

# Aviation Human Factors Industry News

*Volume VII. Issue 42, December 09, 2011*



*From the sands of Kitty Hawk, the tradition lives on.*

Hello all,

To subscribe send an email to: [rhughes@humanfactorsedu.com](mailto:rhughes@humanfactorsedu.com)

In this weeks edition of *Aviation Human Factors Industry News* you will read the following stories:

★Does Common Sense Have a Mathematical Formula

★Prioritizing Maintenance Human Factors Challenges and Solutions: August 2011 Workshop Proceedings

★“CAUTION!” DO NOT IGNORE A “CAUTION” IN THE PUB!

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## Does Common Sense Have a Mathematical Formula?

When it comes to safety, the discussion often centers on Common Sense theories. "If only they had enough Common Sense, it never would have happened." When asked, "Where do we get this Common Sense? Can I buy it somewhere?", You usually met with a quizzical look or a roll of the Sense varies greatly from individual to individual. Common Sense is your very best thinking on your very best day. [Is today that day?"](#)



Common Sense could be determined by a mathematical formula. Let me explain.

$$(LWE+TK+FA) \times SP = \text{Common Sense}$$

Where:

- LWE=Life and Work Experience
- TK=Training and Knowledge
- FA=Focus and Attention
- SP= Supervision and Programs

Increasing or decreasing any one of the variables has a significant impact on Common Sense. Let's examine each of the factors.

**Life and Work Experience:** We know that new employees on the job are most at risk of serious injury or death. The Y Generation does not have the knowledge most of us boomers gained as we watched our parents work with tools on vehicles and equipment that required repairs at home. Now, most items are disposable once they stop working.

**Training and Knowledge:** Unfortunately, the downturn in the economy has many organizations questioning their training budgets. And there will always be some companies that will rely on luck as their safety program.

**Focus and Attention:** The best employee in the world will have off days. The distraction that leads to an incident may be small or large. In either case, the employee will pay the price of an injury or worse.

**Supervision and Programs:** The multiplying factor is the structured safety that the organization provides to supplement the personal factors relating to Common Sense. This is well-trained and motivated supervisors, inclusive safety programs, managed systems and commitment to providing a safe and healthy workplace.

For example:

- To affect the Training and Knowledge variable, employers must provide good orientation and training, and supervisors must ensure that employees have the knowledge required to perform their tasks safely.
- To affect the Focus and Attention variable, management and supervisors should accommodate the employee for a day when their focus is not what it should be. Where I work, we discuss the concept of “sweeping circles in the corner” during our orientation of new employees, supervisors and managers. This means that on a day when an employee cannot focus on the work at hand **that they inform their supervisor and request a simple low risk task for the day.** The distraction could be anything from a sleepless night due to an ill family member to discovering damage on your vehicle that day, etc. It’s not necessarily serious enough to require them to stay home, but that day is not the day to weld high pressure steam lines or to operate equipment.

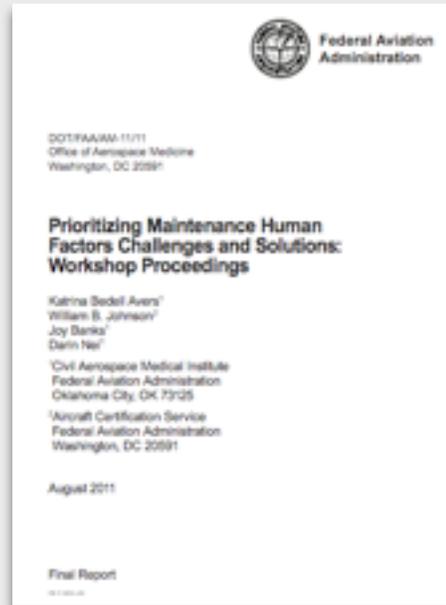
### Conclusion

It doesn’t take a degree in calculus or geometry to understand Common Sense. The key element is a **caring attitude toward employees.** What is the result of your Common Sense calculation?

## **Prioritizing Maintenance Human Factors Challenges and Solutions: August 2011 Workshop Proceedings (Avers, K.B.; Johnson, W.B.; Banks, J.O.; Nei, D.)**

**Abstract:** Thirty delegates, mostly from the Federal Aviation Administration’s Office of Aviation Safety, but also from the U.S. aviation industry, the National Transportation Safety Board, and Transport Canada, assembled for two days at the Civil Aerospace Medical Institute in Oklahoma City. These **leaders in maintenance human factors research** met to discuss challenges and prioritize solutions for **human factors issues in aviation maintenance.**

The delegates reviewed international incidents and accidents and corporate operating procedures to identify **systematic human factor precursors** to maintenance errors. Each human factor issue was discussed and prioritized by each delegate. Analysis of the data revealed **eight core issues**, including: use of technical publications, fatigue/alertness, safety culture, event data collection, return on investment for human factors, prioritization of human factors, professionalism and generational issues, and attention to required inspection items. Solutions and action items for each of these issues were discussed and recommendations were developed. The prioritized list of problems and suggested industry actions **are detailed in the report**. The recommendations stemming from this report can be used to inform future research and development for maintenance human factors.



