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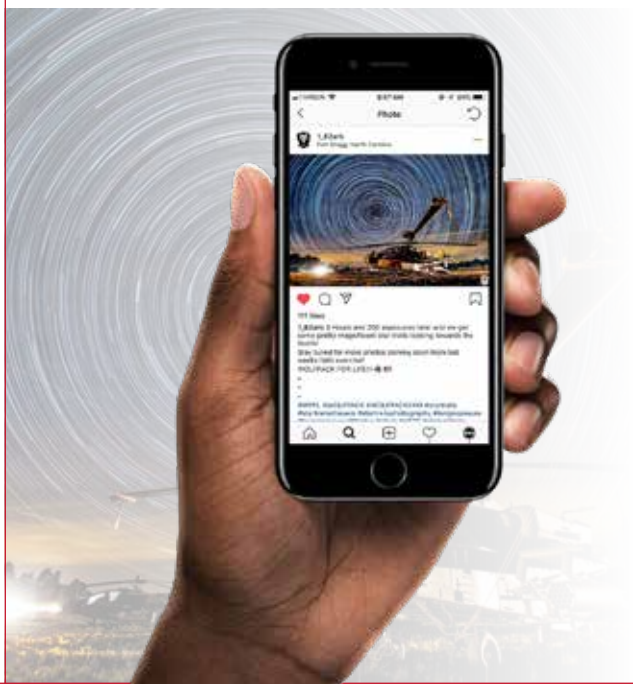

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COLUMN

WHEN SHOULD WE TALK ABOUT ACCIDENTS?

TALKING POINT // **IAIN HOLMES**

Unfortunately, air ambulance accidents seem to initiate a remarkably predictable routine within online communities. Usually, someone on social media alerts industry members of a missing or downed aircraft. Over the coming hours, there are questions from friends of crews who work in the area or for the program. As details emerge, and more and more people change their profile pictures and write expressions of grief, the sober mood becomes palpable.

Jan. 29, 2019, was unlike any other day for the air medical transport industry. As we learned of the first crash in Ohio, the familiar routine started to play out. Someone announced the accident with scarce details; a few questions were asked by people trying to identify loved ones, friends, or former colleagues. Then confusion arose as announcements of another air medical transport crash started to show up, too.

Many people thought the news of a second crash, in Alaska, was misinformation about the first, but when it became evident that there were in fact two crashes, online reactions reached new depths of shock, sadness, and despair. Typically quiet people spoke out, and people who would normally share their grief through words had a hard time articulating their thoughts. The industry was stunned: six of us had gone to work that day and not come home.

In my experience, in the immediate aftermath of an accident, our colleagues typically frown on the discussion of possible causes on social media, believing that playing Monday morning quarterback is disrespectful and unproductive. In the days following Jan. 29, this self-policing was more noticeable than ever. And this got me thinking.

I am not sure that a lack of discussion is actually respectful, or what most crewmembers would want. If I am ever in an accident, if speculation on the events leading up to it might benefit others, then please discuss.

We all have the same goal of getting home safely, and throughout our shifts we utilize the sum of all our skills, knowledge, and wisdom to try and accomplish that goal. In the case of an accident, something went wrong, and that could provide a crucial learning opportunity for thousands of others. When we wait the year or more it takes for the National Transportation Safety Board (NTSB) to publish its final report on an accident, the cadence of life returns, and the learning opportunity is significantly diminished if not lost. The possibilities to learn and improve are optimal during the initial period of shock, not months or years down the road.

The notion of not immediately speculating on the causes of these accidents is well intentioned. Without all of the details, it may not be possible to accurately determine the cause of the crash. No one wants to suggest that a skilled pilot who was operating a helicopter on a dark cloudy night might have become disoriented, when it will later be determined that he or she experienced a catastrophic mechanical failure.

Another concern is that speculation would cause additional distress to the already grieving family. This concern appears to be an easy trap to fall into and is likely more challenging to mitigate. After Ethiopian Flight 302 crashed in March 2019, killing all 157 people on board, Chesley "Sully" Sullenberger logged onto his Facebook account and commented on the relative inexperience of the first officer in the accident. Many people criticized him for his apparent insensitivity.

These concerns are valid, but I believe they can be navigated by respectful discussion with a focus on human factors science and just culture. For example, in the days after Jan. 29, questions arose around the helicopter that crashed in Ohio. Reports came out that other programs had declined the flight, and that the weather may have been marginal. Given the history of accidents related to "helicopter shopping" and operations in marginal weather, these reports provided a valuable reminder to the industry that both factors can have potentially fatal consequences.

> *These concerns are valid, but I believe they can be navigated by respectful discussion with a focus on human factors science and just culture.*

Less than two weeks after that tragic day, when the community was still grieving the loss of our colleagues, another noteworthy detail about the accident was revealed in the NTSB's preliminary report. The report indicated that the night shift pilot initially accepted the flight around 6 a.m. local time, but it was then decided that the day shift pilot would take the flight due to the upcoming shift change.

We don't know any details about the shift change, except that the helicopter took off with the day shift pilot approximately 25 minutes after the night shift pilot accepted the mission. There are essential discussions to be had with all crewmembers regarding perceived or actual pressure to take a flight and get airborne quickly, and how the complexity of a shift change can change this dynamic and one's routine. All of these can contribute to the chain of events that leads to an accident, regardless of what the final conclusions will be in this case.

In hospitals, debriefs are conducted immediately after significant events, as risk departments believe that acting quickly enhances learning opportunities. With just culture, it is understood that the associate who made an error came to work with the desire to help people and utilize the sum of all their knowledge, skill, and wisdom to provide exceptional care. They and the organization recognize that through their mistake they can grow and become empowered.

We can benchmark this strategy to the air medical industry, and have essential conversations in the immediate aftermath of accidents, when our sadness and fear provide a better opportunity to enhance our safety practice. If we proceed with respect and acknowledge the limitations of the information available to us, this can aid our progress to a safer industry.

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COLUMN WHERE PROCEDURES ARE BORN

FOCUS ON PROFESSIONALISM // **TONY KERN**

> *Most training programs simply tell us what the rules are and expect uncompromising compliance. This is a mistake.*

If the name Dennis Martin doesn't ring a bell when you hear it, you've likely not been exposed to planning search-and-rescue (SAR) operations. Fifty years ago this June, in 1969, six-year old Dennis was on picnic with his family at the end of a trail to Spence Field in the Great Smoky Mountains National Park when he walked off a clearing at the top of a hill, and was never seen again.

The family quickly realized the boy was lost, and since it was late afternoon, Dennis's grandfather hiked to the local ranger station to ask for help. Thus began the largest SAR operation in the history of the National Parks.

Like all first response actions, this one was filled with emotions, panicked family members and hundreds of well wishers who wanted to do something to help. All of this led to a highly publicized, highly confusing emergency response. Over 1,400 volunteers including Green Beret special forces operators from a nearby military base responded almost immediately. They combed over 60 square miles of National Park and Forest land, and never found a trace of the boy. Or did they?

Once the word got out about the lost boy, masses of well-wishers descended on the site and, in an uncoordinated fashion, fanned out and trampled over any terrain that might have held clues for an experienced woodsman or tracking dogs. One person reported hearing a scream that night. Another saw a track along a creek bed that looked like it might have belonged to a small boy. But without a single unified command post or point of communication, these leads were not followed up on with any sense of urgency. No remains or clothing that belonged to Dennis were ever found, and his disappearance remains the greatest unsolved mysteries of the Smoky Mountains to this day.

It would be easy to blame those who were in charge of the various units that launched the frantic search for the boy, and many have. But to be fair, they had little guidance, and no procedures to provide a framework for their response. Over the years, the response to this event has shaped the procedures we now use to find lost people in the wild and helped shape our entire emergency management system, and many others around the world.

In first response aviation, we seldom stop to ask where our procedures came from, or why they are important. Over time, we question their value, occasionally violate them, or generally see them as an impediment to getting the job done. Unless we experience a negative outcome from one of these violations, no one says much about it. Most training programs simply tell us what the rules are and expect uncompromising compliance. This is a mistake.

As a historian, I am intensely curious about where our guidance, customs, and processes come from. And I think I am a more disciplined professional because of it. I've found that most procedures are born of someone else's failure; a certain time and place where a lack of guidance made the coin come up tails. From these events, our well-thought-out and validated procedures were born. Absent this understanding, it is easy to perceive the myriad of rules and regulations as the child of some faceless bureaucrat whose sole purpose in life is to make our job more difficult. There may well be a few of these out there, but for the most part, the guidance we are asked to fly by is designed to keep us out of the type of trouble someone else found for us.

Dennis Martin would be 57 years old this June, and wherever he is in this world or another, he can rest knowing that his life was not insignificant. Following the botched search effort, the National Park Service completely overhauled its SAR procedures and the lessons learned have saved lives for the past 50 years. Since June 1969, searchers in the Smokies have failed to find only four other missing people. Around the world, the science of SAR has evolved into a fully organized package of command and control. Along the way, you can bet there were thousands who wanted to rush in and help, who felt the rules were getting in the way of their intent, desires, and personal judgment.

They likely had never heard of Dennis Martin.

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COLUMN PRECAUTIONARY TALES

FOCUS ON SAFETY // **DAN FOULDS**

Recently, industry expert and author Rex Alexander and I were having one of our periodic telephonic mind-melds. During the discussion Rex mentioned that, "In my flying career I have made precautionary landings in some pretty crazy places."

So have I.

So what is a precautionary landing? While it might mean different things to different people, according to aviationglossary.com it is "a premeditated landing, on or off an airport, when further flight is possible but inadvisable. Examples of conditions that may call for a precautionary landing include deteriorating weather, being lost, fuel shortage, and gradually developing engine trouble."

The International Helicopter Safety Team (IHST) published a safety bulletin about precautionary landings, lamenting the fact that too often pilots don't take advantage of a helicopter's miraculous capability to land, well, just about anywhere. According to the IHST, fear causes helicopter pilots to press on, rather than executing a precautionary landing in response to changing conditions: fear of ridicule, fear of punitive action, fear of Federal Aviation Administration (FAA) enforcement, fear of inconvenience, and fear of losing personal pride/ego.

Let me take those points one by one — or one by two — relating personal experiences. First, "fear of ridicule and loss of pride/ego." I was flying a Dauphin in Pennsylvania one winter night on the way to pick up a patient. I was operating in a sister ship's area as they were on a flight when this request came in. We were flying unaided in the ridge and valley section of the state and it was very dark with occasional snow showers. A temperature inversion created warmer air and icing conditions at higher altitudes, so, in my mind, going up was not an option.

As conditions deteriorated, I made up my mind to turn around. As we were completing the 180, I called the comms center to let them know what we were doing. The pilot of the other aircraft came on the radio with one word: "Wimp."

Stupid pride and ego then combined to elicit my response. "Well, OK, maybe we will give it another try." My 180 turned into a 360. Now, that other pilot was only joking when he made that "wimp" comment, and I can imagine his dismay when he heard what I was going to do. As soon as I headed back into the goo we went into instrument meteorological conditions at very low altitude. I didn't want to climb into icing.

> *The lines between safe, legal, and dangerous are very thin, and on any given flight a VFR pilot might have to* land right here.

I slowed down, filled with dread, and knew that this was going to be a tough few minutes.

Then I was startled by the big red "Landing Gear" light flashing as we came to a hover with the landing gear up. Gear down. Outside, I had exactly one light on one pole below me for visual reference. And I wasn't going to stray from it. Thick snow enveloped us completely, swirling in our wash. I hung onto that light like a drowning man hanging onto a life-ring. My feet were dancing on the pedals from fear and adrenaline. I called the comms center to tell them what was happening, and when they started asking questions, that other pilot broke in and told them to be quiet, "Hold on! He is busy now!" He was probably praying to God that I wouldn't crash.

As we hovered there, at 50 or 60 feet over trees, I took comfort in the fact that I had plenty of fuel. I wasn't leaving that light. After a few minutes the shower drifted off of us and a schoolyard came into view a quarter mile away. We went there and landed.

We shouldn't let our ego or ridicule from a peer kill us.

On a different flight, when I was still restricted to visual flight rules (VFR), I had a burn patient on board. Hot tar had exploded from a factory-pipe, and as he instinctively turned away from it, it covered half of his face like a black shiny mask. In daylight, we flew into deteriorating weather, notwithstanding a rosy forecast and cheerful automated weather observing system (AWOS) reports. I turned around. The path behind us was blocked. I turned left; blocked. We were boxed in.

We landed in a plowed field in the middle of nowhere, Pennsylvania. We had fuel, air conditioning, drugs, fluids, and the patient was as cool as a cucumber. It was a very relaxed atmosphere, sitting there safe on the ground. After 20 or 30 minutes the weather above cleared and we diverted to a closer hospital to transfer our patient to a ground truck.

My director of operations (DO) was angry that I had landed in that field. This was his turn to be stupid. What a DO *should* be putting out is this: "If at any time you are concerned about safety of flight, LAND THE HELICOPTER. You keep my people alive and my machines intact and I will cover your butt to the best of my ability."

At an industry meeting at which I was representing the National EMS Pilots Association, Air Evac Lifeteam's DO recounted a situation in which a pilot had made a precautionary landing for weather and the FAA was trying to violate him. I think my face registered horror.

VFR pilots rely on incomplete weather information to fly to off-airport locations from which weather information is simply not available. The lines between safe, legal, and dangerous are very thin, and on any given flight a VFR pilot might have to *land right here*. Enforcement action against a pilot who makes a prudent decision to land is stupid and will get pilots and teams killed. If you are an FAA inspector, don't do this.

Now back to Rex and the crazy places one might land. Between the two of us, we have landed, shut down, and climbed out in cold, heat, rain, snow, inconvenience, and combat. Landing before crashing is the mark of a mature and wise pilot. Recognizing all the factors and hazardous attitudes that conspire to prevent you from doing this are matters of education and experience. Old pilots have an obligation to share stories of their mistakes with younger ones, as their predecessors shared wisdom with them. After all, there are no new mistakes under the sun — or the moon.

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FAA working to improve heliport database accuracy

The FAA will be surveying heliport owners and managers in an effort to improve the accuracy of its database. **Sheldon Cohen Photo**

BY GERRARD COWAN

The Federal Aviation Administration (FAA) is taking a number of steps to improve the accuracy and comprehensiveness of its heliport database, but has only a limited ability to gather information on private operators, the organization has told *Vertical 911*.

Concerns have been raised over the information in the database, which depends on information supplied by the heliport facility owner. At first, an interested party notifies the FAA of their intention to build a heliport (or an airport) through the administration's Form 7480-1. After the facility is complete, they file form 5010, which is used by the National Flight Data Center (NFDC) to create an Airport Master Record. Form 5010 can accommodate data for either an airport or a heliport, including its name, location and status. This information is used across the industry for a variety of purposes.

According to Helicopter Association International (HAI) president Matt Zuccaro, however, some of the information in databases like the FAA's is inaccurate. Congress's FAA Reauthorization Act of 2018 has required the FAA to assess the availability of information to the general public related to the location of heliports and helipads used by air ambulance helicopters, while the House Appropriations Committee recently directed the FAA to develop a national data standard "to design and chart airspace in order to identify potential hazards and develop flight procedures for helicopter pilots, especially for helicopter air ambulance procedures."

A spokesperson for the FAA told *Vertical 911* the organization is planning to send surveys to every heliport listed in its database and to the owners and managers listed on each Airport Master Record in an effort to gather more accurate information and update the database where appropriate. To address the House Appropriation Committee's air ambulance requirements, the FAA's Office of Airports added a relevant new field to the 7480 form.

Misinformation could be detrimental to the safety of the National Airspace System, the spokesperson said, imploring "users of the applications available to submit inquiries to the FAA regarding potential sites deemed a hazard to flight or inactive." However, the spokesperson cautioned that there is no regulatory requirement to report on private heliports, which represent the vast majority of facilities. While the FAA is working to improve the location accuracies of each site, "the FAA has no authoritative jurisdiction to request reporting or implement changes without the permission/agreement

of the listed owner or manager on record."

Improving the database has been a major focus for the U.S. Helicopter Safety Team (USHST) in its work with the FAA, said Rex Alexander, who has led many of those efforts. Alexander is president and executive director of the Five-Alpha consultancy, and also works with LZControl, a private company that provides similar information to that contained on the FAA's heliport database.

In an interview with *Vertical 911*, Alexander outlined a range of problems with the current system. For example, the 5010 form is very airport-centric, he said, and does not capture heliport-specific information, such as the approach/departure paths for a heliport. Among other issues, it does not say whether a heliport is a ground-based pad or a rooftop pad or provide for information on the maximum gross weight of rooftop helicopters, Alexander said.

The UHSHT has conducted various types of research into the database. It found that there are 44 hospitals with helipads in the state of Ohio that are not in the system today, because the relevant paperwork was not submitted or finalized or for another reason, Alexander said. He thinks the system to register helipads and heliports with the FAA should be simplified, which would in turn help reduce the administration's backlog.

A comprehensive and fully accurate heliport database is particularly important given the continuing rise of the drone industry, he pointed out. If a drone pilot were flying in the vicinity of a heliport or airport or similar facility, they would be required to notify the latter of their activities. However, if those heliports are not included in the 5010 database, or if they are listed at an inaccurate location, the drone operator would simply not know they exist, Alexander said.

"If an operator has a system that's out doing photography work, for example, he or she is required to notify any airports or heliports in the vicinity. And since it's not in a database, they won't know about it."

This problem will only grow more pronounced as the drone industry advances towards beyond visual line of sight (BVLOS) operations.

"If you're flying a drone from Point A to Point B beyond line of sight, and if you don't know about a landing or take off site on that route, then how would you avoid it?" Alexander asked. "This will be interesting over the next 10 years with the push for autonomous delivery vehicles."

Another concern centers on the impact of a natural disaster, when government organizations require accurate information on hospital helipads and heliports. There is a danger that individuals would have no idea where such facilities exist, or even the relevant radio frequencies or telephone numbers for communications.

"It's a case of 'let's show up and hope,'" he said.

Finally, while heliports are a major issue, Alexander said the problem also extends to airports. UHSHT identified 128 airports listed in the database in Ohio (from small grass strips on farms to tiny, municipal airstrips) that are not in the specified locations.

In a statement, Zuccaro said that as a general concept, HAI supports any initiative aimed at updating the existing FAA heliport database.

"By improving the accuracy of the database, the FAA are providing pilots and operators [with] an enhanced tool for flight planning and in-flight decision making, ultimately enhancing the safety of flight," he said. "An inaccurate or incomplete database introduces uncertainty into our flight operations. This update/revision of the database will produce a more valuable system."

Drone operators are required to avoid or coordinate with airports and heliports in the vicinity, but they need accurate location data in order to do so reliably. Inaccuracies in the FAA's heliport database could lead to conflicts between drones and other aircraft.
Skip Robinson Photo

HOW BYSTANDERS' SMARTPHONES COULD AID AIR AMBULANCE DISPATCHERS

Streaming live video from the scene of an emergency to a control room can improve the utilization of helicopter air ambulances and their crews. **GoodSAM Photo**

BY GERRARD COWAN

Live video footage from mobile phones at the scene of accidents could help guide helicopter emergency medical service (HEMS) dispatchers, a new study has found.

Video footage provided by callers could significantly boost the correct tasking of HEMS teams, according to the research, which was published in the *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*. The concept relies on an app called GoodSAM (Smartphone Activated Medics). This allows the HEMS dispatcher to request the caller of the emergency number to activate the video camera on their phone, securely streaming live video footage in real time to the control room, according to the study. This can only take place if the caller gives permission and if it is safe for them to approach the scene. The footage is not recorded or stored on the person's phone or on the GoodSAM portal.

The concept was tested by Air Ambulance Kent Surrey and Sussex (AAKSS) in the U.K. between March and December last year. Video footage from the scene was attempted for 21 emergency calls, mainly to directly assess the patient and to obtain information about the injury and the scene. Video footage was successfully obtained in 19 of these calls. It was used to send a HEMS team on five occasions, and to stand down a team in 14 others.

