

The

Safety

Wire

April 2014

**WHAT ABOUT BARNEY?** Early in my career, I had the pleasure of working with one of the most professional aircraft technicians you could ever hope for. I continue to work with mechanics that hold the same level of expertise, but working with Barney those first few years set the standard in my mind for how things should work. A core aspect of our operation was that Barney was part of what we did on a daily basis. That included bringing him with to ALEA events and the safety training days we participated in with local agencies. When working on safety management at your agency, don't forget about maintenance.

SMS is specifically geared towards identifying and correcting problems within the 'system' that drives daily operations. Maintenance is a critical part of that system, however, it is all too often overlooked when engineering a safety program. I challenge you all to look at your current SMS and see if maintenance has been included. If you want a place to start looking, check out the fatigue management policy for your aircraft technicians. Another place to look is the policy on interrupting maintainers when they are working on the aircraft. Most of us will find nothing under either category.

Maintenance professionals are subject to the same human factors issues as any flight crewmember. Failures in CRM, fatigue management, training, organizational pressure and risk management can lead to critical mistakes, just as they can in the cockpit. They must be addressed with your SMS if they are to be successfully mitigated the same way we address aircrew human factors issues. If a pilot flies for 8 hours on a 12 hours shift, and goes home to rest for another shift the next day, we would, at *minimum*, raise eyebrows if we called him back a couple hours later to fly another mission and still expect him back for his regular shift in the morning. Sadly, our industry often fails to even bat an eye when doing that to an aircraft mechanic, let alone raise an eyebrow (by the way, the responsible solution to either case is to NOT DO IT). If a pilot calls for a 'sterile cockpit' during takeoff or landing, it is understood that it is a good policy



based on mitigation of human error. Maintenance professionals need the same 'sterile cockpit' when performing critical maintenance tasks for the exact same reason an aircrew does in flight. One study on maintenance errors over a three-year period found that nearly 60% of the mistakes were due to 'omissions' of required tasks. Incorrect installation was the second largest category, accounting for 30% of the errors.



The solution starts with education, for everyone in the operation, on the safety issues involved with aircraft maintenance. It cannot stop there. A study conducted last year by the FAA and an industry partner found that educational programs for maintainers had a limited effect. While it helped them understand and identify risk factors, there was minimal effect on operations. This is because the system they operated in had not been

changed to allow this knowledge to work. If a hazard has been identified, what can be done about it? If someone has a rough night taking care of a sick child, or performing call-out maintenance in the middle of the night and is now outside of the fatigue management guidelines, what is the agency prepared to do about it? Just knowing something is risky is a good start. The SMS needs to allow this safety information to influence the 'system' that drives daily operations. Remember the pillars of an SMS: Policy, Risk Management, Assurance, Promotion. Make sure maintenance is included in all four areas.

In the accident report section below, I have included a couple examples of what can happen if these issues are allowed to manifest into accidents. The resources section below has several links to material that you may find useful, as well.

If you take anything away from this, I hope it is this lasting point that was made to me back when I was just learning how to be a part of this business. In every aspect of your operation, ask yourself, "what about maintenance?" If you don't find some connection, I am willing to bet it is because you are not looking hard enough.

To those aircraft maintainers reading this, I hope to see you at the next ALEA event in your area. And thank you for what you do to keep us safe.

If your system involves accidents, then the solution is not to find excuses for the accidents. The solution is to change the system

~Richard Bach

### FREE EDUCATIONAL RESOURCE

Controlled Flight Into Terrain (CFIT) following Inadvertent entry into Instrument Meteorological Conditions (IIMC) continues to be a serious threat in our industry.

**Please**, take 55 minutes to watch the online presentation ALEA has put on the website. It is free. It could save your life. Then take a look at the IIMC training recommendations that compliment the presentation.



