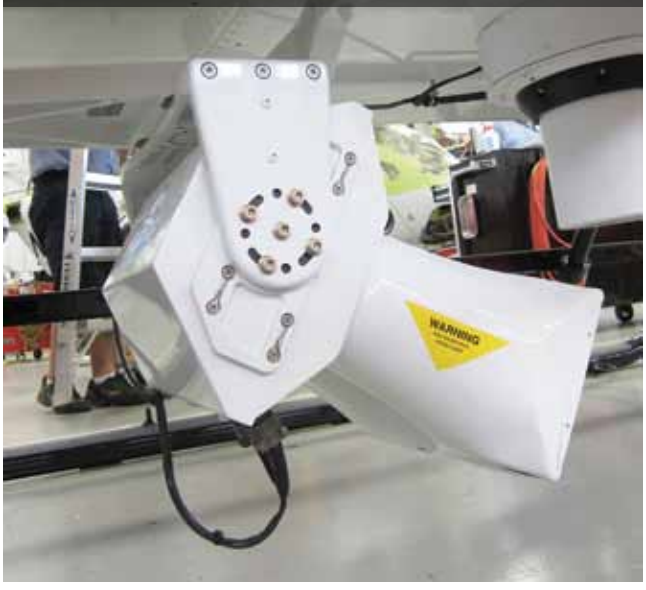
In San Diego, the two most common uses for the system are to find a missing person and to find a suspect in the area where he or she was last seen. "If someone has been missing or a crime happened a while ago, people don't typically remember seeing the person," said Evans. "We get the helicopter up there in a short time and get the message out, which typically has a very good response."

Recently Evans responded to a burglary call from someone who saw a suspect at a neighbor's home. Once over the neighborhood he began reporting the suspect's description on the loudspeaker. Calls began coming in, leading Evans to a canyon. Because he was now flying in the right location, he spotted the suspect running across a six-lane highway and could call in ground support.

The department has also found the system useful in off-airport landings, allowing pilots to clear the area and ask for things to be moved before coming in to land, and in helping the fire department get messages to the public in hazardous situations and evacuations.

"The more we use it, the more we find new uses," Lacey said. "We use it every shift."

A transducer optimized for mid-range sound was chosen and then customized for the Power Sonix system. **PowerSonix Photo**



Jen Boyer | Long-time communications professional Jen Boyer is a 1,500-hour helicopter pilot with commercial instrument, flight instrument and instructor instrument certificates. When not flying, writing or spending time with her husband and two kids, Jen mentors current and future Whirly-Girls.

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Civil helicopter rescue operations in New Zealand will mark their 50th anniversary in 2020. Simon Barton, a 37-year veteran of the industry, began his career as a volunteer rescue swimmer with the Auckland Rescue Helicopter Trust. He now leads a national change to better coordinate the tasking of rescue and aeromedical helicopters with St John Ambulance New Zealand.

COLUMN

FINAL APPROACH | **INTERVIEWED BY PAUL SADLER**

SIMON BARTON | AIR AMBULANCE ADVISOR

Vertical 911: Civil rescue helicopter services started in New Zealand in 1970. How did you become involved?

Simon Barton: While I was full-time diver in the Royal New Zealand Navy in 1979, I volunteered as a rescue swimmer for the Auckland Rescue Helicopter Trust. Until the mid-1980s, before the inflatable rescue boats came along for surf rescues at patrolled beaches, a lot of what I was doing was jumping out of helicopters — a Bell JetRanger back then — to rescue people from the surf. After leaving the Navy, I went full-time on the helicopter and I converted over to being a crewman, a role that I did for 23 years.

I made a few trips to Australia to look at how the services there employed the role of crewman on board their helicopters and their winching operations. I came back to New Zealand and put a hoist on our helicopter, then a LongRanger, and wrote the manuals which everyone in the country back then used for their crewman and winch training as other services started.

V911: You've been the driver behind setting up a new way to dispatch rescue helicopters across New Zealand, starting soon?

SB: When I finished flying [in 2015], I took up a position as the national air ambulance advisor at St John Ambulance New Zealand. I have been working to establish a centralized national air desk where the 28 rescue helicopters, that are run by 11 trusts from 18 bases around the country, will be dispatched on all missions through the one air desk. We currently have three ambulance control rooms managing three different areas of the country. It is not a good use of resources. They are being dispatched by people that don't understand aviation. It's just the local ambulance dispatchers getting a job in and dispatching an aircraft with no training in aircraft operations. It has been a bit of a bumpy road to get here, and there's likely a few more bumps to go, but we're aiming for the air desk to become operational in February [2017].

V911: You mentioned having spent some time in Australia. What other lessons did you learn from your counterparts across the ditch?

SB: I have spent a quite bit of time in Australia over the years visiting a number of their rescue helicopter operators for a couple of weeks at a time watching what they were doing and how they were doing it. You can always learn from what other people are doing and see if you can adapt it to your own environment.

Based on what both CareFlight in Queensland and CareFlight in New South Wales (NSW) were doing — they're two completely independent operations — I helped set up an international medical retrieval work in New Zealand running with three fixed-wing aircraft as well as doing retrievals using commercial flights around the Pacific Islands.

While I was in Australia, I also picked up the idea of ChildFlight, which was a dedicated helicopter service in NSW that retrieved sick and injured newborn babies and young children. I took the idea to Dr. Liz Segedin, who was the head of pediatrics and intensive care at the children's hospital, because she was tired of seeing kids being brought in on aircraft with inappropriate medical equipment for transporting children as the equipment and configurations were all set up for transporting adults.

After what I had seen in Australia, and with Dr. Segedin's support, I took the idea to the Trust and was able to start a ChildFlight program in 1995. Although we operated our service with fixed-wing aircraft, starting off with a Piper Seneca and then as we grew a Metroliner, we were transporting around 500 kids a year and made a difference to their lives. Childflight has since been taken over [in 2006] by another contractor, Starship, which today continues to carry on the service that we started.

V911: Do doctors fly on board medical and rescue helicopters in New Zealand?

SB: Having a dedicated doctor flying on board our helicopters permanently is new to this country. In the past, we have gone and picked them up out of the hospitals on the way to a job. But since 2015 we have been trialing having a doctor on board every flight with the Auckland Trust Helicopter Rescue Service. At the end of the trial, which is likely to be late in 2017, we'll assess how effective this has been.

V911: The first helicopter you flew in was a Hiller UH-12E, and you have since flown in an FH-1100, JetRanger, LongRanger, Squirrels, and the BK117. What type do think is best for rescue work?

SB: You can't beat the BK117 — it's such a good, solid platform. I class it as a mini Bell 412. You can swing the hoist boom out and load it right up and the thing just sits there. The only disadvantage I have with the BK is its [rigid] rotor head in bad weather — it kicks the life out of you. It's an absolute workhorse and the BK has done this country proud.

V911: What has been the most noticeable improvement in helicopter rescue during your career?

SB: The best piece of equipment I think has been the introduction of night vision goggles (NVGs). How I wish I had NVGs all those years ago when we used to island hop our way out to Great Barrier Island in a JetRanger, 52 nautical miles off the coast, in the middle of the night to pick up a patient.

This interview has been edited and condensed.

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