In an interview with *Vertical 911*, professor Richard Lyon, associate medical director at AAKSS and one of the co-authors of the report, said a HEMS team by definition is a very valuable resource. They tend to cover a large area: for example, AAKSS has two teams covering three counties in the southeast of England. It is therefore extremely important that the teams are tasked appropriately, and not sent to jobs that could be handled by regular ground ambulance and emergency medical services. It would be wasteful, for instance, to send a HEMS team to treat someone with a sprained ankle or other minor injury, Lyon said.

"They're not bringing any added benefits there, because the ground EMS teams could handle that very effectively," he explained. "And if we're tasked to something like that, we may then be unavailable for a serious incident."

HEMS teams are trauma-focused, Lyon said, covering incidents where they can

bring additional clinical capability to the scene: delivering anesthetic, for example, or a blood transfusion, as well as rapidly transporting injured parties to a specialist facility like a major trauma center. EMS teams in general are very reliant on members of the public, he said. However, much of the required information is often very technical, and callers are often asked to provide this information at times of extreme stress. It can be difficult for a layperson to tell if a person is conscious or semi-conscious, or whether they are breathing normally, crucial details a dispatcher will use in assigning a HEMS team. Video footage can provide these details.

The pilot study considered two areas in particular, Lyon said. First, it sought to determine if the idea was technologically feasible. Second, it analyzed whether it was acceptable to the public. The research returned positive results for both of these questions, Lyon said. On the technical side, the GoodSAM app worked well, though it relied on the caller having 3G access at least.

"If you're in an urban environment it's usually fine, but if you are in a very rural place it is much more difficult and sometimes impossible to actually get video footage," Lyon said.

While the study focused on just a small number of incidents, the results suggest that "it was entirely acceptable to the public; we had no one refuse to do it, and in fact everyone was very willing." However, the researchers learned that it was important "to keep the call continuous": once the caller gave their information to the dispatcher they were immediately transferred to a specialist HEMS dispatch team who then explained the GoodSAM system, because if they hung up before agreeing, it was very difficult to get them to answer the phone again, perhaps because it came from an unrecognized number or simply due to the acute stress they were under.

"We need to keep the caller on the line until we've explained the video procedure to them," Lyon said.

AAKSS is now working closely with South East Coast Ambulance Service — which operates in the same geographic area — on the next steps for the project. This will see critical care paramedics receiving access to the footage, allowing them to make more informed clinical decisions.

"We know it works and that the public so far accept it — what we need to do now is work out the kind of clinical input we can extract from the calls and how it is going to affect our dispatch, not just for HEMS but for ambulances in general."

During the trial with Air Ambulance Kent Surrey and Sussex, live video was used to send a HEMS team on five occasions, and to stand down a team on 14 others. **AAKSS Photo**

RotorBits

NEXT-GEN UK SAR AIRCRAFT FLY INTO SERVICE AT INVERNESS

Inverness' HM Coastguard search-and-rescue (SAR) helicopter base has welcomed two Leonardo AW189 helicopters, serving the Highlands and islands and further afield as part of the Maritime and Coastguard Agency's (MCA's) airborne response.

The aircraft replace two Sikorsky S-92 helicopters, which have been in active service out of Inverness since 2015. Each US$25 million AW189 helicopter, painted in red and white HM Coastguard colors, is operated by Bristow Helicopters Limited, on behalf of HM Coastguard.

The Coastguard base at Inverness is the fifth and final location in the U.K. to fly this new model of helicopter for SAR missions.

Inverness is one of 10 strategically located sites around the U.K. which are operated by Bristow. The purpose-built Coastguard SAR base at Inverness is operated by a team of 32.

Damien Oliver, aviation program director at the MCA, said: "These Leonardo AW189 aircraft will enable us to continue to carry out even more vital life-saving missions across Scotland in an area where rescues can be very demanding on our crews and in difficult-to-reach locations."

AIRMEDIC ACQUIRES 3 EC145e HELICOPTERS

Airmedic has purchased three new fully equipped EC145e helicopters. Metro Aviation will be in charge of the aircrafts' interior configuration for medical emergency services. The close to $30 million investment will enable Airmedic to deploy aircraft that have been tailored for air medical transport to support lifesaving missions across Quebec.

Airmedic has carefully chosen the EC145e helicopters, which will bring its total number of aircraft entirely dedicated to emergency medical services to nine.

Factors in Airmedic's selection of the model include its larger cabin space, which can accommodate two patients at the same time and seat up to four passengers, providing more room for specialty medical personnel and equipment. The EC145e's range will also allow Airmedic to travel longer distances without refueling, reducing response times.

The aircraft will be used for both for pre-hospital and inter-hospital transport.

RotorBits

CELEBRATION MARKS STORNOWAY COASTGUARD HELICOPTER BASE'S 30TH ANNIVERSARY

HM Coastguard's search-and-rescue (SAR) helicopter team on the Western Isles celebrated more than three decades of vital lifesaving service with a special event at their newly-renovated base in Stornoway in mid-June.

The helicopter service, operated by Bristow Helicopters Ltd on behalf of HM Coastguard, has a long and proud history of saving the lives of those in need on land and at sea.

The event also recognized the people and communities who work together to save countless lives; the Department for Transport's Rescue Shield Award, given to those involved in truly heroic rescues, was presented by Richard Parkes, director of HM Coastguard, to those involved in two incredible rescues.

Parkes said: "I am immensely proud that HM Coastguard has been entrusted to provide the search-and-rescue helicopter service from Stornoway for over 30 years."

Russ Torbet, director of UK SAR for Bristow Helicopters said: "The combined efforts of the air, land and sea rescuers continue to be vital to communities around the U.K., and today's event was superb recognition for the dedication shown by our team in the Western Isles."

BLUEDROP TO DELIVER HMTS TO RCAF

Bluedrop Performance Learning, and its subsidiary Bluedrop Training & Simulation, will deliver another hoist mission training system (HMTS) to the Royal Canadian Air Force (RCAF) at 19 Wing Comox, British Columbia, in addition to a similar CH-148 Cyclone simulator delivered to 12 Wing Shearwater, Nova Scotia, in July 2018.

The immersive virtual reality simulator will replicate the CH-149 Cormorant helicopter and be used for search-and-rescue (SAR) hoist procedure and mission training. The HMTS will improve hoisting skills in challenging mission scenarios, allowing trainees to practice critical skills in a safe, true-to-life environment.

The simulator provides high-fidelity cable behavior that responds to flight dynamics and operator inputs with accurate turbulent flow zone rendering and complex rescue coordination scenarios.

The first release of Med-Pac's EMS Lite HEMS system is for the Bell 505. **Med-Pac Photo**

MED-PAC LAUNCHES NEW GENERATION OF HEMS AEROMED STRETCHERS

Med-Pac, Inc. has announced a new generation of helicopter emergency medical services (HEMS) AeroMed Stretcher Systems, ahead of this year's Airborne Public Safety Association APSCON conference, to be held July 15 to 20 in Omaha, Nebraska.

The design is based on feedback from the operator community and will significantly increase the durability and usability of medical stretchers used onboard civilian, government, military, fire, police and aeromed helicopters, the company said.

The HEMS upgrade from Med-Pac provides operators with a rugged, lightweight and functional product that reduces maintenance and increases performance.

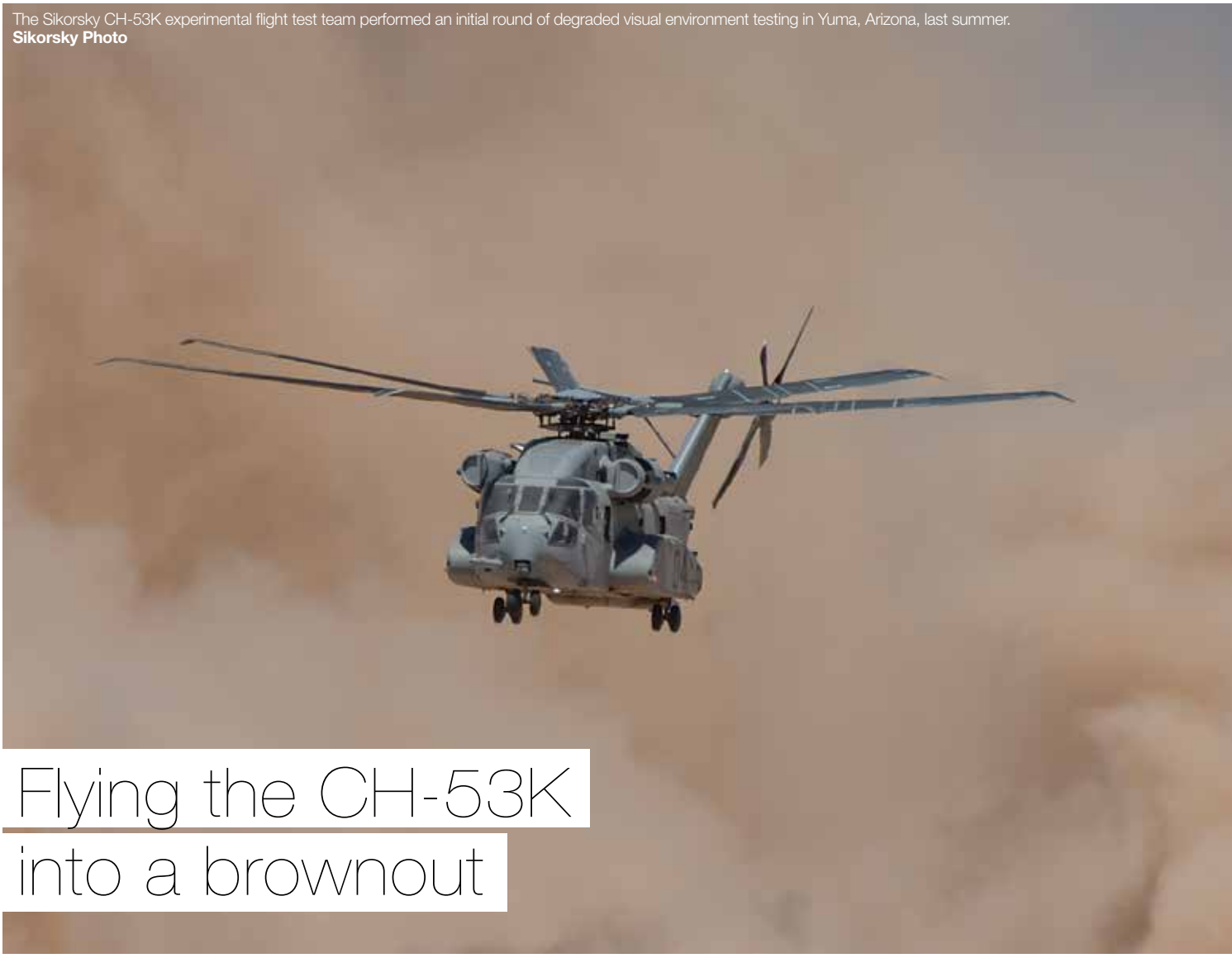
The first release of Med-Pac's revolutionary EMS Lite HEMS system is for the Bell 505.

The EMS Lite HEMS system reduces weight, reduces maintenance due to lack of any cables or complex mechanisms, and requires only a simple replacement of the seat with no need for any electrical installation.

Med-Pac stretcher systems feature a carbon fiber deck, Kydex floor barrier, trauma and oxygen bags, a heavy-duty stretcher with a manual locking bracket and a single-hand release, which allows for simple handling inside the aircraft.

Med-Pac's new EMS Lite design will soon be available for additional helicopter brands and models.

The EMS Lite design is the latest in Med-Pac's family of stretchers, which offers customers a variety of options to meet their medical operations needs. Based in northwest Minnesota, the company has four decades of experience in the medical equipment manufacturing industry, developing products made to customers' specifications.



The Sikorsky CH-53K experimental flight test team performed an initial round of degraded visual environment testing in Yuma, Arizona, last summer.
Sikorsky Photo

Flying the CH-53K into a brownout

We spoke with Sikorsky experimental test pilot John Rucci about flight testing the CH-53K in degraded visual environments.

BY ELAN HEAD

The U.S. Army's Yuma Proving Ground in southern Arizona sees its fair share of dust clouds. But there are dust clouds, and then there are *dust clouds*.

Late last summer, the Sikorsky CH-53K experimental flight test team stirred up some record-setting dust clouds when they visited Yuma for degraded visual environment (DVE) and hot weather testing. According to Sikorsky senior experimental test pilot John Rucci, Yuma is a popular location for DVE testing because the particulate matter there "represents about the worst you can find on the planet. And then you actually prepare the LZ with a tractor that essentially discs the sand up into a fine talcum powder, which makes it even worse."

As seen in video footage of the testing, the CH-53K — which will have a maximum gross weight of 88,000 pounds (39,900 kilograms) — churned up massive, billowing, persistent clouds of dust as it practiced reduced visibility landings (RVLs), an essential capability for its U.S. Marine Corps customer.

"In a daytime environment, it was about the worst dust cloud I've ever seen, in terms of just the consistency, how it prevailed, how it just sat there," recalled Rucci, a former Marine Corps CH-53E pilot who experienced brownout landings while on deployment in the Middle East in the early 2000s. "But because the aircraft was that much more stable, it made my job much easier."

Rucci spoke with *Vertical 911* in advance of the Sea-Air-Space exposition in National Harbor, Maryland, in May, where Sikorsky and parent company Lockheed Martin were promoting the CH-53K's progress. The roughly $31 billion development program has received some critical press coverage recently, with the revelation of technical issues that will cause it to miss its target for initial combat

capability by the end of this year.

According to Rucci, however, the program has been racking up some significant milestones — the successful DVE testing among them.

"I'm always eager to tell success stories because I know there's been a lot of negative angles out there on the aircraft, just in terms of its development efficiency and process," he said. "I would say that in terms of track records of development aircraft we're doing very well, and to give a functionality like this [DVE capability] . . . I know it's going to do the job."

And, shortly after Sea-Air-Space, the U.S. Navy gave the program a vote of confidence when it awarded Sikorsky a $1.13 billion Low Rate Initial Production contract for 12 CH-53K helicopters, with deliveries expected to begin in 2022 *(see p.29)*.

According to Lockheed Martin, the CH-53K program has now logged more than 1,400 flight test hours across four experimental developmental models and two system demonstration test articles. Rucci said that last year's testing in Yuma accounted for roughly 25 of those hours, including the evaluation of critical components in temperatures of up to 108 F (42 C).

The DVE portion of the testing encompassed a series of maneuvers, from landings on the ground — simulating troop insertions and extractions — to approaches to a high hover, as would be required to pick up external loads. This round of testing was performed at an aircraft operating weight of approximately 60,000 lb. (27,215 kg). Sikorsky intends to return to Yuma in the summer of 2020 for testing at the maximum internal gross weight of 74,000 lb. (33,565 kg) and with external loads up to the absolute maximum gross weight of 88,000 lb.

"It was a build-up process, like everything is in flight tests, because we were at the same time testing the reliability of our engine air particle separator system . . . and our engines themselves and how they reacted to the fine talcum dust," Rucci explained. "We were really pleased with the results we saw there that allowed us to extend our period of dust ingestion over time."

Reduced visibility landings are among the most challenging maneuvers that helicopter pilots perform, because pilots typically rely heavily on visual cues to maintain stability while close to the ground. As Rucci explained, the Marine Corps over the years has doctrinally perfected an RVL technique

Sikorsky test pilot John Rucci said that the CH-53K's workload-reducing automation will enhance safety and efficiency for the Marines.

WATCH **VIDEO**

that brings the aircraft to the ground on a glide path that is not too shallow, and not too steep.

"If you perform either one of those types of approaches [very shallow or very steep] into the dust, you're going to incur the dust cloud at a different part of the descent profile than you desired to, and you may lose sight of the ground before you're completely stabilized," he said.

As part of the testing in Yuma, the CH-53K team confirmed that the RVL descent profile that works for the CH-53E works for the newer generation aircraft, too. Then, they worked to tune the software in the fly-by-wire K model to automate that desired approach.

"So that was part of the effort, to get the computer to fly the approach to the same numbers that a pilot would fly it," Rucci said. That, he explained, allows the pilot to "back out of the loop and monitor the approach . . . then all they have to do is maybe tweak to go a little further or a little short depending on where the intended point of landing is."

According to Rucci, the pilot can make those adjustments by simply manipulating the sidearm controller — the active inceptor that replaces a conventional helicopter cyclic in the CH-53K. Pilots also have the option of making adjustments through a beeper trim, but Rucci said that rudimentary kind of input "isn't agile enough in the real world to make an input that a crew chief might be calling for in real time. . . . It's actually much better for the pilot just to get on the stick and displace it."

Once the pilot has made the desired correction, the automatic flight control system will resume the planned deceleration profile. "It responds in the manner that you would expect it to respond if you were flying yourself," Rucci said. "It's been tuned to not be overly aggressive, so when you put an input in to correct it, it then doesn't pop the nose up or do anything that would be disorienting in the dust environment."

Should the pilots lose all visual references, the aircraft can maintain a stable low hover with no uncommanded drift, Rucci said. In fact, he said, the stability of the CH-53K in an auto-hover is "astonishing" when compared to helicopters with conventional mechanical flight controls.

"[In the CH-53K], because of the fly-by-wire, the full authority, the rate that it has, it is making the corrections at a rate [that] you really don't even feel them, as the pilot," he said. "I call it 'pilot nirvana.' . . . It's really incredible."

Rucci predicted that the K's workload-reducing automation will enhance both safety and efficiency for the Marines. Today, CH-53E pilots require frequent, intensive training in RVLs to stay proficient, "which translates into a lot of hours spent doing a task to be able to do that consistently [when] you have to do it for real," he said.

"Whereas I feel the K, because of the workload reductions, because of the way the aircraft flies, you won't need to have that level of intense training in order to be able to pull off that mission."

BOEING TO BUILD MH-47G BLOCK II CHINOOKS FOR SPECIAL OPS

Boeing will build next-generation MH-47G Chinooks for the U.S. Army Special Operations Aviation Command. The Block II configuration will enhance the Army's ability to safely carry out the most challenging missions around the world, Boeing said.

The $194 million contract is for a second lot of MH-47G Block II aircraft, to be delivered starting in 2021. Block II Chinooks feature technological advancements to extend the fleet's service life and enhance performance.

"The MH-47G is the world's best, most reliable heavy-lift helicopter and will help Special Operations execute their difficult missions," said Chuck Dabundo, vice president and MH-47 program manager. "Nearly a quarter of the Special Ops fleet is now on contract for Block II, and we look forward to delivering this capability to them on schedule."

The Army has a large number of MH-47G Chinook helicopters. Boeing is now on contract for a total of 15 MH-47G Block II Chinooks. The first MH-47G Block II aircraft is scheduled to begin final assembly this year.

Block II Chinooks feature technological advancements to extend the fleet's service life and enhance performance. **Boeing Photo**

V-280 VALOR COMPLETES LOW-SPEED AGILITY TESTING

Bell's V-280 Valor has successfully completed flight demonstrations of its low-speed agility key performance parameter. **Bell Photo**

The Bell V-280 Valor recently completed flight demonstrations of its low-speed agility key performance parameter (KPP) in the U.S. Army-led Joint Multi-Role Technology Demonstrator (JMR TD) program, ahead of schedule.

The V-280 Valor has now demonstrated in flight testing that it has the raw control power in pitch, roll, and yaw maneuvers to meet the Army's Level 1 Handling Qualities requirements, which is the highest performance standard for agility. Bell said the flight testing validates its engineering models and development processes to design, build, and test an air vehicle on an aggressive aircraft development schedule that meets Army performance requirements and delivers advanced capabilities to warfighters.

"This latest flight milestone proves that the V-280 Valor tiltrotor delivers first-rate handling for pilots during low-speed maneuvers without sacrificing speed, range or payload that the military needs for multi-domain operations," said Ryan Ehinger, V-280 program manager at Bell. "Bell and Team Valor continue to prove that the Army-led JMR TD program has been successful in rapidly maturing new technologies to support accelerated acquisition of the FLRAA."