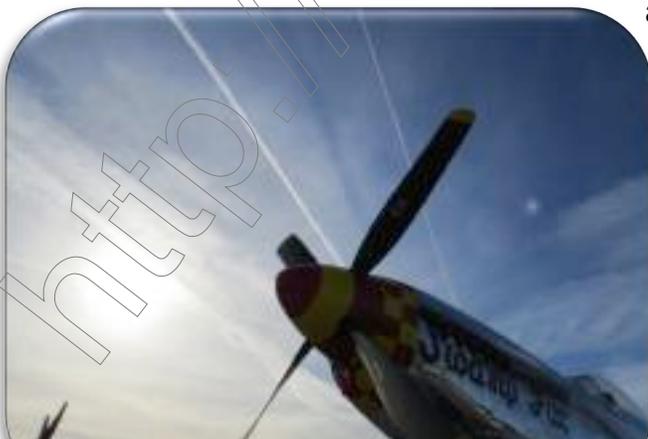
[https://live.blueskybroadcast.com/bsb/client/CL\\_DEFAULT.asp?Client=514630&MA\\_ID=68631](https://live.blueskybroadcast.com/bsb/client/CL_DEFAULT.asp?Client=514630&MA_ID=68631)

<http://www.alea.org/assets/cms/files/safety/IIMC%20Training.doc>

### FROM THE TRENCHES

This year, we are focusing on reducing training accidents. One of the best ways to learn about accidents, and how to prevent them, is by sharing actual experiences. I have talked about the accident I was in many times. Now, I am asking for those of you who have a story about an

accident, or close call, that you were involved in, to share it. The story would be relayed as a learning event for others to benefit from. If you wish, I will remove all names, places and identifying facts to protect your identity. Your willingness to share these experiences could save someone else from having the same incident, or worse. Email or call me 24/7. Thanks!

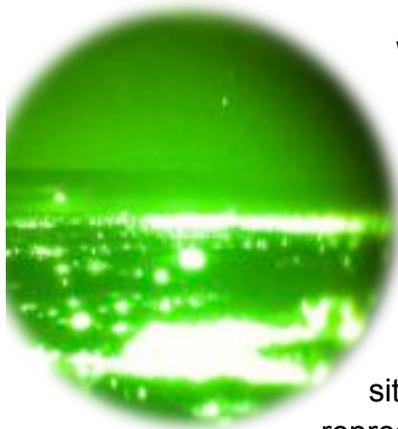


Trying to manage risk with experience alone is a poor approach to conducting a safe flight

~Frank Lombardi

## AEROMEDICAL SAFETY

Dudley Crosson, PhD, ALEA Aeromedical Liaison



We hear a lot about Operational Risk Management, or ORM. In recent years, a new concept developed - Time Critical Risk Management (TCRM). In fact, we discuss this in my Stress and Aeronautical Decision Making Course (remember the picture of the elk?). It is now a common method for individuals and crews to manage risk in the execution of a task or event. Recent research revealed the original time critical format was absent from routine use, difficult to recall, and hard to employ, especially while multi-tasking or during imminent-risk situations. Further studies resulted in adopting a new TCRM tool which is represented by the "ABCD" model. The "ABCD" model mnemonic represents straight-forward actions associated with each letter:

- A** = Assess the situation
- B** = Balance resources
- C** = Communicate your intentions
- D** = Do and debrief the event

For individuals and crews, the "ABCD" model enhances situational awareness and is readily understood after a short instructional period. The TCRM "ABCD" model complements the 5-step in-depth and deliberate ORM process, and is not a replacement for using the 5-steps in planning and preparation of an evolution when ample time is available. "ABCD" is a tool which can assist aircrews in applying risk management principles during execution, thus helping to make informed risk decisions which will lead to success on-duty.