For a copy of this report, please visit:

<http://www.faa.gov/library/reports/medical/oamtechreports/2010s/media/201111.pdf>

## **“CAUTION!” DO NOT IGNORE A “CAUTION” IN THE PUB!**

Good advice from the U.S. Navy that applies to all aviation maintenance organizations.

Problem: Most people have heard the saying “**Publication WARNINGS are written in blood.**” Although it’s not 100 percent literally true, this saying should be taken lightly. Why? A maintenance manual WARNING refers to an operating which, if not correctly observed, could cause injury to personnel.



In comparison, a maintenance manual CAUTION refers to an operating procedure which, if not correctly observed, could cause equipment damage. You can use your imagination on what type of ink a CAUTION would be metaphorically written in. [Regardless, it \[also\] should not be taken lightly.](#) Occasionally during safety surveys, I find evidence that CAUTIONs are flat out ignored.

One such CAUTION in NAVAIR 13-1-6.2 concerns performing battery voltage checks on Parachute Harness Sensing Release Units (PHSRU). It specifically states that only FLUKE 77 series multi-meters are authorized for use, touching meter probes together must be avoided, and all probes must be modified with 3/32 inch heat shrink.



The cautions dealing with the probes are clearly explained as, “Failure to do so will result in an inadvertent firing of the PHSRU.” However, the reason for only using FLUKE 77 series multi-meters is not totally clear. Here’s the explanation. In the 1990’s, the CONAX Florida Corporation manufactured a Battery Voltage Tester that mitigated the risk of contacting probes (see photo). It was subsequently authorized for Navy use and many work centers started using them.

It was later determined that the CONAX Tester was not safe for use due to HERO (Hazards of Electromagnetic Radiation to Ordnance) testing failures. Most importantly, it was not to be used onboard ships or near EA-6B aircraft because of the different radio frequencies being used around the aircraft. This resulted in a recall by the Lakehurst Support Equipment Division. It is not as authorized piece of equipment and hasn’t been for more than 10 years. [Yet, one was found in a work center during a recent safety survey.](#)

Other series of FLUKE multi-meters differ in frequency range and can inadvertently fire the PHSRU. Therefore, the only authorized way to safely test the PHSRU batteries is by using the Fluke 77 series meter.

**Solution:** Preventing this kind of problem is simple. Make sure all maintainers read, understand, and follow all written procedures in manuals and MRCs. If there is ever a perceived “Gray Area,” immediately contact the proper authorities before proceeding. [Aviation Maintenance Instructions are never written with the intent of having various interpretations.](#)

## When All Else Fails...

### UPSIDE DOWN AND BACKWARDS

One of several versions of the origin of "Murphy's Law" contends that the Law's namesake was Captain Ed Murphy, an engineer at Edwards Air Force Base in 1949. Frustration with a transducer which was malfunctioning due to an error in wiring caused him to remark that—if there was any way that something could be done wrong, it would be.

Recent ASRS reports indicate that Captain Murphy's Law was in full effect when several aircraft components managed to get installed upside down or backwards.

Placing a maintenance Job Card upside down may seem like a minor example of Murphy's Law, but when it leads to a departure from [Allen's Axiom](#)

([When all else fails, follow the instructions](#)), the results can be major. In the incident reported by this Maintenance Technician, a large portion of a turbofan engine fell to the hangar floor.

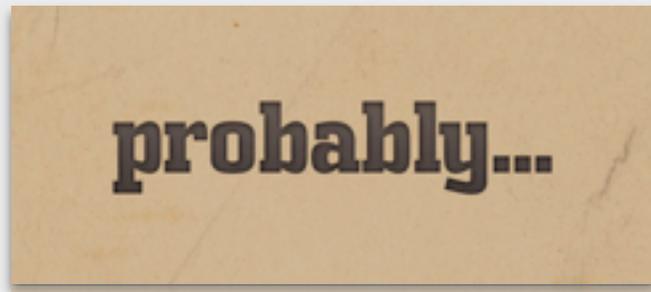
- I was assigned to work on an engine with another Mechanic [who was under training](#). We started working on a Job Card to remove the HPC (High Pressure Compressor) from the fan case which we finished and then started working on another Job Card to trunnion the HPC. We followed the Step #1 to Step #3 [procedures]. In Step #3, we installed a fixture plate in front of the HPC. During this installation the other Mechanic was working at the 12:00 o'clock position while I was at the 6:00 o'clock position.... I was [sick from a head cold](#) and was wondering if I should talk to my Supervisor or a Safety Representative about this? With these thoughts running through my head, I put the Job Card on the table upside down and walked away for a moment to try to refocus on the job. When I came back, I looked at the Job Card and saw Step #6— to remove the center fixture. The next step (#7) was to trunnion the core, but the eye bolt attached to the front fixture sheared off....