For pilots, this achievement provides additional proof that the V-280 will have unprecedented agility on the objective for operational effectiveness, Bell said. The aircraft's digital flight controls and design increase mission effectiveness by providing a high level of agility, reducing pilot workload, and enhancing flight safety on the objective in all weather conditions and degraded visual environments.

As the JMR TD period of performance winds down, Bell said that Team Valor continues to expand the flight envelope and demonstrate new capabilities to prove out the V-280 Valor's key technologies and reduce the risk for Future Vertical Lift programs.

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SIKORSKY HH-60W ACHIEVES FIRST FLIGHT

WATCH VIDEO

The Sikorsky HH-60W Combat Rescue Helicopter achieved first flight on May 17 at Sikorsky's West Palm Beach, Florida, site — an important step toward bringing this all-new aircraft to service members to perform critical search-and-rescue operations. The aircraft, based on the proven UH-60M Black Hawk, is customized for the U.S. Air Force's rescue mission.

Total flight time was approximately 1.2 hours and included hover control checks, low speed flight, and a pass of the airfield.

"This achievement is yet another vital step toward a low rate initial production decision and getting this much-needed aircraft and its advanced capabilities to the warfighter," said Dana Fiatarone, vice president, Sikorsky Army & Air Force Systems.

The first flight paves the way for a Milestone C production decision in September 2019, per the original baseline schedule, to which both Sikorsky and the Air Force are committed. Additional HH-60W helicopters are expected to enter flight tests this summer.

"The HH-60W's first flight is the culmination of significant development and design advances. We are excited to now move forward to begin full aircraft system qualification via the flight test program," said Greg Hames, director of the Combat Rescue Helicopter program.

The HH-60W Combat Rescue Helicopter is intended to be significantly more capable and reliable than its predecessor, the HH-60G Pave Hawk. The aircraft hosts a new fuel system that nearly doubles the capacity of the internal tank on a UH-60M Black Hawk, giving the Air Force crew extended range and more capability to rescue those injured in the battle space. The HH-60W specification drives more capable defensive systems, vulnerability reduction, weapons, cyber-security, environmental, and net-centric requirements than currently held by the HH-60G.

"With the Combat Rescue Helicopter's successful first flight now behind us, we look forward to completion of Sikorsky's flight test program, operational testing and production of this aircraft to support the Air Force's critical rescue mission," said Edward Stanhouse, Chief, U.S. Air Force Helicopter Program Office.

The U.S. Air Force program of record calls for 113 helicopters to replace the Pave Hawks, which perform critical combat search-and-rescue and personnel recovery operations for all U.S. military services. A total of nine aircraft will be built at Sikorsky's Stratford, Connecticut, facility during the engineering and manufacturing development (EMD) phase of the program — four EMD aircraft and five system demonstration test articles.

RotorBits

UW HEALTH ANNOUNCES UPGRADED FLEET

Metro Aviation and UW Health's Med Flight partnership has officially taken flight. Med Flight has begun serving its 250-mile-radius service area with a new fleet of three Airbus EC135s and an EC145, completed by Metro Aviation.

Over the next two years, Med Flight will replace the three single-pilot instrument flight rules (IFR) EC135s and one legacy single-pilot EC145, all provided by Metro, with four brand-new, single-pilot IFR EC145e helicopters.

These new helicopters will provide longer range and higher payload for the UW Health Med Flight team, enabling them to provide care to a larger geographic area.

Med Flight is expanding its reach in 2019, adding a base in Portage, Wisconsin, to its existing bases in Mineral Point and Madison, Wisconsin.

All the aircraft will receive Metro's standard EMS configuration and premium paint package along with mission-specific equipment. Each completion will be performed at Metro's Shreveport, Louisiana-based completion center.

BRISTOL ROYAL INFIRMARY OPENS FIREFIGHTING SYSTEM ON ROOFTOP HELIPAD

Bristol Royal Infirmary has announced that a new Deck Integrated Fire Fighting System (DIFFS) is now fully operational on its rooftop helipad. The HELP Appeal — the only charity in the U.K. dedicated to funding hospital helipads — has provided a check worth US$729,195 to cover its entire cost.

Typically used in offshore oil rigs, the DIFFS can extinguish a fire within 15 seconds by using a series of nozzles built into the helipad which spray water and foam at the touch of a button. It allows air ambulance crews to continue treating and transferring a critically ill patient to the emergency department as quickly as possible.

The DIFFS reduces the need for more traditional fire management measures on the helipad, which have a greater running cost over time.

Bristol Royal Infirmary's helipad, which opened in 2014, is the fourth hospital helipad in the U.K. to have the system in place.

LAUNCH OF JOINT LIGHT HELICOPTER PROGRAM BROUGHT FORWARD

The French Minister of the Armed Forces, Florence Parly, has announced that the launch of the Joint Light Helicopter (Hélicoptère Interarmées Léger, HIL) program has been brought forward to 2021. The HIL program, for which the Airbus Helicopters H160 was selected in 2017, was initially scheduled for launch in 2022 by the current military budget law. Launching the program earlier will enable delivery of the first H160Ms to the French Armed Forces to be advanced to 2026.

The helicopter was given its official name and will be designated as "Guépard" ("Cheetah") by the French Armed Forces.

The H160 was designed to be a modular helicopter, enabling its military version, with a single platform, to perform missions ranging from commando infiltration to air intercept, fire support, and anti-ship warfare in order to meet the needs of the Army, the Navy and the Air Force through the HIL program.

"We are proud that the HIL is considered a strategic program. I would like to thank the Ministry, the French Defence Procurement Agency DGA and the Armed Forces for their trust and for the close collaboration which helped create the conditions for the program to be brought forward within the framework of the current military budget law," said Bruno Even, CEO of Airbus Helicopters.

"This will make it possible to speed up the replacement of the older generation of aircraft, while optimizing the support and availability of the French state's helicopter fleet. Our teams are committed to delivering an aircraft in 2026 that meets the needs of the French Armed Forces in terms of availability, performance and capability."

Built around a platform that will enter service next year, the HIL program will benefit from many of the advantages inherent in the civil H160, particularly in terms of support, with simplified maintenance and lower operating costs than the previous generation of helicopters in this category, Airbus said.

The Airbus H160 was selected for the Joint Light Helicopter program in 2017. **Eric Raz Photo**

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SANTA BARBARA SHERIFF HOSTS FIRST FLY-IN EVENT

The Santa Barbara County Sheriff and Fire Air Support Unit recently hosted its first fly-in event geared toward establishing relationships with other agencies to share techniques and discuss advances in technology.

The fly-in event brought numerous law enforcement operators and their aircraft together, including Kern County Sheriff, Tulare County Sheriff, California Highway Patrol (CHP), Pasadena Police Department Air Support, Sacramento County Sheriff, L.A. Impact and others. The agencies participated in a training session during the event.

Santa Barbara Sheriff said having one-on-one relationships with other agencies helps it stay connected to resources and the latest equipment.

"I have found that aircraft technology, such as moving map systems, searchlights, infrared cameras, video downlinking, [and] ETC are always advancing and hard to keep up with due to their expense," said George Deluca with Santa Barbara Sheriff.

"Most agencies try to pick equipment that will best suit their needs while providing the best longevity for their money. Again, it's through these partnerships with other agencies and with vendors that we can make sense of it all."

Santa Barbara Sheriff has a strong local relationship with the United States Coast Guard, CHP, and Ventura County Sheriff/Fire Air Support. Through these relationships, the agencies are able to assist in each other's missions, and in some instances share parts and technical knowledge.

A number of Southern California law enforcement units attended Santa Barbara County's first fly-in event.

The agency also believes it is beneficial to its tactical flight officers (TFOs) to have working relationships with other TFOs, as they are able to share techniques that make the agency's operations more efficient.

"We intend to host this event each year," Deluca told *Vertical 911.* "With input from other agencies, we will work to make this event better and better by offering training and one-on-one time with vendors to work through technical issues and techniques to improve our skills. Together, we succeed."

The Santa Barbara County Sheriff and Fire Air Support Unit is comprised of Santa Barbara Sheriff's Office and Santa Barbara County Fire Department employees. Operating two Bell UH-1H helicopters, one UH-1N Twin Huey, two Bell OH-58s, one Sikorsky HH-60L Black Hawk, and one Cessna 206, Santa Barbara Sheriff responds to all calls related to law enforcement, aerial firefighting (day and night), hoist rescues (day and night), water rescues, medical transport, and search-and-rescue.

Santa Barbara County intends to host the fly-in event annually, and will work to make it "better and better" with expanded training and networking opportunities. **Skip Robinson Photos**

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Sentara Nightingale Regional Air Ambulance's new rooftop landing site is 296 feet above grade. **Sentara Healthcare Photo**

Nightingale Air Ambulance moves to the roof

Sentara Nightingale Regional Air Ambulance has transitioned from its original ground helipad to a rooftop array 296 feet above grade. Nightingale is based at Sentara Norfolk General Hospital in Virginia. The Nightingale program has been in operation since February 1982 and currently operates an instrument flight rules (IFR)-capable Airbus EC145.

The new rooftop site includes a 45-foot-by-45-foot pad exclusively for Nightingale and an adjacent 65-foot-by-65-foot pad for other air ambulances in the region, as well as U.S. Coast Guard and U.S. Navy MH-60 helicopters, which called at the hospital 21 times in 2018. The visitor pad has a capacity of 22,000 pounds (10,000 kilograms).

"It's safer for us and the public to take off and land from the roof," said Denise Baylous, program manager and flight nurse. "The ground pad is flanked by the hospital and a medical office building which creates a swirling effect that buffets the helicopter on windy days."

There are two ground level pads. The lower one will be converted to ambulance and police parking outside the emergency department (ED). The upper pad will remain for overflow on busy days when the rooftop pads are occupied and a third aircraft needs to land.

The $3.7 million rooftop site, designed and built by FEC Heliports, tops a three-story vertical expansion of the hospital's Kaufman and River wings. It is a five-year, $200M project scheduled for completion in 2020.

"There has been a learning curve to make the best use of the new configuration," said Baylous, "This is an exciting evolution for our team and we're looking forward to using this state-of-the-art system."

Training for the rooftop system includes invitations to Dare MedFlight and other air ambulances in the region to practice landing and transporting patients to the ED via elevator with help from hospital security and Nightingale personnel. Coast Guard crews from the air station in Elizabeth City, North Carolina, and squadrons from Naval Air Station Norfolk are also being invited to practice landing on the roof and offloading patients.

One notable challenge of the rooftop project has been the fueling system. The builders had to install underground piping from the ground-level storage tank across the ED parking lot and up the side of the hospital to carry jet fuel to the roof almost 300 feet off the ground. The new fueling system includes fuel sump separators, allowing for less fuel waste during daily fuel samples.

Sikorsky receives contract to build 12 CH-53K helicopters

The CH-53K will immediately provide three times the lift capability of its predecessor.
Lockheed Martin Photo

Sikorsky will build 12 production CH-53K King Stallion helicopters under a new $1.13 billion contract from the U.S. Navy. These advanced helicopters are part of the 200 program of record aircraft for the U.S. Marine Corps.

Under the terms of the contract, known as Low Rate Initial Production (LRIP) Lot 2 and 3, Sikorsky will begin deliveries of 12 CH-53K helicopters in 2022, and also provide spares and logistical support.

"I'm proud of the joint government and industry team in achieving this award," said Col Jack Perrin, U.S. Marine Corps program manager for the Naval Air Systems Command's Heavy Lift Helicopters program, PMA-261.

The CH-53K is the only sea-based, long-range, heavy-lift helicopter in production and will immediately provide three times the lift capability of its predecessor. The CH-53K will conduct expeditionary heavy-lift transport of armored vehicles, equipment, and personnel to support distributed operations deep inland from a sea-based center of operations. The new CH-53K will have heavy-lift capabilities that exceed all other DoD rotary wing-platforms and it is the only heavy lifter that will remain in production through 2032 and beyond, Sikorsky said.

"Sikorsky employees and our nationwide supply chain are ready to ramp up CH-53K production to support deployment of this modern, safe and reliable aircraft in 2023-2024," said Sikorsky program director Bill Falk.

Lockheed Martin, Sikorsky, and its suppliers have made significant investments in facilities, machinery, tooling, and workforce training to ramp-up production required for the CH-53K program. For example, the company has installed more than eight new titanium machining centers, designed and implemented a new final assembly test facility with multi-floor ergonomic work platforms, installed 10-ton cranes, and now have 3D work instructions on the factory floor.

SIKORSKY HOPES TO EXPAND USE OF RETROFITTABLE OPV KIT BEYOND BLACK HAWKS

WATCH **VIDEO**

BY OLIVER JOHNSON

Sikorsky says its optionally piloted vehicle (OPV) kit installed in a UH-60A Black Hawk is retrofittable, and hopes to see its future use expanded to other existing military and commercial product lines.

The kit sees the aircraft's mechanical systems removed and replaced with full authority fly-by-wire controls and Matrix technology software.

The first flight of the OPV Black Hawk, completed at Sikorsky's West Palm Beach, Florida, facility on May 29, marked the official start of a flight test program that will lead to fully autonomous flight of the aircraft in 2020.

In a conference call with reporters, Chris Van Buiten, vice president of Sikorsky Innovations, said the event was "a historic flight for Sikorsky and perhaps for aviation," marking the start of a journey to operations with two, one, or zero crew, depending on mission demands.

The piloted 0.9-hour first flight of the OPV system was completed by Sikorsky test pilot Mark Ward.

"The initial flight involved some basic hover work as well as some expansion to hover work up to about 40 knots," he said, adding that there have been three subsequent flights. "Flight four had us going out to about 80 knots. We're working on some datalink issues right now, but in terms of the aircraft itself, it's performing very well."

Developed through DARPA's Aircrew Labor In-Cockpit Automation System (ALIAS) program, Sikorsky's OPV approach aims to provide autonomy support during very complex missions with two crew, and enable reduced crew or unmanned flights when necessary.

The OPV is operated with a traditional-looking cyclic and collective controls. These are connected to the Matrix system, and it's the aircraft's computer that then drives the actuation.

"This system is flight critical, will be certifiable, so we are obviously careful with how we expand the envelope," said Igor Cherepinsky, director of autonomy at Sikorsky.

Sikorsky has been developing the Matrix technology in the Sikorsky Autonomy Research Aircraft (SARA) — a modified S-76B — since 2013, recording more than 300 hours of autonomous flight. Cherepinsky explained that the difference between SARA and the OPV was that SARA retains mechanical flight controls. The Matrix system is in addition to those, and is simply engaged or disengaged to switch between autonomous and piloted flight.

The Army is also planning tests with an identical OPV kit, which it is installing on a UH-60M. It will begin flight tests with that aircraft in about six months, and the two programs will share data as testing progresses.

Van Buiten said the choice to install the kit in an A-model (which had been partially converted to an L-model) — one of the oldest Black Hawks — was deliberate. "We did that to show that we could retrofit any of the Black Hawks," he said.

The kit will be retrofittable to UH-60 A, L, and M models, and possibly to other product lines, said Cherepinsky.

In March, Sikorsky announced an S-92 upgrade that includes the introduction of the first phase of Matrix technology. According to Sikorsky, it will enable adoption of autonomous landing technology.

For the time being, Sikorsky is continuing to expand the OPV Black Hawk's flight envelope, and will be adding more software developed by SARA as testing continues.

When in operation, system functionality will continue to be added, said Cherepinsky. "As a baseline, what we intend to field immediately are the things we can demonstrate… which is handling all the contingencies, engines out, single-engine out, being able to autorotate, picking out its landing site and safely landing," he said. "With that comes protection from controlled flight into terrain in degraded visual environments."

The next step, which would happen soon afterwards, is allowing customers to decide whether they would like to fly certain missions with no one on board.

In terms of its military applications, Van Buiten said the potential of the OPV technology to save lives was particularly promising.

"We're going to get future flight crews that say, 'It was a dark stormy night, all hell was breaking lose, and the autonomy system saved us,'" he said. "Or, we're going to get a crew in the back of a helicopter that got shot up, lose the flight crew up front, and the helicopter saved all their lives, or pilot got injured in flight, became unconscious, and the helicopter delivered them to the MASH unit. It's super exciting to me — part of the Sikorsky legacy of saving lives."

RotorBits

ELBIT SYSTEMS' BRIGHTNITE DECLARED OPERATIONAL

Having being declared operational, Elbit Systems has delivered BrightNite systems for Aérospatiale SA 330 Puma helicopters operated by an Air Force of a NATO country. User feedback has been extremely positive, with pilots emphasizing the contribution of the system to degraded visibility environment (DVE) flights and describing it as a "game changer" and a "breakthrough in pitch dark night flight," the company said.

The BrightNite system is designed to overcome visibility limitations and enable pilots to safely and effectively fly mission helicopters in pitch dark nights and in DVE conditions, including poor weather conditions, brownouts, whiteouts and sandstorms.

BrightNite transmits high-resolution video to the helmet-mounted display (HMD), allowing pilots to fly in a head-up, eyes-out position. The system processes real-time panorama video, pre-loaded terrain and obstacle information enhanced by a 3D conformal and intuitive symbology.

BrightNite utilizes unified location-based information culled from a wide field of view (FOV) to display clear images, regardless of visibility conditions. BrightNite can present information to multiple pilots simultaneously on an intuitive multi-functional display.

NAKANIHON AIR SERVICE TAKES DELIVERY OF 20TH H135

Airbus Helicopters delivered Nakanihon Air Service's 20th H135 at an entry-into-service ceremony held at the operator's hangar in Aichi Prefecture.

This new light-twin helicopter will join Nakanihon Air Service's growing fleet of H135s to support emergency medical service (EMS) missions throughout Japan.

One of the largest aircraft operators in Japan, Nakanihon operates 45 Airbus helicopters for a wide spectrum of activities including EMS, electronic news gathering, as well as passenger and goods transportation. Nakanihon Air Service also operates an Airbus-approved maintenance center for H135 helicopters.

Army researchers working at NASA Langley Research Center analyze complex flight challenges unique to rotorcraft and tiltrotor aircraft. **David McNally Photo**

Army pushes for higher speeds in future tiltrotor aircraft

The U.S. Army is developing a new wind-tunnel testbed that will help future tiltrotor aircraft attain higher speeds, improved stability and enhanced safety.

At a massive wind tunnel at NASA Langley Research Center, Army researchers are readying a unique tiltrotor model to support analysis and design of advanced tiltrotor aircraft, a possible key to achieving Army modernization goals for Future Vertical Lift.

"Tiltrotors are like the V-22 Osprey aircraft that the Marines currently use," said Matt Wilbur, a senior aerospace researcher with the U.S. Army Combat Capabilities Development Command's Army Research Laboratory. "Their benefit is they have very high flight speeds. They can transition from a helicopter configuration to a forward flight configuration that looks more like a turboprop aircraft and can go at much higher flight speeds than typical helicopters."

Current tiltrotors provide Army researchers with a baseline of what is possible. In the future, aircraft designers will leverage new materials, advanced propulsion and supercomputer modeling — validated by physical experiments — to deliver new combat capabilities to the Army.

"The data we're going after is completely new; it doesn't currently exist," said Dr. Jaret Riddick, director of the lab's Vehicle Technology Directorate. "We want to be able to model whirl-flutter stability, which will help us to overcome a critical limitation for tiltrotor aircraft."

Tiltrotor designs require a compromise between a spinning helicopter rotor for efficient hovering flight and a fixed-wing for forward flight in airplane mode, he said. Interactions between this unique combination of rotor and wing can lead to instability at higher speeds.

"ARL researchers are bridging a scientific gap by providing underpinning research that will validate modeling for tiltrotor aircraft of the future," Riddick said.

Using foundational aerodynamics research and computational models, Army engineers will shape Future Vertical Lift with analysis of new tiltrotor designs, with the goal of increasing reach, enhancing protection and lethality, and delivering agility and mission flexibility.