Dudley Crosson  
(772) 359-3680  
[dcrosson@delta-p.com](mailto:dcrosson@delta-p.com)

# SAFETY RESOURCES

FAA Human Factors in Aviation Maintenance

[https://www.faa.gov/about/initiatives/maintenance\\_hf/](https://www.faa.gov/about/initiatives/maintenance_hf/)

Aviation Maintenance Human Factors Newsletter

[http://www.faa.gov/about/initiatives/maintenance\\_hf/fatigue/publications/](http://www.faa.gov/about/initiatives/maintenance_hf/fatigue/publications/)

IHST Maintenance Toolkit

<http://www.ihst.org/Default.aspx?tabid=3050&language=en-US>

Maintenance Human Error Presentation

*(The list of 12 most common maintenance human error mistakes starts on page 4)*

<http://www.faasafety.gov/files/gslac/courses/content/67/741/FFP%20Text%20Only%20Version.pdf>

Maintenance Human Factors Training:

[https://www.faa.gov/about/initiatives/maintenance\\_hf/training\\_tools/#roi](https://www.faa.gov/about/initiatives/maintenance_hf/training_tools/#roi)

SKYbrary page on maintenance error:

[http://www.skybrary.aero/index.php/Maintenance\\_Error](http://www.skybrary.aero/index.php/Maintenance_Error)

NASA Callback – April, 2014

[http://asrs.arc.nasa.gov/publications/callback/cb\\_411.html](http://asrs.arc.nasa.gov/publications/callback/cb_411.html)

NASA Callback maintenance report samples:

<http://asrs.arc.nasa.gov/docs/rpsts/mechanic.pdf>



Let the refining and improving of your own life keep you so busy that you have little time to criticize others."

~H. Jackson Brown,

# REALITY CHECK...

**Aircraft: Airbus AS350 B2**

**Injuries: 5 Fatal**

**NTSB Identification: DCA12MA020**

<http://www.ntsb.gov/investigations/summary/AAR1301.html>

An AS350 B2 helicopter [on a] sightseeing trip crashed in mountainous terrain. The pilot and four passengers were killed and the helicopter was destroyed by impact forces and post-impact fire. Visual meteorological conditions with good visibility and dusk light prevailed at the time of the accident, and the flight operated under visual flight rules.

The accident occurred when the helicopter unexpectedly climbed about 600 feet, turned about 90° to the left, and then descended about 800 feet, entered a left turn, and descended at a rate of at least 2,500 feet per minute to impact. During examination of the wreckage, the main rotor fore/aft servo, one of the three hydraulic servos that provide inputs to the main rotor, was found with its flight control input rod not connected. The bolt, washer, self-locking nut, and split pin (sometimes referred to as a "cotter pin" or "cotter key") that normally secure the input rod to the main rotor fore/aft servo were not found. The investigation revealed that the hardware was improperly secured during maintenance that had been conducted the day before the accident. The input rod separated from the linkage while the helicopter was in flight, at which point the helicopter became uncontrollable and crashed.

*[The report is lengthy and can be downloaded from the link above. Here are some sections of it related to the topic this month...]*

- Maintenance personnel fatigue - Both the mechanic and the quality control inspector, who inspected the maintenance work completed the day before the accident, were likely fatigued during the shift, in part, because they had insufficient time to adjust to working an earlier shift than normal. The mechanic and inspector's performance was degraded by fatigue, which contributed to the improper securing of the fore/aft servo connection hardware, the improper installation of the hydraulic belt, and the inadequate post-maintenance inspection of the accident helicopter, respectively. If the work shifts of the maintenance personnel had been consistent, a major source of their fatigue could have been mitigated.
- Lack of human factors training for maintenance personnel - Although the FAA has developed substantial guidance for the industry about maintenance human factors and has repeatedly stressed the importance of human factors training, there is still no requirement for human factors training for maintenance personnel involved in air carrier operations. This investigation has shown that providing human factors training, including training on the causes of fatigue, its effects on performance, and actions individuals can take to prevent the

development of fatigue, to all maintenance personnel would help reduce the likelihood of human error in aviation maintenance.