Army researchers are working with an industry partner to fabricate the Tiltrotor Aeroelastic Stability Testbed, or TRAST. The apparatus is a scaled-down tiltrotor engine assembly and partial wing loaded with sensors and designed to be attached to wall of the wind tunnel. The Army hopes to take delivery in September.

The wind tunnel lets researchers push the envelope in dynamic testing by producing winds of Mach 1.2, or 1.2 times the speed of sound.

"Obviously a rotorcraft does not fly that fast. However, we do have unlimited flight velocity range for a rotorcraft, and the rotorcraft of the future will be flying faster and faster; this is one of the only facilities in the world in which rotorcraft are consistently tested that already meets and exceeds the flight range that rotorcraft are expected to fly," Wilbur said.

If you would like to submit a press release or if you have a new product or service that you believe is newsworthy, please email our news editor at news@verticalmag.com.

Newquay SAR operates two S-92 helicopters: G-MCGY and G-MCGZ.

NEWQUAY LIFESAVERS

TEXT & PHOTOS BY GREG CAYGILL

It has now been over four years since the United Kingdom's search-and-rescue (SAR) helicopter service successfully transitioned from a mix of military- and Coastguard-operated aircraft to a service solely provided by the Coastguard, and operated by Bristow Helicopters Ltd. The fleet of Sikorsky S-92 and Leonardo AW189 aircraft are strategically located across 10 bases, one of which is at Newquay in southwest England.

The Newquay base's coverage area encompasses not only busy shipping lanes and an extensive coastline, but also a very popular tourist area, which leads to many cliff and beach rescues. Newquay SAR is one of the busiest bases in the country and in 2018, completed 349 tasks, rescuing 289 people. *Vertical 911* recently went behind the scenes at the base to learn more about this lifesaving work, and the people and equipment that make it happen.


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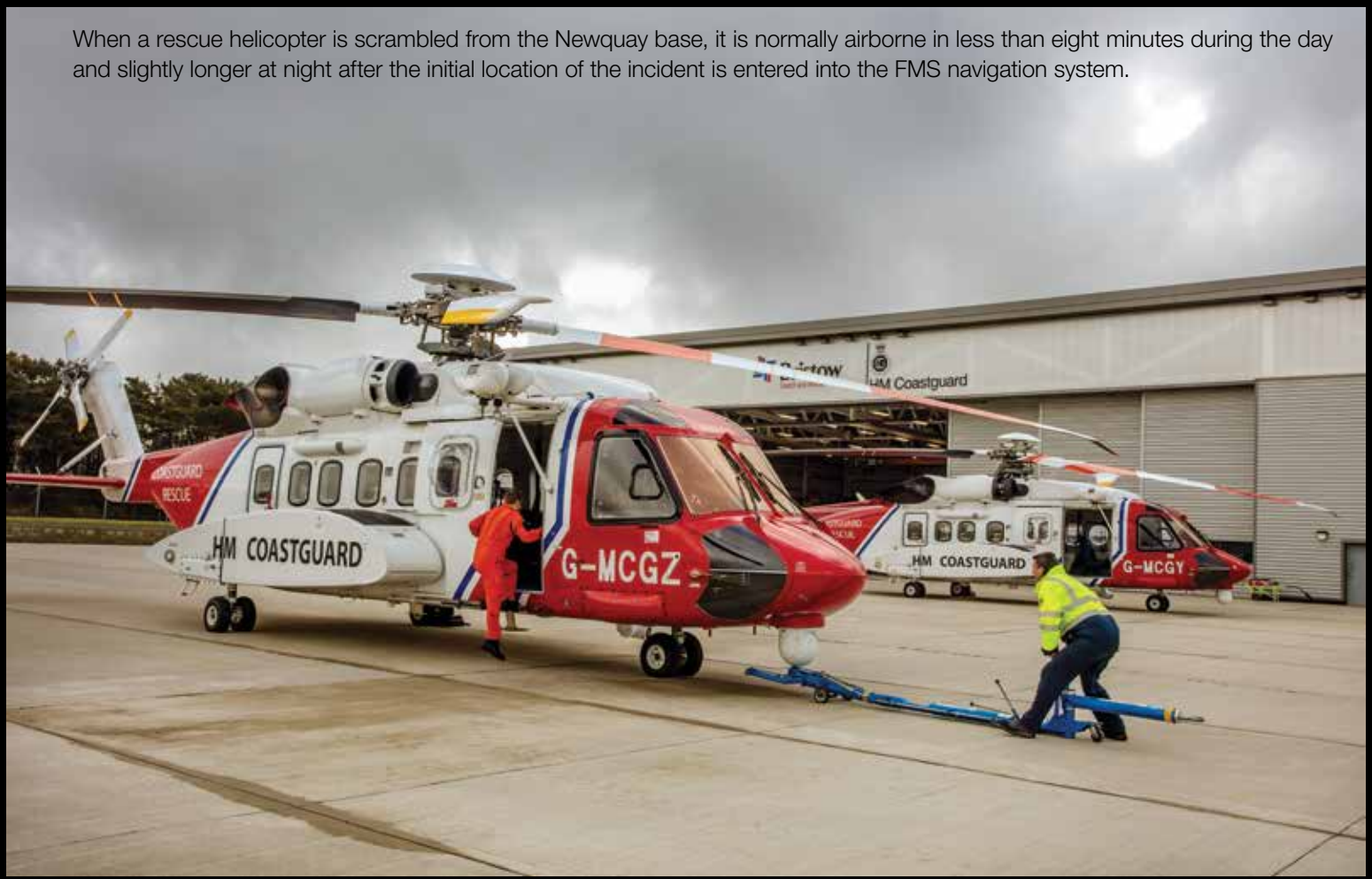
COASTGUARD
RESCUE

In the SAR role, the S-92 is a step change in capability compared to the Sea King that it replaced. There's a wealth of technology on board, including a weather radar capable of ground mapping, enhanced ground proximity warning system (EGPWS), moving map, flight management system (FMS) and terrain collision and avoidance system (TCAS). The aircraft is also equipped with a comprehensive communication suite that includes HF, VHF, UHF and airwave radios, satellite phone, FLIR, Trakkabeam high intensity searchlight, scene lights and an electronic flight bag. To further enhance the overland capability, the crew can elect to fly using night vision goggles (NVGs).

The S-92 has a comprehensive avionics suite including a dual digital automatic flight control system (AFCS), coupled flight director, and fully integrated navigation system. This provides the crew with several SAR-mode options, including six search patterns. There is capability for automatic flight control from the incident overhead, through the transition phase into the hover and then the climb on completion of a rescue. While in the automated hover, the winch operator can apply inputs to refine the auto hover position when required, using controls in the cabin. Despite this impressive automation, pilots must also be capable of completing all tasks manually, and practice this regularly.

When a rescue helicopter is scrambled from the Newquay base, it is normally airborne in less than eight minutes during the day and slightly longer at night after the initial location of the incident is entered into the FMS navigation system.



As the aircraft speeds toward the location of a rescue, updated information is received by the crew via radios and the position is plotted onto the moving map. The winch operator and pilot will then coordinate the best approach to the target and additional waypoints may be sent to the FMS, to map a detailed route toward and away from the scene. As the aircraft approaches, casualties will be located using a combination of radar, FLIR, and NVG.

"The pilot may elect to use SAR modes to descend the aircraft to hover, particularly in bad weather or at night," explained Newquay Capt Graham "Sharky" Finn. "Once on scene, the casualties' positions will be illuminated with aircraft scene lights and the winchman/paramedic will be deployed via the Goodrich electrical hoist."

When the rescue crew responds to an incident on land, casualties are assessed and may be loaded onto a stretcher and recovered to the aircraft. Casualties in the water are normally recovered quickly, with the use of strops. Once in the aircraft, the winchman/paramedic can provide medical care equal to care provided in a ground ambulance.

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In March, Rescue 924 came to the aid of Reegan Green, a fisherman who was swept overboard by a wave off the coast of Salcombe, Devon. Green spent an hour in very cold water and three- to four-meter (10- to 13-foot) waves. Thankfully, the crew of his fishing vessel was able to mark the position where he went overboard, and he was wearing a reflective lifejacket that aided his survival and enabled rescuers to locate him quickly.

"We got the call to help just five minutes after the fisherman had fallen overboard," recalled Capt Jörg "Yogi" Brunner. "Despite horrendous weather conditions on scene with winds in excess of 60 knots, we were preparing ourselves for an extensive search-and-rescue operation." However, they quickly spotted the smoke marker and the life ring released by Green's crewmates.

Brunner continued, "We flew toward that position and saw the casualty immediately as he was wearing a reflective life jacket. We lowered our winchman into the water in very rough conditions and conducted a double winch recovery which only took about two minutes." The week after the rescue, Green, shown here in a black jacket, visited the Newquay base to thank the helicopter crew for saving his life.

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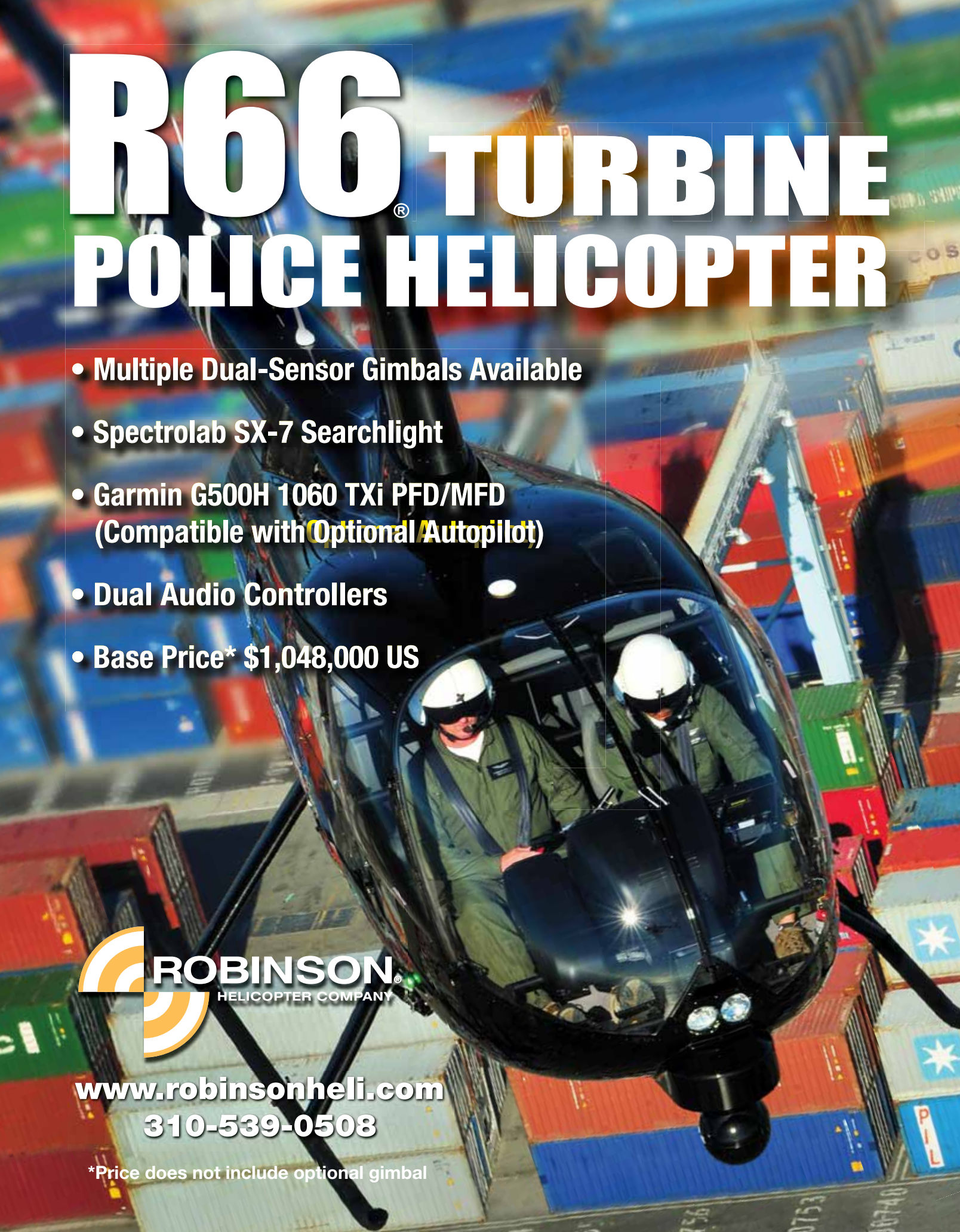
Newquay Capt "Sharky" Finn transitioned from flying Royal Navy Sea Kings to the S-92 in 2013. He was one of the first recruits to come to UK SAR from the military after training with Bristow.

In the back of the aircraft, the winch operator can manipulate the map, identifying waypoints. If the aircraft were going to a cliff using the radar as an aid, the winch operator would add the approach to the map, electronically transfer waypoints to the map in the front of the aircraft, and use them in the navigation system and flight plan.

Paramedic/winchman Julian "Bungi" Williams winches down onto "The Ivan Ellen," one of two lifeboats based at the Royal National Lifeboat Institution's (RNLI's) Penlee station. The Ivan Ellen is the main lifeboat for SAR operations.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RNLI crewmember Ami Smith is winched aboard the helicopter during training. This was her first winch.

When flying the S-92 during a rescue, pilots can use a variety of hovering techniques. If it's a static casualty and weather conditions allow, they may elect to hover manually. However, they generally take full advantage of the S-92's impressive automation.

Capt "Sharky" Finn elaborated, "We have two modes — V-hold and P-hold. V is velocity and P is position. When we're in position, there's a GPS stabilized hover that always bring you back to where you have said you want to hover. If you deviate away from that spot because of wind or you just touch the controls, it will bring you back to that point in space.

With V-hold, we use it if we're going to a vessel and basically you set the aircraft and you trim it so it's formatting with a boat. It's got the same velocity as the ship, so you can use that to conduct them when transferring crew."

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Every year on Jan. 1, Pasadena Air Ops flies multiple missions for the Tournament of Roses Parade and Rose Bowl. Here, a Bell OH-58A does an overflight of the Rose Bowl.

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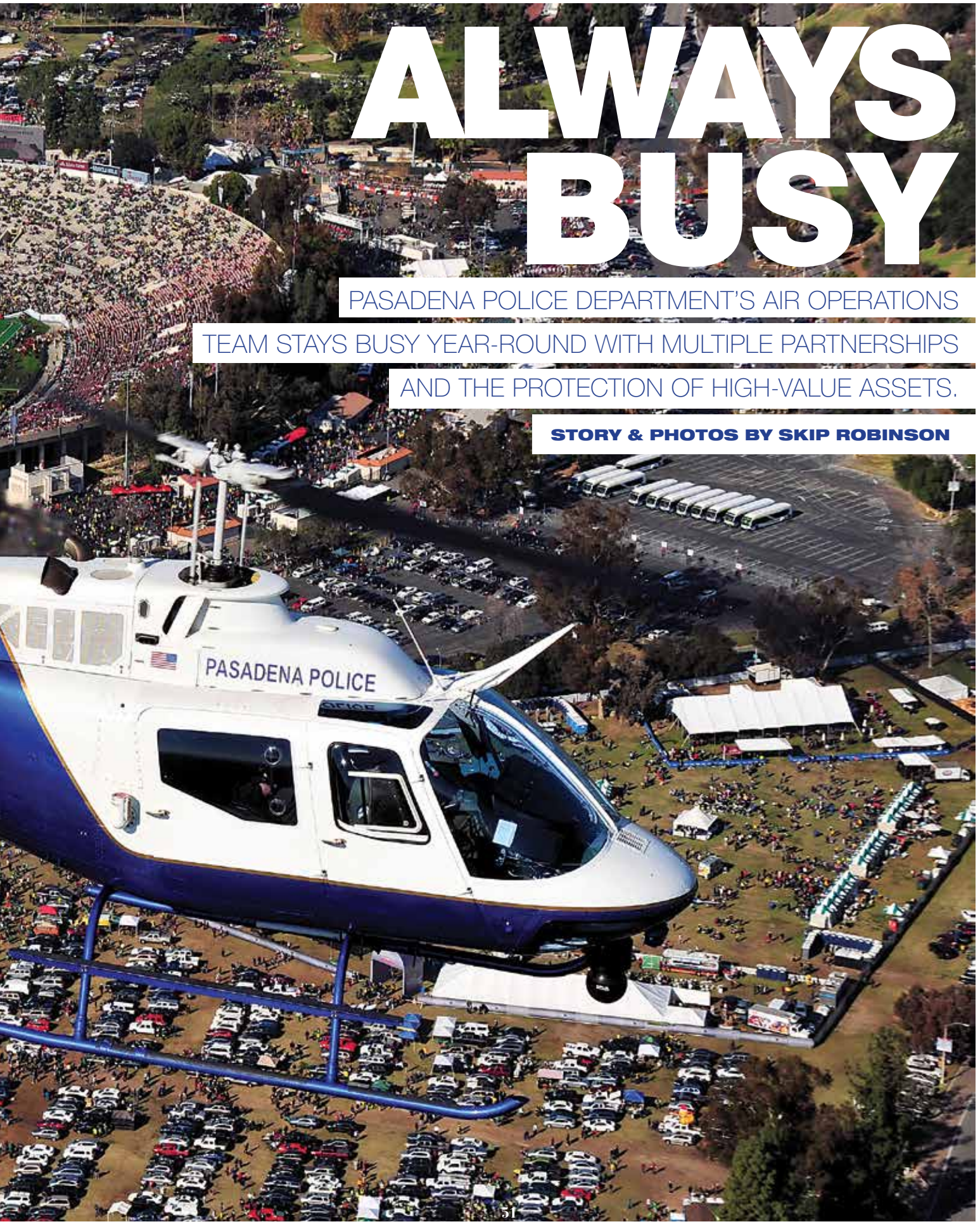
ALWAYS BUSY

PASADENA POLICE DEPARTMENT'S AIR OPERATIONS TEAM STAYS BUSY YEAR-ROUND WITH MULTIPLE PARTNERSHIPS AND THE PROTECTION OF HIGH-VALUE ASSETS.

STORY & PHOTOS BY SKIP ROBINSON



Pasadena removes the OH-58's left door window during the warmer months of the year.

The unit works closely together and conducts regular training to stay proficient in its many missions.

Night flights are routine for Pasadena Air Ops. The unit has NVGs, but because of the bright lights in the city, uses these mostly for dark mountain searches.

Although recently retired, the Enstrom 280 series served as Pasadena's primary patrol aircraft for four decades.

Pasadena, California, is known internationally for its Rose Bowl stadium and televised New Year's parade. It is also known for its attractive houses and properties. The city is nestled against the San Gabriel mountain range, adding beauty to an already beautiful city.

Nevertheless, Pasadena has its fair share of big-city law enforcement issues, as it is adjacent to other cities including Los Angeles, Glendale, Burbank and Arcadia. Pasadena Police Air Operations helps its own police department and other local law enforcement agencies keep a rein on these problems by providing effective and responsive airborne service for the public.

Pasadena Air Ops is one of the oldest airborne law enforcement programs in the United States. The section has a dedicated four-acre heliport immediately northwest of the city, nestled in between the Rose Bowl and the Jet Propulsion Laboratory (JPL). The unit consists of a lieutenant who is a qualified pilot, two sergeants/tactical flight officers (TFOs), a corporal/chief pilot, and three line pilots. There are three assigned TFOs as well. Pasadena's program also supports the Los Angeles Interagency Metropolitan Police Apprehension Crime Taskforce (L.A. IMPACT) with a dedicated Pasadena pilot and TFO.

FIFTY YEARS OF SERVICE

The Air Operations section was started in 1969 after city officials saw an increase in local crime rates. Pasadena PD looked at the very successful helicopter programs of the L.A. Police

Department and L.A. County Sheriff's Department to see how they helped support ground officers by giving them better situational awareness and more tactical options. Pasadena then started looking at helicopter types, focusing in on the newly designed piston-engine Enstrom F-28A.

By 1970, patrol crews were flying patrols a few days a week. The F-28A worked well as it was inexpensive to fly but also smooth and relatively rugged for patrol flights. Within a relatively short period of time, airborne law enforcement had made a difference; crime rates were down and criminals were on the run. As the F-28A aged and eventually needed replacement, Pasadena continued on with the Enstrom tradition by procuring the F-28C and later the turbocharged F-28F.

The Enstroms were good helicopters and over the years were upgraded with better avionics, radios, and infrared cameras. The first turbine aircraft arrived in the form of a Bell 206B JetRanger III, which is still in service today. By the late 1990s, the U.S. Army was retiring and making available Bell OH-58A/A+ and C model helicopters to law enforcement agencies. Pasadena put in a request and procured multiple OH-58A+ airframes and spares, eventually refurbishing two and putting them into patrol service. These airframes were updated with civilian radios, avionics, infrared cameras, and new paint schemes. They served Pasadena well for over a decade before being damaged beyond repair in a ground accident in 2012 *(see sidebar, p.54)*.

Pasadena liked the OH-58 airframe, and so was able to refurbish and equip three more surplus helicopters and place them into service. As Lt Mike Ingram explained, "We know the Bell OH-58A has years of life left in it and has proven to us to do what we need on a daily basis."

That said, in 2009 Pasadena did buy a new MD 500E as part of a fleet replacement plan. Unfortunately, the economic issues at that time put the fleet replacement plan on hold. Today, now that the Enstrom fleet has been fully retired, Pasadena operates three Bell OH-58A+, one Bell 206B JetRanger, and one MD 500E, all similarly mission-equipped.

Acquired in 2010, the MD 500E is liked by flight crews for its maneuverability and speed.

The unit regularly trains for airborne use of force. Both flight crews and the SWAT team are involved.

The OH-58A+ and MD 500E have the Spectrolab SX-16 searchlight, while the JetRanger uses the smaller SX-5. Other equipment includes BMS downlink equipment in 4.9 GHz frequency, FLIR 8500 camera systems, Technisonic TDFM-7000 radios, Lo-Jack stolen vehicle recovery systems, gyro-stabilized binoculars, Churchill ARS mapping systems, Aviation Specialties Unlimited night vision cockpit modifications and equipment, and Van Horn Aviation tail rotor blades on the OH-58As and JetRanger.

According to Ingram, "We have had great luck with Bell helicopters and specifically the OH-58As, and we see being able to fly them for another six to eight years before the parts supply [diminishes] and cost of operation rises to the point of having to look at a replacement. By then other helicopters should be available for consideration."

He continued, "For as long as I've been here we have tried to be as safe yet fiscally responsible as possible. The Enstroms were flown as many years because the cost of operation was low, but provided what we needed. When we went to turbines, the JetRanger worked well compared to many larger aircraft. The OH-58 procurement allowed us to keep expenses low but fly a quality aircraft. We maintain the OH-58s as if they were civilian aircraft and will never waver from our high quality standards.

"We're proud to have helped change the FAA rules on [military] surplus aircraft as it relates to training and ratings. Because of our efforts, pilots training in surplus aircraft can count those hours toward their ratings and certifications," Ingram added.

The aircraft are maintained in house by Pasadena Air Operations' director of maintenance, Randy James, who has over 40 years of aviation experience, including 31 years at the unit. He is assisted by two other experienced technicians. James recalled, "We flew the Enstroms for over four decades, and from what I understand we had the highest-time F-28 series Enstroms by a good margin. They were good helicopters and we knew them inside and out. Since the Enstroms flew so many hours we needed to know how to keep them reliable and flying every day, and we were successful at doing it."

He continued, "As far as the OH-58As and JetRanger [are concerned],, they are excellent aircraft. Very reliable and easy to maintain, and never come up with an issue we don't already know about. We have a large inventory of parts and Bell still supports the airframe, so keeping them in the air is a non-issue. We started flying the OH-58 helicopters in 1998. Since then, we have flown our fleet of OH-58 helicopters in excess of 28,000 hours. The MD 500E is a good machine and relatively easy to maintain.

James said that his team performs all of the scheduled maintenance on the aircraft in house, while contracting out engine overhauls and major airframe work to vendors who have the tooling to complete those tasks in a timely manner. "One of the most significant cost savings is having our Air Ops maintenance staff performing our own in-house component overhauls and repairs," he

The OH-58A+ has been an excellent aircraft for Pasadena. It can do the mission at a reasonable cost, is very reliable, and is a comfortable platform for its crew.

noted. "Before placing the OH-58 helicopters in service, they went through a comprehensive in-house repair and rebuilding process, which consisted of disassembly of the complete aircraft. They were then inspected, repaired/overhauled and reassembled."

THE MISSIONS

With respect to overall flight hours, Pasadena Air Ops is for the most part a patrol unit, with shifts seven days a week covering approximately 17 hours a day. It also trains for airborne use of force with its SWAT teams and is capable of inserting officers onto the tops of buildings, and supporting K-9 teams.

Notable are the unit's close relationships with local air units and outlying cities. Pasadena Air Ops has a partnership with 10 neighboring cities in the San Gabriel Valley called FAST, for "Foothill Air Support Team." This program began in 1996 with five cities that wanted air support service. Today, the partnership extends east all the way to Pomona and is one of the largest regional cooperative programs on the West Coast, with a combined service area encompassing about 125 square miles and 750,000 people.

> *"We will have at least one helicopter covering all three cities but if there is a need for another helicopter to launch we have the crews and flexibility to get another ship into the sky. It saves money from putting unnecessary time on aircraft and wearing out our crews."*

Director of maintenance Randy James stands next to the unit's Bell 206 JetRanger, an airframe he is quite fond of.

The unit has three full-time mechanics and a grounds engineer.

All aircraft are maintained to the highest level through a combination of in-house maintenance and work by outside vendors.

"The FAST program supplements our patrol efforts and on selected nights crews fly a separate aircraft to cover the partner cities," said Ingram. "Yearly, those flights account for roughly 500 hours of extra service. At the same time Pasadena has its own patrol helicopter; however, we have developed an outstanding relationship with the Burbank/Glendale Air Support Unit. Together, through an informal Tri-City agreement, Pasadena-Glendale-Burbank partner to cover our cities. Cooperative flight schedules have been created to insure our aircraft are in the air during the busier times of the day.

"We have been doing this for years and it works extremely well," Ingram continued. "We will have at least one helicopter covering all three cities but if there is a need for another helicopter to launch we have the crews and flexibility to get another ship into the sky. It saves money from putting unnecessary time on aircraft and wearing out our crews."

Another cooperative venture is L.A. IMPACT, a nationally recognized regional, multi-agency task force responsible for high level narcotic interdiction. Pasadena took over the air support

LESSONS LEARNED

On Nov. 17, 2012, two Pasadena Police Bell OH-58 helicopters collided with one another while operating at their heliport. The ground-based collision occurred as one aircraft was landing and another was preparing to depart for a mission. As the landing aircraft prepared to touch down, the two helicopters' main rotor blades collided, resulting in the total loss of both aircraft. Fortunately, neither aircraft rolled over or caught fire, and the injuries sustained by the crewmembers were minimal. In the end, the National Transportation Safety Board described the collision as controlled flight into terrain as a result of human error.

The circumstances leading up to the collision were carefully studied by Air Operations, and lessons were learned. One immediate finding was that the aircraft spacing in between the two landing pads had not been increased when the unit transitioned to the larger aircraft. The second major finding was the need for thorough review of landing and communication procedures with crewmembers. Following the collision, the heliport landing area was redesigned with increased "stand-off distances," the removal of ground obstructions, and improved lighting and markings. A renewed sense of focusing on the "little things" was strongly embraced by all.

Lt Mike Ingram, who was standing next to the departing aircraft at the time of the accident and injured by flying debris, told *Vertical 911*, "Although there were a number of issues that took place that day, it comes down to one thing: leadership. It's critical, and identifying issues before they happen is paramount to running a successful operation. The 'top down' approach doesn't work because everyone needs to be involved. Fight complacency and don't judge incidents by the end result because we miss opportunities to get better. It's humbling to say, but I missed opportunities on Nov. 17. The silver lining is I could not be more proud of my team for the way they responded and came together. We learned a lot and I can honestly say we are better because of it."

Pasadena Air Ops has a large dedicated facility with an ideal layout.

operations for L.A. IMPACT in 2005, but its involvement in providing aerial surveillance dates back to the mid-1980s. Today, the unit flies a special mission Airbus AS350 B2 which is equipped with an L3 Wescam MX-10 camera for high-altitude surveillance and a Spectrolab SX-16 Nightsun searchlight.

The L.A. IMPACT flight crew flies daily missions throughout Southern California, supporting L.A. IMPACT groups in various surveillance operations. These missions target major drug trafficking organizations and usually result in large seizures of narcotics, money, or weapons. Based in L.A. County, the crew covers an area from the southern border north to the Central Valley.

While Pasadena Air Ops stays busy enough with patrol work, it is also occasionally called into the adjacent Angeles National Forest to search for lost hikers and other parties. "If we locate them, we generally help direct the crews in for hoist work or recovery," Ingram explained. Here, the unit especially benefits from its night vision goggle (NVG) program, which has been in place since 2012.

"We use ANVIS 9 goggles and are happy to have them," said Pasadena Air Ops pilot Steve Thurston. "Since we are so close to the mountains, the goggles have been a game-changer for us. It can literally be black up there and previously we would have simply not ventured into those areas. Today, we can go there for a search or to support officers with confidence."

PART OF THE COMMUNITY

Naturally, the unit is also busy during the Pasadena New Year's Rose Parade and Rose Bowl football game on the same day. It provides normal patrol coverage, command and control, and traffic control flights throughout the day, in addition to working with a number of federal agencies on security and anti-terrorism support flights. "We won't go into great detail, but rest assured the public is well protected with what goes on [during] this day," said Ingram. Although Jan. 1 is a particularly big day, Pasadena provides similar coverage throughout the year during large concerts, international soccer games, UCLA football and other sporting events at the Rose Bowl.

Because Pasadena Air Ops likes to stay connected with as many air support agencies as possible, for the last 30 years the unit has hosted a yearly training event that brings air units from across Southern California together to discuss current topics and safety-related items. "Because of our great relationship with the

Recently acquired for special missions, the Airbus AS350 B2 is proving its worth during long surveillance flights.

An OH-58A+ over the city on a patrol flight. The unit anticipates operating these aircraft for another six to eight years.

Rose Bowl, we've been using it for the fly-in exercise for a number of years," Pasadena Air Ops Sgt Brad May told *Vertical 911*. "This is an extremely good way for flight crews to meet and build relationships. These types of events are critical in forming relationships that help us for years to come. When you have a question or need assistance, knowing each other makes all the difference."

In addition to police work, Air Ops is active in community outreach efforts. A good example is the Christmas toy drive, originally created by another agency but adopted by Air Ops. This is a regional effort, where section officers raise funds from within the agencies served by the section to buy toys. These toys are then delivered by Santa Claus to the rooftop heliport of Pasadena's Huntington Memorial Hospital and distributed to kids in the pediatric ward. In addition, the unit supports a local domestic violence center and provides toys and holiday cheer for the children there. Other efforts involving the community include neighborhood National Night Out activities; conducting tours for Boy and Girl Scouts, school and other groups; and proactively promoting police helicopter support activity among the people the unit serves.

Pasadena Police Air Support's future is secure: it has a superb facility, a great working relationship with almost every other air support and fire air support agency in California, extremely well maintained aircraft, and well trained flight crews that have strong support from the command staff. Although it might be able to afford larger and more capable aircraft, it has found that its fleet, for now, does the mission well. When the time for fleet replacement comes in the future, the unit will do its best to give its citizens the most value for the dollars spent.

Skip Robinson | Skip has covered helicopter operations through photography for 25 years and has worked with *Vertical* Magazine for over a decade. His main interests are rescue, parapublic and military operations. Skip is based in Los Angeles, California.

DOWNLOAD THE WALLPAPER!

A line of duty death is a difficult event for any emergency response agency. Taking some simple steps to prepare for such an eventuality can make a real difference when a tragedy occurs. **Mike Reyno Photo**

PREPARING FOR THE WORST

PART I

No one wants to contemplate a fatality within their organization, but fatal aviation accidents can and do happen with unfortunate regularity. Here's how your organization can prepare to cope with a line of duty death.

BY DANIEL J. MCGUIRE

Editor's Note: This is part 1 in a two-part series by Daniel J. McGuire, a board-certified grief educator and counselor who works with emergency response agencies to prepare for losses within their organizations. Part 2 will appear in the Fall issue of Vertical 911.

Mayday, mayday! can be the most disturbing words ever transmitted to communications in any helicopter emergency medical services (HEMS) or other public safety aircraft operation.

With it comes the realization that when a medical, law enforcement, or search-and-rescue aircraft crashes, there is a potential death toll of two or more crewmembers and quite possibly the patient — serious losses that can be difficult to comprehend in the state of raw, unfiltered shock that sets in after an accident occurs. This is not to mention the loss of resources and the resulting limitations placed on saving the lives of other patients who are seriously injured or ill.

In 20 years of facilitating discussions with emergency response agencies, the questions I've been asked most frequently with respect to line of duty deaths (LODDs) are, "Where do we begin?" and "How do we begin?" Before getting into the specifics, I often share three guidelines that should be used to shape any standard operating guidelines or procedures: tradition, honor, and respect. Keep these values in mind as you work to create a program worthy of your valued colleagues who might end up making the ultimate sacrifice.

A LODD or serious injury is a tragic and very difficult event for any emergency response agency to get through correctly. Any organization involved in a LODD event will experience disturbance of normal operations; raw emotions; intense feelings of grief, sadness, anger, and bereavement; and will face very difficult days and weeks ahead. These factors necessitate pre-planning and awareness of the fact that no single person will be able to handle the immense number of responsibilities and action points associated with a LODD.

If you have any title or rank before or after your name (e.g. director, captain, CEO, or president), your employees will be looking towards you immediately as the person who will know how to handle this sudden tragic loss. Are you equipped to manage such an awful event, while also balancing the need to maintain minimum daily operations and keep the lights on? When a LODD event occurs, your agency cannot "shoot from the hip" and expect to accomplish these minimal tasks while also adequately supporting the surviving family and colleagues. To prepare for such an occasion, you need to adopt the mindset that it's not *if* this will happen to your organization, but *when*.

TWO 'FAMILIES' TO CONSIDER

When we work (and live) in a collective unit like a HEMS program or other emergency response agency, we build lasting relationships characterized by deep trust in one another. Consequently, we end up with two "families" that we deal with on a daily basis: a strong work family, and the biological family we go home to after our shift is over. It is not uncommon for many of us to spend more time with our work family than with our loved ones at home.

I bring this up due to the fact that in the wake of a LODD, it can often happen that the surviving agency — the "dual family" — can begin to overtake the surviving family when it comes to funeral planning and related items. This is generally not done from any sense of malice or disrespect, but as a consequence of the surviving agency's complicated grief. In such situations, our EMS training encourages and enhances the ability to take over in a way that can push the surviving family off to the side — mistakenly so.

For this reason, in the event of a LODD, the surviving agency's leadership must make a concentrated effort to work in concert with the surviving family, remaining in an assistance position without crossing over into a decision-making role. With this said, one tool that I strongly encourage your agency to adopt is some type of emergency contact form (ECF) for all of your field personnel. This form should have a minimum of two emergency contacts who you can reach out to before the details of a tragic event break on social media.

In addition to these names and contact details, part A of the ECF should include such important details as:

1. The employee's personal data (complete name, date of birth, address, and phone numbers).
2. Whether the employee has any siblings in the immediate area.
3. Whether the employee is an organ donor (this is often overlooked or unknown by surviving family members).
4. Is there anyone at the home address who has a fragile condition that could be exacerbated by a death notification? Is there anyone who has a hearing or speech impairment?
5. Are there any younger children at the home address? (If so, an extra person may be needed to occupy the children while you work with the surviving spouse.)

The ECF should also have a part B that will help your agency and the surviving family arrange funeral services in accordance with the deceased employee's wishes. It often happens that the surviving family's deep, sudden shock may compromise their ability to make quick decisions and deal with the tasks facing them. In such cases, having the employee's stated desires readily available can be of help to the family, provided you respect their primacy as decision makers. It is important to note that not only your employees, but also their spouses or close family members should be involved in answering questions such as:

1. What type of funeral and/or wake services do you desire?
2. Do you wish to be buried, and if so, would you like to be buried in your flight suit or other agency garment?
3. Would you prefer to be cremated? If so, what do you want to happen to your cremains?
4. Do you wish for any honorary pallbearers?
5. Any special music or prayers to be incorporated into the services?
6. Any important preferences to reflect your religion or customs?

Many of us spend more time with our co-workers than our actual families. Nevertheless, the family's needs and wishes should always come first in the aftermath of a LODD. **Mike Reyno Photo**

WE KNOW HELICOPTERS

Vertical DAILY NEWS

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Things happen fast in the helicopter industry. For the most up-to-date news and press releases, subscribe to our free email newsletter, delivered every weekday, ***Vertical* Daily News**. You'll get important industry news delivered straight to your inbox or smartphone, so you don't miss out on *anything*.

verticalmag.com/subscribe

The Memorial Lights are an artistic project by photographer Mark Mennie, displayed annually the night before the Air Medical Memorial and in the AMTC Memorial Room. There are currently more than 400 lights in the project, each bearing a handwritten name memorializing a line of duty death in the air medical community. **Mark Mennie Photos**

PRIVACY BEST PRACTICES

Due to the sensitive personal information contained in ECFs, it is essential to keep them secure and private. I suggest that you send them out as blank documents with envelopes. Each employee should be given clear instructions to complete the ECF in the presence of a spouse or close family member, put it into the provided envelope and seal it, then return it to the organization before a specified deadline. The sealed envelopes should be returned to a leadership group who can keep an inventory of who has been provided with ECFs, and who has turned in completed documents.

Due to the sensitivity of the ECF data, I do not recommend that they be stored with other, standard employee files. All agencies should abide by the rule that an employee's sealed ECF is to be opened in only three circumstances: 1) in the event of that employee's death; 2) if the employee is incapacitated to an extent that they are unable to speak for themselves; or 3) the employee wishes to update critical information in the ECF.

I'll note in summary that the importance of having a comprehensive ECF program for your agency is twofold. First and foremost, it gives the leadership of your agency peace of mind and the ability to carry out necessary tasks when tragedy hits.

A secondary benefit for your employees is that it encourages them to speak openly with their loved ones about end-of-life issues — a conversation that many people tend to avoid. As a grief counselor, I have seen how difficult it can be for families and significant others to stumble through end-of-life and funeral planning choices in the midst of crushing grief. With an ECF in place, you can rest easy knowing that in a time of loss and sorrow, these important decisions will not have to be made in the shroud of loss and heartache.

In part 2 of this series, I will address another important step for agencies to take — assigning a family liaison who can help coordinate the many necessary actions following a LODD. In the meantime, may the wings of the ultimate chief pilot keep you all safe and with the faith that your agency, regardless of size, never has to experience a line of duty death.

Daniel McGuire | President and senior consultant of CISM Perspectives, Inc., a nationally known and respected training and consulting practice that specializes in establishing line of duty death response programs and peer support programs. Contact him through www.cismperspectives.com.

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In addition to our proven live flight training programs, our Search & Rescue and Tactical Training Academy (SART/TAC) is setting a new standard for mission training performance and safety by employing a synthetic hoist/aerial gunnery virtual simulators, hoist and fast-rope training towers, and modern classrooms that utilize cutting edge technology to provide our universally adaptable and standardized multi-mission training and operational SAR programs.

Whether you are looking for Civil Aviation Authority (CAA) compliant and certified basic to advanced hoist mission training, new aircraft type SAR role conversion, or complete turn-key Air Ambulance/HEMS and SAR/LIMSAR program implementation and support, with operational Paramedic and Rescue Specialist Aircrew staffing, we deliver proven solutions. Priority 1 Air Rescue is dedicated to providing unparalleled capability, safety, and service to perform lifesaving missions.