**Aircraft: Robinson R44**  
**Injuries: 2 Fatal**  
**NTSB Identification: DEN07FA079**

[http://www.ntsb.gov/aviationquery/brief2.aspx?ev\\_id=20070405X00374&ntsbno=DEN07FA079&akey=1](http://www.ntsb.gov/aviationquery/brief2.aspx?ev_id=20070405X00374&ntsbno=DEN07FA079&akey=1)

A Robinson R44 II was destroyed when it impacted terrain following a loss of control during cruise flight. The flight instructor and student pilot were fatally injured. Day visual meteorological conditions prevailed.

Several witnesses observed the helicopter approximately 200 to 500 feet above ground level (agl) in cruise flight along the coastline on a southerly heading. One witness, a former pilot and mechanic, reported he observed the helicopter in straight and level flight, then heard a change in "rotor noise, followed by a bang/pop/twang sound." The helicopter then "snap-rolled" to the left and descended into the terrain in a nose low attitude. The helicopter impacted the sand terrain, bounced, and came to rest near the low tide water line. A post-impact fire ensued and extinguished itself a short time thereafter.

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the mechanic's improper installation of the attachment hardware for the servo to swashplate push-pull tube joint which resulted in a disconnection, subsequent loss of control, and impact with terrain. Contributing factors were the company management's inadequate surveillance and enforcement of maintenance procedures, the excessive maintenance workload due to inadequate staffing of maintenance personnel, and the insufficient management of maintenance tasks.

*[Again, this is a lengthy report that can be downloaded from the link above. Here are some additional sections of it related to the topic this month...]*

On March 29th, the NTSB IIC conducted a second interview with the mechanic and informed him of the findings from the wreckage examination concerning the missing hardware on the right servo to push-pull tube joint and the "finger tight" hardware noted on the left forward servo to push-pull tube joint. Upon informing the mechanic of the investigation's findings, the mechanic stated, "I can tell you exactly why that happened." The mechanic then proceeded to explain to the NTSB IIC his reasons for the investigation's findings, which included the following: 1. He was pulled in all directions by company personnel since his arrival at that facility; 2. The "reassembly was not opposite of the disassembly," which was a personal maintenance practice he used to eliminate errors; 3. A couple of nights prior to the completion of the inspection and the maintenance test flight, the apprentice wanted to stay late (with the mechanic) and finish a certain section of the inspection which involved the mast fairing area. As a result, the mechanic forgot to go back and secure the hardware connecting the two

push-pull tube to servo joints; 4. The company was understaffed with maintenance personnel.

After the interview, the NTSB IIC requested a statement from the mechanic concerning his duties since arriving at the Jacksonville location. On March 19th, the mechanic began work on the 100/300-hour inspection of the accident helicopter. The mechanic reported, "For the next three days, I worked diligently on this inspection, finding several discrepancies...At some time during these three days, in which the bulk of the R-44 inspection was done, another R-22 was grounded for a 100-hour inspection." An "apprentice" and a pilot "prepared this R-22 for inspection. I was called over several times by [them] to assist in various routine inspections. I was also attending to several questions from pilots about the aircraft on the flight line."

On the morning of March 21st, the mechanic performed a 50-hour inspection on another helicopter and completed the appropriate paperwork. After completing the inspection, the mechanic "carried on with the inspection of N744SH."

On March 22nd, a pilot had a discrepancy with another helicopter and the mechanic was "pulled off of N744SH again, because [the other helicopter] was now a priority.

The mechanic reported that "Late, on Friday, March 23rd, as I was getting ready to leave, I noticed [the apprentice] working on N744SH. I went over to ask what he was doing. He told me that [the lead mechanic] had instructed him to install the two middle ribs that he had just completed assembling. I told him it was late, it had been a long day and that he should go home. He told me he would put the two ribs on and, " it was just one less thing we would have to do tomorrow." This, combined with working on multiple aircraft, attending to questions from pilots, and simply working long days, is what ultimately caused the oversight of torqueing the two bolts that connect the hydraulic servos to the push-pull tubes. Part of the oversight was that the reassembly was not opposite of the disassembly."

---

**NASA ASRS Database**  
**Report# ACN: 1022004**

[Fatigue is cited in this ASRS report. If we want to look at the economic benefit of a good safety system, consider the amount of time and manpower spent on looking for a missing tool due to fatigue.]