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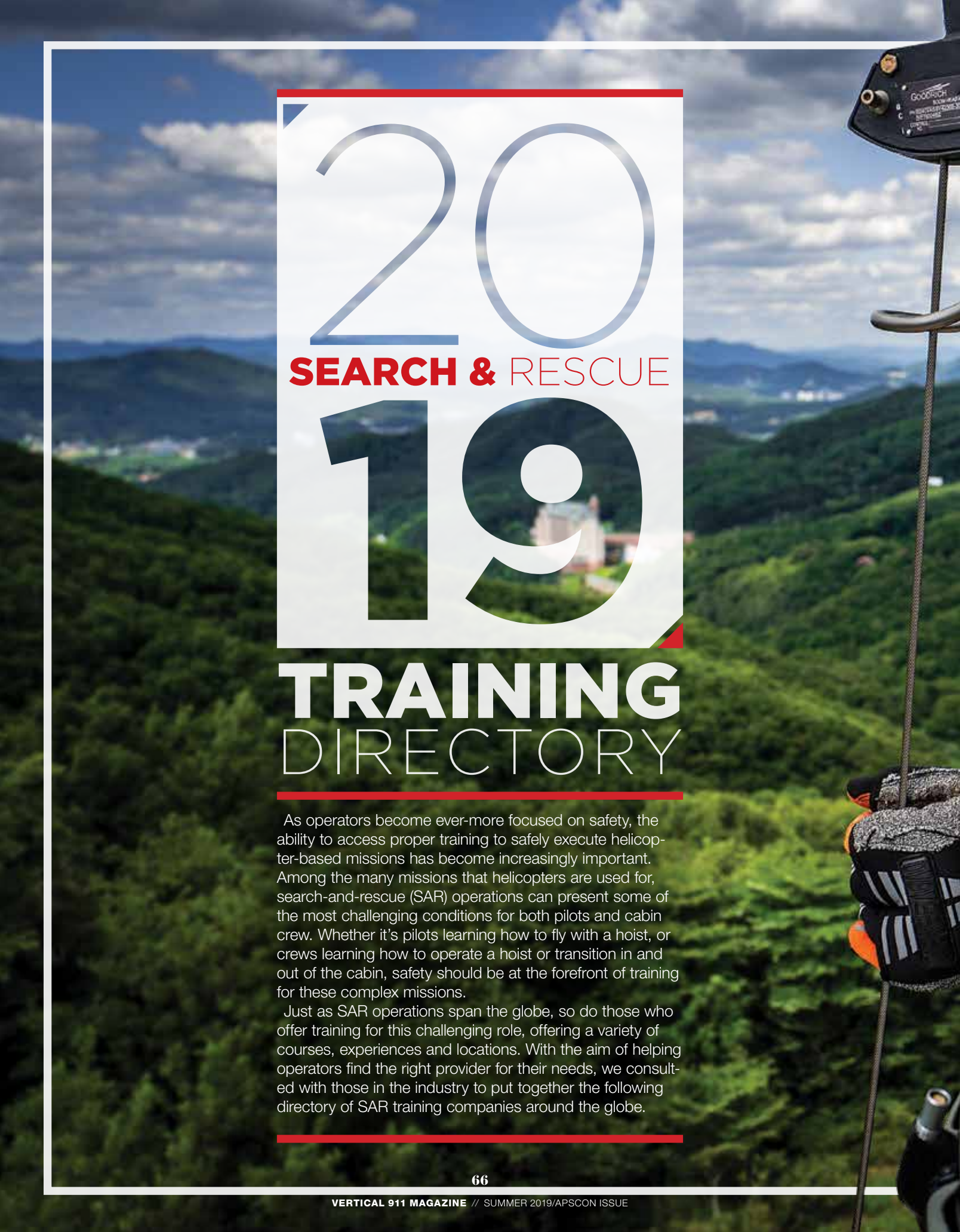

2019 SEARCH & RESCUE TRAINING DIRECTORY

As operators become ever-more focused on safety, the ability to access proper training to safely execute helicopter-based missions has become increasingly important. Among the many missions that helicopters are used for, search-and-rescue (SAR) operations can present some of the most challenging conditions for both pilots and cabin crew. Whether it's pilots learning how to fly with a hoist, or crews learning how to operate a hoist or transition in and out of the cabin, safety should be at the forefront of training for these complex missions.

Just as SAR operations span the globe, so do those who offer training for this challenging role, offering a variety of courses, experiences and locations. With the aim of helping operators find the right provider for their needs, we consulted with those in the industry to put together the following directory of SAR training companies around the globe.

Bob Cockell/ARS Photo

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Skip Robinson Photo

ACE TRAINING CENTRE (OPERATED BY TOLL GROUP)

Sydney, Australia
- Wet and dry winch training
- Rescue crewman training
- Human factors training
- Helicopter underwater escape training (HUET)
- Complete Aircrew Training System (CATS)

acetrainingcentre.com.au
+61 2.9782.1654

ADVANCED HELICOPTER + RESCUE TECHNIQUES

Ramona, California
- Helicopter (land or water) operations/ level 1
- Underwater egress + HEEDS
- Short haul
- Hoist

ahrt-training.com
503.444.7952

AIR RESCUE CONCEPTS

Hurricane, Utah
- Rescue hoist training
- Swift water hoist rescue training
- Rescue swimmer training
- Combat search-and-rescue

airrescueconcepts.com
661.305.1944

AIR RESCUE SYSTEMS CORP. (ARS)

Ashland, Oregon
- Precision hoist
- Physical laws of hoisting
- Short haul
- Open water, flood water & swift water helicopter rescue
- Vertical hoist insertion/extraction (urban and cliff)
- Combat search-and-rescue

airrescuesystems.com
541.488.0941

AIR RESCUE UK

Ramsey, England
- Search-and-rescue, HEMS & hoist – operations & training
- SAR technical crew
- Sensor operators
- Winch/hoist operators
- Winchman/rescue swimmer

airrescueuk.com
+44 (0)1255807490≠

AIRBUS HELICOPTERS TRAINING SERVICES (AHTS)

Marignane, France
- Search-and-rescue systems training (pilot)
- Initial hoist
- Hoist conversion to type
- Helicopter hoist operator – role training (pilot)
- Initial onshore hoist operations
- Conversion to type onshore hoist operations
- SAR refresher courses

airbushelicopterstrainingservices.com
+33 4.42.85.68.75

AMST

Ranshofen, Austria
- Helicopter rescue hoist trainer
- Underwater escape training system
- HUET modular cabin (HUET-M)
- HUET small cabin (HUET-S)

amst.co.at/en/aerospace-medicine
+43 7722.892.0

BLACKCOMB HELICOPTERS

Whistler, British Columbia
- Hover exit
- Short haul (HEC) longline
- Hoist capability

blackcombhelicopters.com
604.938.1700

BLUEDROP TRAINING & SIMULATION

Halifax, Nova Scotia
- Rescue hoist training system — search-and-rescue mission scenario

bluedropts.com
1.800.563.3638

BLUESKY INTEGRATED SOLUTIONS

- U.K.
  - Search-and-rescue (front and rear crew) training
  - Combat search-and-rescue (front and rear crew) training
- blueskyaero.uk
- +44 (0) 7825.109178

BOOST SYSTEMS

- Vancouver, British Columbia
  - Basic technician training (HEC)
  - Advanced technician training (HEC)
  - Pilot training and assessment (HEC)
- boostsystems.ca
- 604.561.4014

CMC

- Goleta, California
  - Rope Rescue Technician I/II (helicopter)
  - Rope Rescue Technician III (helicopter)
- cmcpro.com
- 1.800.513.7455

COBHAM HELICOPTER ACADEMY

- Basingstoke, England
  - Maritime, urban, mountain & combat SAR training
  - Dry hoist techniques
  - Wet winching techniques
  - Boat/vessel winching techniques
  - Cliff/urban winching techniques
  - Mission planning and search techniques
  - Surveillance techniques
- cobhamhelicopteracademy.com
- +44 (0) 1256.316.116

DCI GROUP

- Paris, France
  - Helicopter search-and-rescue training
  - Combat search-and-rescue training
- groupedci.com
- +33 (1) 44.95.26.00

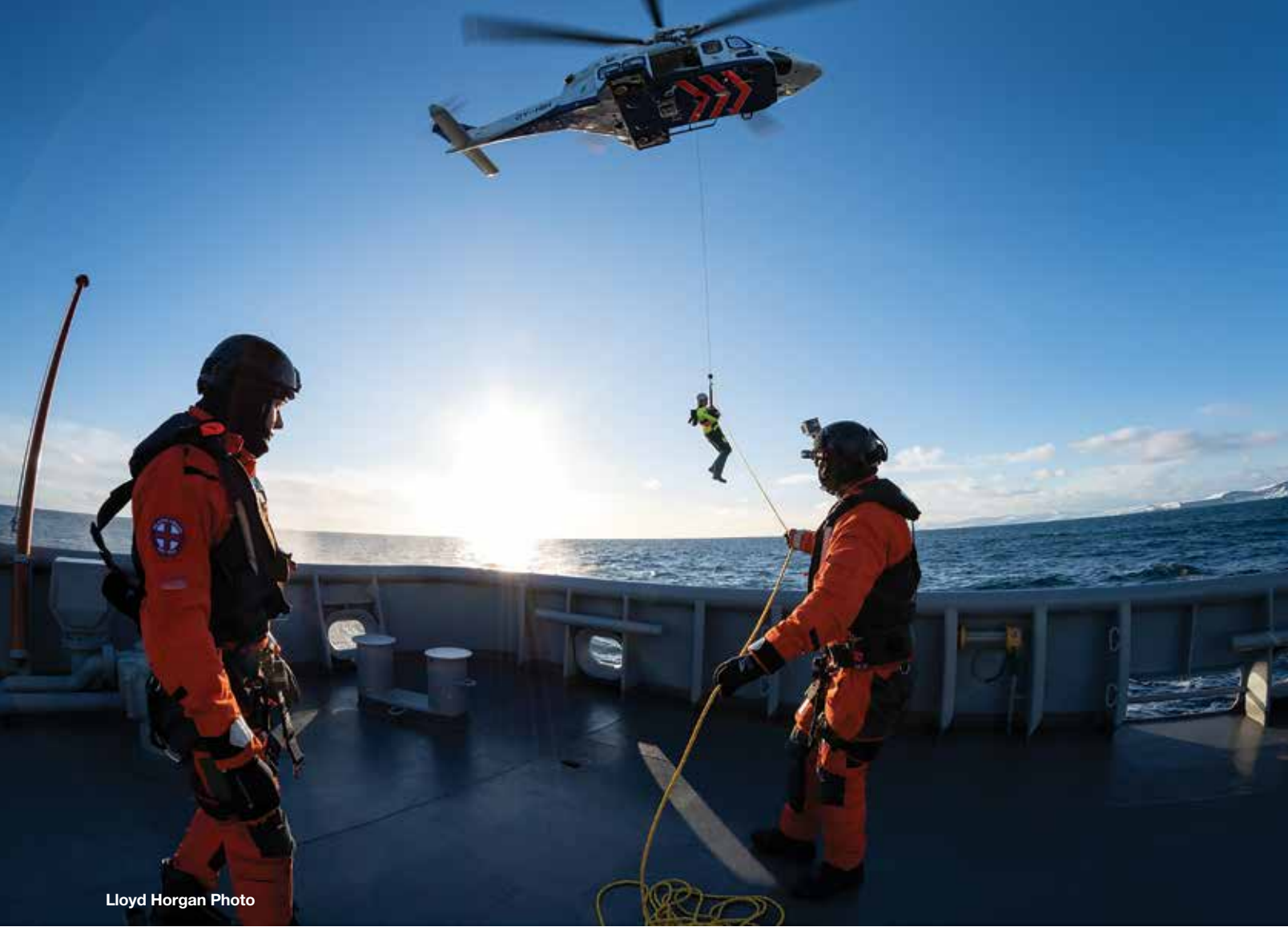
EUROPEAN AIR SERVICES

- Prague, Czech Republic
  - Search-and-rescue/combat search-and-rescue (Urban, fast water, maritime & wilderness helicopter SAR training)
- eu-as.cz/
- +420.774.311.399

FLIGHTSAFETY INTERNATIONAL

- Dallas, Texas
  - Pilot search-and-rescue training

Mike Reyno Photo



Lloyd Horgan Photo

- Search coordination (crew chief)
- Hoist operations (crew chief)

flightsafety.com
316.220.3150

HELIOPERATIONS

Portland, England

- Helicopter LimSAR Operations (pilot, crew, winch operator)
- Overwater & vessel rescue hoist training
- Mountain & cliff rescue
- SAR essentials
- Civil search-and-rescue
- SAR NVG training (SAR pilots & crew in Ireland)
- Military search-and-rescue

helioperations.co
+44 (0) 1305.701702

KNO SOLUTIONS

Shrewsbury, England

- SAR helicopter crewman (basic/advanced)
- Helicopter winchman/operator
- Helicopter camera surveillance (FLIR)
- Tactical flying helicopter pilot
- Rotary-wing pilot ab-initio

knosolutions.com
+44 1743.463153

LEONARDO HELICOPTERS

Rome, Italy

- Helicopter operational training:
- Pilot, hoist operator technical crew, mountain rescuer & rescue swimmer SAR training (basic to advanced)
- Scenario-based SAR training
- SAR full crew training
- NVIS operations training
- Mission console operator training
- Helicopter underwater escape training (HUET)

leonardocompany.com/services/training
+39 06.324731

MOUNTAIN RESCUE ASSOCIATION

San Diego, California

- Helicopters in search-and-rescue (basic & intermediate levels)

training.mra.org
858.229.4295

PRIORITY 1 AIR RESCUE

Mesa, Arizona

- U.S. Search and Rescue/Tactical Training Academy:
- Inland SAR mission hoist training (basic)
- Maritime vessel rescue (advanced)
- Ocean rescue (advanced)
- Night unaided with NVG hoist rescue (advanced)
- Annual recurrent hoist rescue training
- SAR live flight and safety training:
- Inland SAR mission hoist training (basic)
- Flood/swift water rescue (advanced)
- Mountain/cliff rescue (advanced)
- Maritime vessel rescue (advanced)
- Ocean rescue (advanced)
- Night unaided hoist rescue (advanced)
- Night NVG hoist rescue (advanced)
- Short haul (basic)

priority1airrescue.net
480.621.6023

PRIORITY 1 AIR RESCUE

Bordeaux, France

- France Search and Rescue/Tactical Training Academy:
- Combat search-and-rescue training

- Inland SAR mission hoist training (basic)
- Maritime vessel rescue (advanced)
- Ocean rescue (advanced)
- Night unaided with NVG hoist rescue (advanced)
- Annual recurrent hoist rescue training

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+33 (0)5 562.101.71

RELYON NUTEC CANADA

Dartmouth, Nova Scotia

- Technical rope rescue
- Rotary-wing underwater egress training (RUET)
- Aircrew survival training
- Confined space rescue technician

relyonnutec.com/en_ca
902.466.7878

RESCUE CANADA

Chilliwack, British Columbia

- Helicopter safety rescue:
- Level 1 – Safety and Survival
- Level 2 – Operations
- Level 3 – Technician
- Level 4 – Advanced

rescuecanada.ca
1.800.663.8931

SR3 RESCUE CONCEPTS

Las Vegas, Nevada

- Light helicopter rescue training
- Helicopter human hoist operation training
- Short haul

sr3rescueconcepts.com
725.201.1988

SRT HELICOPTERS, LLC

Bakersfield, California

- Special operations courses:
- Search-and-rescue — hoist, short haul, long line & vertical reference
- Combat search-and-rescue
- Water, swift water, flood & ocean rescue
- Crew courses:
- Technical rescue training
- Rescue boat operations

srthelo.com
661.393.4567

STC-KNRM

Rotterdam, The Netherlands

- Static helicopter hoist training (wet and dry)
- Fast rescue boat training
- Sea survival training
- HUET

stc-knrm.nl
+311.042.83860

Skip Robinson Photo

Priority 1 Air Rescue (P1AR) has worked with well-known law enforcement operators including U.S. Customs and Border Protection. **P1AR Photo**

PRIORITY 1 AIR RESCUE

BY DAYNA FEDY

When you're 100 feet in the air during a search-and-rescue (SAR) mission, you have to be prepared. For the aircrew, it's about knowing how to transition in and out of the helicopter cabin on the hoist, safely operate the hoist system, communicate with the pilot and other crewmembers, and package and extricate the patient.

For the last 20 years, Priority 1 Air Rescue (P1AR) has been training rescue crews and hoist operators how to safely execute SAR missions in a helicopter. Working with well-known law enforcement operators like the New York Police Department (NYPD), Arizona Department of Public Safety, Customs and Border Protection, Drug Enforcement Administration, and San Diego Sheriff's Department, the company's goal is to provide people with the knowledge and skills to successfully save lives.

"In the past 20 years, we've trained over 8,500 students around the world," said Adam Davis, Search and Rescue/Tactical (SAR/TAC) manager at P1AR. "We're a mission training and a SAR operations provider, and we are solely committed to our industry. . . . Getting to help people in extreme times of need is truly one of the most humbling and rewarding things that you can do."

Based in Mesa, Arizona, the SAR training and operations provider has established a SAR/TAC Training Academy at its home base, as well as a second academy in Bordeaux, France. At either location, students train in virtual hoist simulators, on hoist procedural towers (with actual Breeze-Eastern aircraft hoists), and on static aircraft.

However, if traveling to one of P1AR's SAR/TAC academies is not an option or is not practical for some customers, Davis said P1AR instructors can travel to customers' venues to provide full SAR courses. "Going to the customer . . . and providing all the training there is probably what we do a higher percentage of the time," he added. "We've done training in 26 different countries on 25 different helicopter platforms."

P1AR employs 12 full-time instructors who are dedicated solely to the training division; the company also has 10 additional full-time employees in its operations division who can be brought over

Students at P1AR's SAR/TAC academies are able to use the hoist procedural tower and virtual hoist simulator before moving on to live flight practice. **P1AR Photo**

Adam Davis, SAR/TAC manager at P1AR, said in the last 20 years the company has trained over 8,500 students around the world. **P1AR Photo**

A typical SAR course with P1AR begins with a classroom phase, which transitions to static aircraft practice and progresses to live flight practice. **P1AR Photo**

to the training side to augment the pool of instructors during busy periods. "To give an example," Davis said, "two or three weeks ago we had four separate training classes going on around the U.S. all at the same time . . . [and] there was also one class occurring at our France facility."

While P1AR's SAR courses vary based on a customer's needs, a six- to 10-day training program at a customer's location would typically see two P1AR instructors with up to 12 students; the training process would begin with a classroom phase, which would then transition to static aircraft practice, progress to live flight practice, and culminate with scenario-based training exercises. This is what the company calls "the traditional approach."

Training programs at P1AR's SAR/TAC academies also start with classroom/static equipment practice, but students also utilize the hoist procedural tower and virtual hoist simulator, which Davis said "play off of each other to practice techniques and tactics." This is all followed by live flight sessions back at the customer's location.

"That's what we call the blended training approach," said Davis. "When we start the actual live flight phase, the level of proficiency that the students are demonstrating is much higher because they're not having to learn the physical mechanics of how [to] step out onto the skid of an aircraft, or how to transition a rescue specialist in and out. They've already developed that muscle memory and critical thinking. So, the utilization of that live flight time is really maximized."

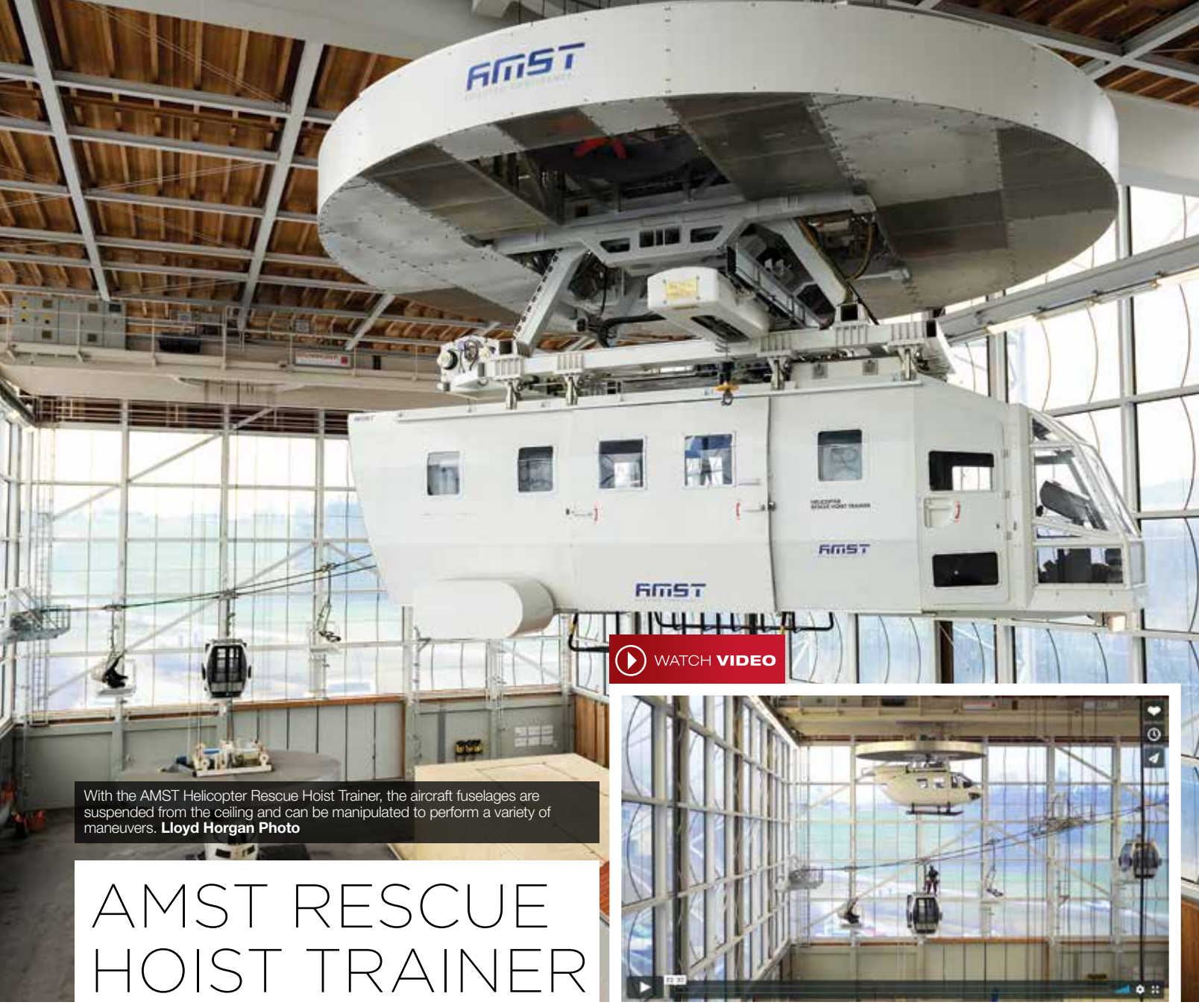
Davis added that P1AR's blended approach stems from the belief that while the simulator and hoist tower are great tools for increasing the safety and capability of students, they are not a direct replacement for live flight; finishing with live flight training is important to allow students to tie everything together, he said.

P1AR has standardized curriculums for SAR training, and the company matches the appropriate program to its customers based on their desired outcomes and the skills they need to be trained in. "[The customer] dictates it in the sense that they tell us what they want . . . and we'll match it with existing standardized curriculum," Davis said. "We've been doing this for 20 years, so we've got a very refined method of how we deliver the training and knowing how long it will take."

And for tactical and military groups, P1AR's France SAR/TAC academy offers SAR as well as combat search-and-rescue (CSAR) training. "In addition to the hoisting, we have high fidelity simulated weapon systems which utilize NABK ballistics, a full sniper dome and a cockpit component for our simulators," said Davis. "So, it's not just people going through the muscle memory or the motion of practicing manipulating the weapon, it's actual aerial marksmanship skills."

Davis told *Vertical 911* that the company has already exceeded its 2018 schedule with its training calendar for this year.

"We've been continually improving and honing our principles and method for 20 years now," he said. "Helicopter search-and-rescue, to us, is far more than a job; it's an honor and privilege. . . . And with our training division, it's furthering that honor of not only getting to go out and perform the mission, but enabling future generations and new people to fulfill that same incredible mission."



With the AMST Helicopter Rescue Hoist Trainer, the aircraft fuselages are suspended from the ceiling and can be manipulated to perform a variety of maneuvers. **Lloyd Horgan Photo**

WATCH **VIDEO**

AMST RESCUE HOIST TRAINER

BY JON DUKE

Synthetic training systems are not new phenomena in emergency response aviation, having long been used to reduce the cost and increase the availability of training opportunities, particularly for pilots. However, less attention has been paid to providing technical solutions to the training requirements of non-aviators who are involved in these missions.

Aviation comes with a host of risks, both to aircrews and those in or around aircraft — particularly if their attention is focused on another safety-critical task, such as lifesaving. It is essential that such personnel are not only comfortable and confident in the aircraft, but aware of the risks and familiar with the complex, but highly standardized, procedures that accompany aircraft operation.

The Bavarian mountain rescue service recognized these requirements, and in 2003 began to investigate a means to address them without the risk, cost, and complexity of live helicopter training. Within five years it had built a facility specifically to provide hoist, rescue and helicopter deployment training, ranging from basic familiarization to the most complex scenarios. The center now provides specialist training for a wide variety of emergency response personnel whose role brings them into regular contact with helicopters.

Roland Ampenberger is the chief of the rescue service's training facility, which includes the groundbreaking Helicopter Rescue Hoist Trainer. He started his career in emergency response as a mountain rescue volunteer, and has since made it his profession.

"We started with the question of how to train effectively, [while] saving costs and reducing risks," he said when *Vertical* visited the facility in Bad Tölz, Germany. "There were already a few types of helicopter training systems, but they all involved flying in the helicopter."

The aim of avoiding live training was not only to make the training affordable for charitable organizations such as mountain rescue teams, but to reduce the hazards associated with introducing unfamiliar personnel to the highly dynamic environment of aviation. Ampenberger explained that existing synthetic training systems could not offer the range of training opportunities that were required.

"There already existed a few types of simulation for helicopter rescue but no way to train whole scenarios," he said. What he wanted was a system that took students from theory to a live airborne setting

in a controlled environment that wouldn't overwhelm those unfamiliar with it. "You have to introduce the dangers of height, stressful experiences and the sensation of flying," he said. "Our first idea was to move an aircraft with a crane inside an industrial unit."

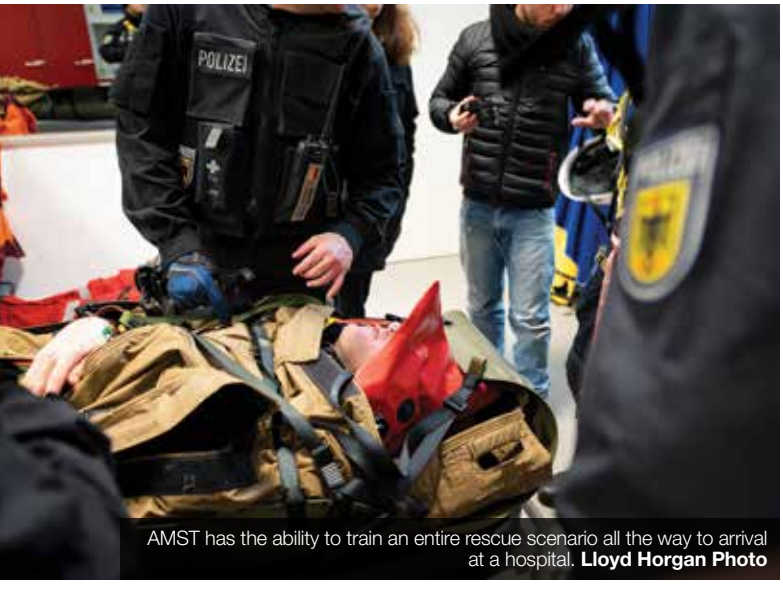
After building the training hall, the mountain rescue service began training with two BK117 airframes, one of which was static, and the other was attached to a crane. Before long, other professional rescue services were expressing an interest in the facility, including services with responsibility for fire and water rescue. Initially, training scenarios utilized basic wooden mock-ups to simulate likely rescue situations.

The center's development was focused on identifying and meeting the individual training needs of its customers, with funding provided through training fees, charitable contributions and the state (due to the environmental benefits of training without aircraft).

In 2013, engineering think tank AMST partnered with the facility. AMST is a recognized center of excellence for the research, development and manufacture of aircrew and aeromedical training solutions.

"The mountain rescue service was interested in having and providing to their customers high-class training," said Tobias Seidl, who is responsible for training solutions at AMST. "AMST is interested in developing and providing first-class training solutions, and financing through public-private partnerships gives organizations the potential to establish such facilities."

Not only does the Rescue Hoist Trainer make training more affordable, it also provides a progressive way to introduce new crewmembers to a highly dynamic aviation environment. **Lloyd Horgan Photo**



AMST has the ability to train an entire rescue scenario all the way to arrival at a hospital. **Lloyd Horgan Photo**

AMST is a technology supplier to the mountain rescue service and has been instrumental in the development and delivery of a second, larger helicopter fuselage module specifically designed for training in the facility. "AMST specializes in tailored solutions," explained Seidl. "Several organizations train here. Each one has different requirements and operates different equipment. The larger [fuselage] cell incorporates a specialist winch system which can simulate any aircraft winch in use worldwide."

The facility now includes a variety of rescue scenarios, from urban to wilderness, including an artificial rock face, a pool for water rescue and even a cable car gondola. The aircraft fuselages are suspended from the ceiling and can be manipulated to perform a variety of maneuvers, while lights and powerful fans simulate rotor strobing and downwash. The fidelity of the system can provide an intense experience, but Ampenberger explained that its flexibility was just as valuable. "You can train as long as you want; you can train very intensive or very slowly," he said. "The ability to do it step-by-step provides a very good base for the next step of live training."

This step-by-step approach and the ability to vary the intensity as required highlight the fact that this method is not intended to completely replace live training. As well as the utilitarian functions of reducing cost and weather dependence, it also builds confidence and reinforces drills and safety procedures, making live training more effective by decreasing the likelihood of errors. The scale of the facility allows for larger scale rescue scenarios such as from a replica domestic house, but also provides the benefit of training at scale; depending on the requirements of the customer organization, up to 40 people can be trained simultaneously.

Although the facility has global reach, there are many customer organizations locally, including a variety that conduct search-and-rescue (SAR) and helicopter emergency medical services (HEMS), as well as police and special forces who require training in specialist helicopter dispatch methods. The variety of aircraft and skills involved make the facility's flexibility invaluable, but its focus on rescue and emergency response allows an unusual depth of training that recognizes the necessity to train procedures and processes traditionally delivered "on the job," such as the transfer of patient care. The facility includes a medical room that simulates a hospital trauma room.

"Although we initially focused on technical work, during development we felt that we could train the whole rescue scenario from the initial alarm through the execution of the mission," Ampenberger explained. "The rescue chain ends at the hospital, so we have the capability to train all the way to hospital arrival."

Those who live and work around them every day often forget how intimidating an aircraft can be. Sensory overload and stress reduce the ability for students to take on new information and reproduce complex cognitive functions — skills that may be lifesaving. Training repetitively at incremented complexity reinforces skills and conditions the trainee to a state of respectful familiarity with their new environment, ready to make the maximum use of live training opportunities.

As ever, live training comes with a significant risk factor, and the main priority must always be flight safety. This can lead to early intervention to prevent error, and consequentially poor learning. An environment like the one offered at the facility allows the opportunity to learn step-by-step, developing from simple scenarios to very intensive, with the focus firmly on training outcomes.

Anthony Pecchi Photo

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SR3's hoist operator training course starts with a day of ground instruction, followed by mock-ups with the customer's aircraft. The remaining days of the course are spent flying. **SR3 Photos**

SR3 RESCUE CONCEPTS

BY DAYNA FEDY

When tragedy struck helicopter instructor pilot Dave Callen and hoist instructor/rescue specialist Jason Connell, they vowed to do everything they could to reduce the risk of the same thing happening to anyone else.

In 2013, Dave VanBuskirk (call sign SR3), Callen and Connell's friend and coworker, lost his life during a helicopter rescue operation on Mt. Charleston, Nevada. In response, the two pilots set about making the industry safer, creating SR3 Rescue Concepts — a Las Vegas, Nevada-based helicopter search-and-rescue (SAR) training provider — in his memory.

"We lost a really, really good friend of ours that was amazing at what he did," said Callen. "It was a dynamic roll out accident with the hook that was being used at the time. It possibly could have been avoided had we, at the time, been aware of different techniques and equipment. So, that's really the backbone of the company."

Over the last year, SR3 Rescue Concepts has been working to provide quality-focused SAR training to pilots and crews, with the

SR3 has partnered with Helicopter Institute to use its hoist- and hook-equipped Bell 407 for introductory or refresher training. **SR3 Photo**

SR3 prefers to train pilots and hoist operators separately to maximize the learning opportunities for each. **SR3 Photo**

goal of reducing preventable accidents during rescue operations.

"We want to provide the highest level of quality training to . . . anybody involved in search-and-rescue-type operations, to make those types of operations as safe as possible for the people that are doing them," said Callen.

SR3 offers light helicopter rescue training, typically conducted with smaller aircraft like the MD 500 and Bell 407; helicopter hoist rescue training with aircraft like the Airbus H135, H145, AS350 AStar, or Bell UH-1H; and short-haul operations training. SR3's 12 instructors — consisting of flight instructors, hoist instructors and rescue specialists — will often travel to customer locations to provide requested SAR training on the customers' aircraft.

"We're really selective with who we take on board to teach for us," Callen said. "Our group has a very wide range of experience. . . . The only thing that we run into sometimes is finding really good areas to do the training. We're usually looking for areas that provide a variety of terrain and conditions. . . . So, a lot of times we're just having to work with the customer to find the best training location."

If companies outside of the U.S. are interested in sending their pilots to a U.S. location for training, SR3 has that covered, too. The company has partnered with Helicopter Institute in Fort Worth, Texas, which operates a night vision goggle (NVG)-certified Bell 407 equipped with a hoist and hook.

"We have a unique opportunity if people want to use our aircraft," Callen said. "We're able to train pilots in that [Bell 407] aircraft for introductory or refresher hoist training."

SR3 has also partnered with Blackcomb Helicopters in Whistler, British Columbia, which operates a fleet of aircraft used for rescue and utility operations.

A typical hoist operator training course with SR3 is broken down into 10 days, or two five-day weeks, with around four students — for an initial course. "We try not to do more than four [students] because we find that the quality of instruction starts to diminish. . . . We want to make sure that it's sufficient," Callen said.

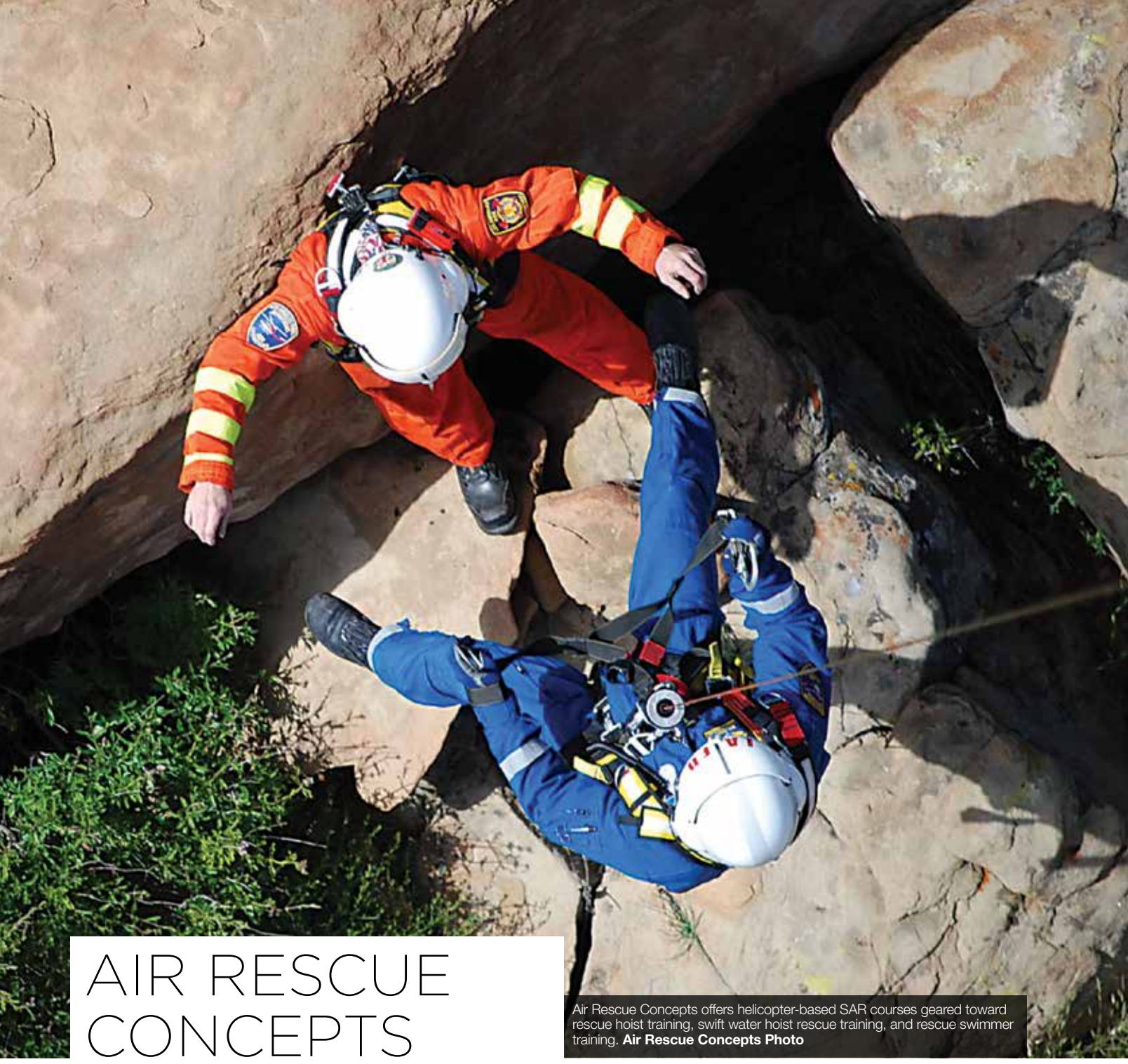
The hoist operator training course starts with a day of ground instruction, followed by mock-ups with the customer's aircraft. "We'll have [the aircraft] on the ground in the hangar and let [the students] actually practice running the hoist [and] bringing people in and out of the cabin," Callen explained. The remaining days of the course are spent flying.

While SR3 has the ability to train pilots and hoist operators simultaneously, the company prefers to train each group separately to maintain the quality of the courses. "If you have the pilots learning how to fly the hoist, and then the hoist operators learning how to hoist, and then the guys going in and out of the door learning, it's not very conducive [to the students]," said Callen. "There's a lot of potential for mistakes."

He added, "We're giving really good quality training, [and] we don't ever want to sacrifice that just to make money."

As SR3 gains momentum, Callen said the team is managing the company's growth to ensure they don't take on more than they can handle.

"Our primary mission is to enhance the safety of first responders and those who serve the public," he said. "We're representing our friend Dave, so everything that we do, we're going to do to the highest possible standard. Even as we grow over the years and get bigger and do more work, we're always going to go back to our roots; it's always going to come back to Dave."