"...later that evening before we finished for the night, I asked a fellow Mechanic to pass me the said wrench and we could not find the wrench. As it had been a long day, we went to the hotel and would complete a thorough search in the morning. We returned in the morning the next day and carried out a thorough search of the engine. Four mechanics spent in excess of one hour and as much as two hours searching the engine using lights, mirrors and magnetic pick-up tools in the area above the heat

shield. We also checked the tool box again and the ramp area. We accomplished a Dry Motor (Engine Run-no fuel) with cowling open to see if we could hear the wrench move. We then accomplished a series of six engine runs over several hours as part of our checks. We then opened cowls and searched again to ensure if wrench was there, and if it was, the [Engines] runs would have moved its location.”

“That afternoon, I informed the Engine Desk of everything that we had done. I told them I was unable to say for certain where the wrench was but that we had done everything we could to ensure it was not in the engine, but that I could not for certain say that it was not there. I asked that at the end of the Ferry Flight, that another search be accomplished in case the wrench was in the engine and had not moved. I do not know the outcome of the event as we still have not found wrench and the Ferry Flight has not terminated so I am unsure as to the wrench's whereabouts. At the time that the wrench was noted as being missing, we were at the end of a second long day.”

---

**Aircraft: Bell 412 and unknown UAV**  
**Injuries: none**  
**ATSB Identification: AO-2014-056**

[http://www.atsb.gov.au/publications/investigation\\_reports/2014/aair/ao-2014-056.aspx](http://www.atsb.gov.au/publications/investigation_reports/2014/aair/ao-2014-056.aspx)

Near collision involving an unmanned aerial vehicle and a Bell 412, VH-WSR, near Newcastle Westpac Base (HLS), NSW on 22 March 2014.

The ATSB has commenced an investigation into a near collision involving a Bell 412 near Newcastle Westpac Base (HLS), New South Wales, on 22 March 2014. During the cruise, the crew observed an unmanned aerial vehicle (UAV) at about 1,000 ft. above ground level. The UAV turned and tracked towards the helicopter and the helicopter crew took evasive action to avoid a collision.

Interview and more info here:

[http://www.theherald.com.au/story/2175901/rescue-helicopters-near-miss-with-drone-at-broadmeadow/?src=rss&utm\\_source=twitterfeed&utm\\_medium=twitter](http://www.theherald.com.au/story/2175901/rescue-helicopters-near-miss-with-drone-at-broadmeadow/?src=rss&utm_source=twitterfeed&utm_medium=twitter)

---

**Aircraft: AIRBUS AS350 B3**  
**Injuries: 3 Minor.**  
**NTSB Identification: CEN14FA193**

An AS350 B3 helicopter impacted the hospital rooftop following departure from the UNM hospital helipad, Albuquerque, New Mexico. The commercial pilot and two paramedics received only minor injuries and the helicopter was substantially damaged.

The pilot reported that he had completed all pre-takeoff hydraulic checks and that after

liftoff, he commanded a slight left turn. However, the helicopter kept turning and entered a spin. The pilot added that the pedals were jammed or locked, in the neutral position. Video from a security camera mounted on the hospital helipad revealed that the helicopter began to yaw in a counterclockwise direction as it lifted off the helipad. The helicopter completed several rotations before it impacted the roof top, and came to rest adjacent the helipad. A small post-crash fire started, but was extinguished shortly after the helipad's fire suppression system activated.

Examination of the accident site revealed that the helicopter came to rest on its right side. Several cuts/scars on the roof consistent with impact from the main rotor blades or skids were observed. Continuity of the drive unit was confirmed throughout the tail rotor system; all major structural components of the helicopter were accounted for on scene.

*There are no new ways to crash an aircraft...*

*...but there are new ways to keep them from crashing.*

Until the next flight,

*Bryan 'MaGu' Smith*

[safety@afea.org](mailto:safety@afea.org)

239-938-6144