Air Rescue Concepts offers helicopter-based SAR courses geared toward rescue hoist training, swift water hoist rescue training, and rescue swimmer training. **Air Rescue Concepts Photo**

AIR RESCUE CONCEPTS

BY DAYNA FEDY

Passion is the fuel that drives many people in the helicopter industry. Hand-in-hand with a love for rotorcraft and vertical-lift flight, that passion is increasingly shown in a drive to make the industry safer. For Air Rescue Concepts of Hurricane, Utah, training people to perform helicopter search-and-rescue (SAR) operations safely is viewed as more of a hobby, because it's what the team loves to do.

With more than 40 years of combined experience in the helicopter industry, company founders Greg Sanderson and Kevin Loomis have spent half of their working lives in and around helicopters. Sanderson's background alone ranges from working as a firefighting flight paramedic, to a hoist operator, to a Naval Reserve aircrewman.

About 12 years ago, Sanderson "saw the need [to provide training] because at the time there was only really, for the most part, one rescue training company in the U.S.," he said. "Our mission is to provide the highest quality helicopter-based rescue and fire suppression training and consultation."

The company has six instructors on the search-and-rescue side who operate on a call-when-needed basis. In addition to that, there are three helicopter pilots with the company who have the ability to support training operations when required. The majority of the team at Air Rescue Concepts consists of special operations pilots and crewmen — involved in areas ranging from U.S. Air Force Pararescue operations to U.S. Navy special ops.

"We're real operators," said Sanderson. "In Los Angeles, we do

Greg Sanderson (front, third from right) said the instructors at Air Rescue Concepts truly love what they do. **Skip Robinson Photo**

After classroom instruction, students simulate procedures with the hoist on the ground before moving on to live flight. **Air Rescue Concepts Photo**

The Las Vegas Metro Police Department is one of the well-known law enforcement operators who have tapped Air Rescue Concepts for training. **Air Rescue Concepts Photo**

so many rescues — along with our brothers L.A. County Fire Department and Ventura County [Fire Department]. We have such experience hands-on, [including] live experiences in fire suppression, in hoist rescue, [and] swift water rescue."

Air Rescue Concepts offers helicopter-based SAR courses geared toward rescue hoist training, swift water hoist rescue training, and rescue swimmer training. The company also provides combat search-and-rescue (CSAR) training to approved organizations.

A typical helicopter-based SAR course has a minimum of two instructors — a hoist instructor and ground instructor — with around six or seven students. "No more than six or seven [students], we find, is the sweet spot where you can get some good sorties and good training in," Sanderson said. "Also, if you have too many [students], you put a lot of flight hours on aircraft."

The customers' aircraft are used for rescue training courses with Air Rescue Concepts. Along with sending hoist and ground instructors, Sanderson said if pilots need to be trained on how to fly with a hoist, the company will also send its pilots to customer locations to sit in the left-hand seat of the helicopter during courses.

"If it's rescue swimmer training, we bring in Navy rescue swimmers and Air Force PJs [pararescuemen] that work for me," he added.

While Air Rescue Concepts' SAR courses vary based on customers' needs, each rescue course begins with a classroom phase, where instructors cover crew resource management, case studies on good and bad rescue operations, lessons learned, as well as how the hoist physically works. However, Sanderson said the classroom portion of the training courses are usually less than half a day, since the hands-on training and live flight are the most valuable. After the class portion, students simulate procedures with the hoist on the ground, before moving on to live flight.

During all training courses, Air Rescue Concepts exercises a zero-tolerance policy for safety violations, Sanderson said. "We're very safety-oriented."

Among all the company's course offerings, Sanderson told *Vertical 911* that Air Rescue Concepts truly shines in swift water rescue training. "That's my bread and butter," he said. "That is what we do better than anybody in the country. We've developed a helicopter-based swift water rescue program that people try to emulate now."

To date, Air Rescue Concepts has provided training for numerous well-known law enforcement operators in the U.S., including Georgia State Patrol, Las Vegas Metro Police Department, as well as other government agencies.

Sanderson believes in maintaining good relationships with rescue operators as well as other rescue training providers in order to make helicopter-based SAR operations as safe as possible. For Air Rescue Concepts, at the end of the day it all comes down to safety.

"We share our experience with everybody — there are no secrets," he said. "If any of our competitors (or anybody) needs help or has questions, we share information and techniques. It's a different mindset. . . . We just like to do what we do; it's a hobby. And we like to see people do things correctly. . . . It's all about safety."

Dayna Fedy | Dayna is junior editor of *Vertical* magazine. She completed her undergraduate degree in communication studies in June 2017, joining MHM Publishing later in the year to pursue a career as a writer and editor.

Any mission you do could become the focus of public scrutiny. Prepare accordingly.

Beyond the FRAT: GOLF & HELICOPTERS?

Two veteran LAPD pilots return for part 3 in their series on risk management — and why you sometimes need to go beyond the standard flight risk analysis tool.

STORY BY JACK H SCHONELY & MARK BOLANOS // PHOTOS BY MARK BOLANOS

Editor's Note: Jack Schonely recently retired after a 31-year career with the Los Angeles Police Department (LAPD), including 18 years with its Air Support Division (ASD) as a tactical flight officer, pilot, and flight instructor. This is the third article in a series in which he and the ASD's former safety officer, Mark Bolanos, recall some experiences that caused Schonely to evolve his personal approach to risk management.

JACK SCHONELY: We can all agree that the internet is a very powerful influence on modern life. YouTube, specifically, has received many trillions of hits with some videos getting billions of views. So, it didn't surprise me to receive a request from a supervisor to organize a "golf ball drop" from a helicopter as a fundraiser.

If you go to YouTube right now, you will find countless videos of helicopter crews flying a wide variety of airframes and dropping hundreds of golf balls onto golf courses for a "closest to the pin" contest. One of the videos shows golf balls in a Bambi Bucket before the drop, which I thought was very creative.

At these fundraising events, participants buy the golf ball, which is identified with a number painted on the side. They can purchase multiple balls, to increase the chance that theirs will land closest to the flag after it is dropped from a hovering helicopter along with hundreds or even a thousand numbered balls.

There's a great visual effect and lots of excitement and the winner often receives hundreds of dollars, while the fundraising cause can raise thousands.

The supervisor advised me and the safety officer, co-author of this article, to start preparing for the golf tournament which was only a couple of weeks away. He also told us that the golf ball drop had been "approved from up the chain of command." We both smiled at that statement, since none of the people in "the chain" knew anything about operating a helicopter, much less doing it safely.

I remember my initial conversation with Mark about the drop. We agreed it could raise lots of money for a unit within our department, but our job was to determine if we could accomplish this mission safely.

We had to put aside our personal feelings of wanting to assist our fellow officers and focus on safety. We had done that before, and we were confident we could do it again.

Over the years, we had learned to say no even when it caused disappointment or anger, but we had also completed many missions after mitigating risk to an acceptable level. We both knew we had a lot of work to do.

MARK BOLANOS: Here we go again!

We were told this shouldn't be a big deal. We were "just" going to drop a bunch of golf balls — nothing to it! Again, management was accepting a mission without analyzing the risks.

Based on experience and training, we knew nothing was ever as easy as it sounded. As Jack and I left the office, we shook our heads.

Over the years, our individual safety and risk management paradigm had evolved. Based on this evolution, I knew I could count on Jack to approach this mission like any other. We were going to do our best to identify hazards and manage risk to an acceptable level. Jack and I had come a long way since our exchange on the flight deck a few years earlier *(see p.44, Vertical 911, Spring 2018).*

Our objective was to ensure we could accomplish the mission with a maximum likelihood of success and a minimum likelihood of loss. We knew we had to complete a comprehensive risk analysis before we dropped the golf balls.

Although we had never completed a golf ball drop, we drew on our experience, training, and education to identify potential hazards. Also, we found plenty of video examples showing us how we didn't want the task to go.

Regardless of how "easy" management made it sound, our risk management process did not change. We set out to manage risk by starting with the five steps of hazard identification:

During each phase of the mission, we attempted to identify all hazards, starting with understanding the purpose of the flight (mission), the people involved (man), equipment (machine), environment (medium), and policies, procedures, and regulations (management).

The first drop was a big success. Unfortunately, once word got out, "golf ball drop" requests for great causes started coming in from many department entities, and even from outside the department.

Some of the points we considered:

MISSION:

- Purpose of the operation
- Type of mission (i.e. charity event)

AIRCREW:

- Crew configuration
- Crew selection
- Crew performance
- Personal factors
- Training
- Qualifications
- Experience
- Currency
- Proficiency
- Fatigue

GROUND PERSONNEL:

- Role
- Training
- Experience
- Proficiency

MACHINE:

- Aircraft selection
- Door configuration
- Crew seating configuration
- Ergonomics
- Maintenance time
- Weight and balance
- Performance
- Height-velocity diagram
- Fall protection
- Seat cushions

MEDIUM:

- Weather
- Suitability, barriers, approach, terrain, take-off (SBATT)

MANAGEMENT:

- Policies
- Procedures
- Regulations
- Resources

We tried to identify all potential hazards: everything from the method of dropping the balls, whether from bags or containers; to the location for picking up the balls, limits on the number of balls, and ground site surveys. We also included other pilots and tactical flight officers (TFOs) in brainstorming sessions, because we wanted to get it right.

> *Over the years, we had learned to say no even when it caused disappointment or anger, but we had also completed many missions after mitigating risk to an acceptable level.*

A golf ball drop may seem innocuous, but there are many factors to consider to ensure that the task is performed safely — from the method of dropping the balls to the site of the drop and surrounding hazards.

> *The first drop was a big success. Unfortunately, once word got out, "golf ball drop" requests for great causes started coming in from many department entities, and even from outside the department.*

Regardless of the number of drops we had done, our risk management process stayed the same. We analyzed each event as if it was the first. We knew each one had its own unique set of hazards and risks and each time we incorporated what we had learned from the previous drop.

Unfortunately, the fourth and last "golf ball drop" didn't go as we planned, and it nearly cost us.

SCHONELY: The fourth and last golf ball drop was requested by an LAPD supervisor for a school fundraiser. The previous three drops were directly related to department personnel and the funds raised benefited very worthy causes within the LAPD. We immediately voiced concerns about flying to a golf course outside the city for a cause that had no connection to the LAPD.

We were simply told, "it has been approved up the chain and we should see if we can do it safely." Mark and I began work on the site survey, treating it as though it was the first ball drop. We completed a thorough reconnaissance from the air and on the ground, driving up and down the fairway in a golf cart looking for hazards.

After completing a risk analysis, we determined that the golf ball drop could be done safely. When we presented our analysis to our supervisor, we again stated our case for not doing this golf ball drop because it did not look good for a department helicopter, with a crew of three, to travel outside the city to participate in a school fundraiser. The reply was "Understood. Schedule the drop."

This was the second golf ball drop of the day. It was getting late as we loaded the bags of numbered golf balls into our department's Airbus AS350 AStar. We were shut down at a neighboring agency's helipad only a few miles from the drop location where we waited for the call from Mark, the safety officer on the ground at the golf course.

I was pilot for this drop, as well as the previous three, and I had an experienced co-pilot and TFO with me. The day was perfect: beautiful blue sky, zero wind, experienced crew and safety officer at the drop site.

We spoke with Mark via cell phone a couple of times, to verify everything was good at the golf course. The only issue was an unanticipated delay in the drop time. No problem; we were in the aircraft and ready to press the start button.

After a significant wait, we received the call. We buckled up, put on our helmets, started up and navigated the short flight to the golf course. I completed one high recon pass prior to setting up for our approach down the fairway to the drop point.

Success! Or was it? Sometimes the concerns associated with a mission may not be strictly related to safety.

People were watching from the clubhouse and everything was going well, until I got to my hover point. The sun was very low in the western sky and directly in my eyes. I had descended out of the shade to my hover point and could no longer see the clubhouse or the drop point. I was forced to look out my side windows.

Now at a hover, I immediately advised my crew that I was unable to see the drop point, which was about 25 yards ahead of us. Our crew resource management (CRM) training kicked into high gear. I asked my crew to verify if I could bring my tail left with a right pedal turn and then side-taxi to the drop point. They confirmed that I had enough space to do exactly that and agreed that making the turn and slowly side-taxiing was acceptable and could be done safely.

I completed the pedal turn and instantly gained relief from the direct sunlight. We completed the golf ball drop and departed the fairway the same way we had come in, as planned. Teamwork allowed us to complete the drop safely.

Later, Mark and I debriefed. We kicked ourselves for missing a simple element of our risk analysis and recon — the ground recon should have been done at the same time of day as the planned drop.

If we had done that, we could have clearly seen the issue with the sun being directly in the eyes of the crew at the drop point. Missing something so simple almost caused us to abort the mission.

It was a great lesson that we would use on future mission requests. However, this would be the last ball drop for LAPD Air Support.

About a week later, a front-page story in the *Los Angeles Times* included a photo of us dropping those golf balls for the school fundraiser, and a long story ridiculing us for doing it.

The *Times* frequently criticizes my department for a wide variety of things, and it now added golf ball drops to the list. The photographer was hiding in a tree line, waiting for our very well publicized drop.

There was lots of activity at Air Support that day, and it was clear that golf ball drops were now off the list of flying activities. Sometimes the concerns you may have about accepting a mission have little or nothing to do with safety.

"Can we do it?" and "Should we do it?" are two questions that must be seriously considered before accepting a mission. This has been a common theme in our three flight risk analysis tool (FRAT) articles.

We learned things during our golf ball drop experiences that made each one safer and more efficient than the previous drop.

Thinking about the environment at the time of the mission was our biggest takeaway, but we also saw first-hand that the "image" of what we are going to do must be considered *beyond the FRAT.*

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 Fleeing Suspects*. Find more information about his book and professional services at www.officertactics.com.

Mark Bolanos | Mark Bolanos has served 20 years of his nearly 30-year law enforcement career as a tactical flight officer, pilot, and aviation safety officer. He earned an Aviation Safety Certificate from the University of Southern California. He is also a graduate of the Aviation Safety Officer Course and the Crew Resource Management Instructor Course at the U.S. Naval School of Aviation Safety.

Final Approach

interviewed by Elan Head

Rich Lee, left, with Mark Metzger

RICH LEE

EXPERIMENTAL TEST PILOT AND HELICOPTER AEROBATIC PILOT

Rich Lee served as a U.S. Army scout helicopter pilot in Vietnam, then started working for Hughes Helicopters (later McDonnell Douglas/Boeing) in the late '70s. As an experimental test pilot and display pilot, he became accomplished in helicopter aerobatics, and has been an Aerobatic Competency Evaluator (ACE) *(see p.44, Vertical, June-July 2019)*. We asked him to tell us more about his helicopter aerobatic flying, and in particular his work with the Boeing AH-64 Apache.

VERTICAL 911: HOW DID YOU GET STARTED IN HELICOPTER AEROBATICS?

RICH LEE: At Hughes we had a small airport in Los Angeles, the Culver City Airport. We were pretty constrained in our test area and had to perform high-angle maneuvers to stay in our limited airspace. We would do what amounted to high banked turns to position ourselves for high-speed runs as we maneuvered to perform certain other tests. As part of that maneuvering, you get attitudes that are beyond normal, and sometimes during testing it was a little easier to just go over the top — which would be like a loop — than to do some other extraordinary maneuvering to get on your test points. I sort of taught myself how to do various maneuvers to stay within field boundaries while testing the Hughes 300 and 500 series of helicopters that would be considered acrobatic today.

V911: WHEN DID YOU START PERFORMING AEROBATIC DISPLAYS?

RL: As a test pilot working for a manufacturer, an additional duty is to demonstrate aircraft to customers, and demonstrate aircraft at air shows. Early in my test pilot career I was asked to go to the 1981 Paris Air Show, and demonstrate one of our military versions of the Hughes 500, a TOW missile ship. I also participated competitive evaluations against other manufacturers. Part of those competitions involved maneuvering demonstration flights to show the capabilities of the helicopter. I eventually demonstrated our helicopters at most of the major international air shows.

V911: TELL US ABOUT SOME OF YOUR WORK WITH THE AH-64 APACHE.

RL: When they created the Longbow, they put a large millimeter wave radar dome on top of the main rotor. The D model was heavier than the A model, and the dome created more drag. The word got out in the military world that the AH-64D Longbow Apache was a less maneuverable than the lighter weight A model Apache.

The company asked if I could perform an aerobatic display in a go-to-war configured Apache. The purpose was to show the world that Apache Longbow could go out and do any maneuver — a loop, a roll, linked loops, linked rolls, return to target turns, various things — in a fighting configuration. In other words, with inert but weighted missiles and ammunition, at mission gross weight for a go-to-war configuration, and while flying every maneuver the AH-64A could do.

V911: HOW DID YOU PREPARE FOR THAT?

RL: Since we were using fleet helicopters to do these demonstrations, there was nothing special about them. We needed to know if were we causing any damage, did we have to replace anything, were we reducing component lives of these helicopters? We conducted a series of flight tests on a fully instrumented Longbow Apache helicopter, and compared the aerobatic flight loads and the maneuvers we were selecting for our air show to normal fleet loads.

We would do these maneuvers at high G loads and to the point of actual blade stall and would actually depart during some critical maneuvers. We simulated mistakes and abort maneuvers to create worst-case scenarios, and then recover to see what kind of loads that would create. We were safe about this: we did proper build up, we had parachutes, we had chase aircraft, and everything was approved. But it allowed us to determine what the best emergency exit strategies were during abort and departure maneuvers, and compare the aerobatic flight load severity to the full spectrum of normal and expected usage.

V911: YOU MENTIONED IN THE CONTEXT OF OUR COVERAGE OF RED BULL'S HELICOPTER AEROBATICS PROGRAM HOW ESSENTIAL GOOD TRAINING IS TO SUCCESS AS AN AEROBATIC PILOT. HOW DID YOU MANAGE TO LEARN SO MUCH ON YOUR OWN?

RL: I think that comes from being a test pilot. Part of our duties is envelope expansion, where you take a new aircraft, or an existing aircraft that's been modified, and you have to go out and expand the envelope — go a little faster, maneuver a little more, obtain load data under various conditions and situations. Test pilots are instructed in how to use an envelope expansion process to do this safely.

Now, having said that, there are things that have to do with aerobatics that go beyond even what you're taught as a test pilot, or at least as a helicopter test pilot, because helicopters are not designed to be aerobatic. That's where the mentoring comes in. Bob Hoover became a lifetime test pilot and air show mentor to me, and his influence on me over my entire career has been very great. It set the stage for what I've tried to do with my own life, and I have attempted to pass that knowledge on to others.

This interview has been edited for clarity.

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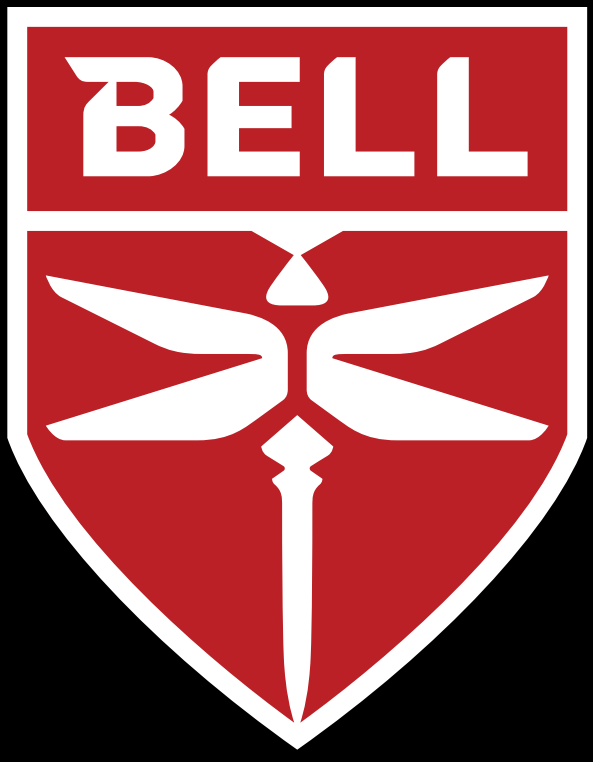

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