Because I had placed the Job Card [upside down](#) from where we had been working, I [inadvertently missed the critical Step #4](#) about handling the HPC safely. As a result the HPC broke off and struck the floor.

## **FAA Team Safety Tip. Not For Pilots Only!**

### **Purge “Probably” From Your Flying Vocabulary**

Just as a drug-sniffing dog alerts in the presence of an illegal substance, you be alert anytime the word “[probably](#)” pops into your head when flying. Probably means that you’ve done an informal assessment of the likelihood of an event occurring and have assigned a probability to it. The term implies that [you believe](#) that things will most likely work out but that there’s some [reasonable](#) in your mind.



Because humans are in general optimistic, there’s also a good chance that you’ve overestimated the probability of success, as do the approximately 300 pilots a year who suffer fatal accidents.

If you ever think that your course of action will “[probably work out](#),” you need to choose a new option that you know will work out. Even if you feel there’s a 99-percent probability that things will work out, that shouldn’t be sufficient justification for you to continue with a course of action. Would you play Russian roulette with a gun that had 100 chambers and just one bullet in it? I hope not.

Pilots can also be lured into a false sense of security if they’ve performed a [risky behavior](#) successfully in the past. One CFII, known locally by his colleagues as “Luke Skywalker,” had a reputation for always being able to make it into his local airport—which didn’t have an instrument approach—regardless of how bad the weather was. Having succeeded perhaps a hundred times, he may have felt justified in believing that he could always make his system work. The last time he tried, however, it didn’t work and he became a statistic.

In the San Francisco Bay area, about one-half of all VMC-into-IMC accidents occur in the Livermore Valley, probably because a marine layer of clouds frequently obscures the mountains that rise from sea level to about 4,000 feet. A common way to traverse this area is through the Altamont and Sunol mountain passes. I tell pilots that if they ever approach these passes and, based on visibility, think “they can probably make it through,” **they need to make a 180° turn** and land at an alternate airport. Undoubtedly, every pilot who crashed in this area thought that he or she would “probably” make it through—otherwise the pilot wouldn’t have continued.

You should always assess risk and prepare a Plan A, Plan B, and Plan C before you take off.

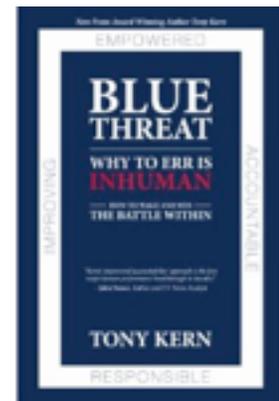
That way, the first time the word “probably” flashes through your mind, you can instantly begin to execute Plan B or Plan C. Fully **thinking out these plans before you leave the ground** leads to better decisions. Waiting until you know things are not going to work out is the wrong time to improvise a seat-of-the-pants decision.

## **Book**

### **Blue Threat: Why to Err Is Inhuman**

**Demystify human error** through a science based process that takes into account your personal uniqueness, environment and situational factors. Contents include key topics such as: - Why compliance is so hard and so vital - Myth busting "to is human" - Why "good enough" really isn't - Reclaiming personal from the political correctness police.

Author: Tony Kern, 2009



## The Speed of Information

Reuters.com reports that in the course of two days, human beings create as much information online as it took our species to create in the 30,000 years of cave painting and the year 2003. In another 10 years, that same amount of information will be generated [in less than one hour](#)



## Pilot's Tip of the Week

How do you best handle in-flight fire emergency, electrical and/or fuel related emergencies? This week, Bob Martens tells you [a simple framework](#) you can follow to manage all emergencies.



View the tip here...

[http://www.pilotworkshop.com/tips/pilot\\_emergency\\_procedures.htm](http://www.pilotworkshop.com/tips/pilot_emergency_procedures.htm)

## Taking professional pride to a new level

**Are you proud to be an Aircraft Maintenance Professional?**

Aircraft Maintenance Technicians [are proud](#) of their technical knowledge, to detail, honesty and integrity and their record of accomplishments. But there are a few people that go beyond feeling proud about their personal accomplishments.

Those few want to celebrate the profession and leave a legacy for the aircraft maintenance profession so there is no doubt in the public's eyes of the contributions that have been made by **dedicated** aircraft maintenance professionals. One of these people is Ken MacTiernan. He is a mechanic for American Airlines, but that's just his day job. For the remaining waking hours of his day, MacTiernan is also the director and founder of the Aircraft Maintenance Technicians Association (AMTA). He is also a board member of AMTSociety, organizer for the annual AMTSociety Maintenance Skills Competition, fund raiser, father, husband.



According to AMTA's website ([www.AMTAUSA.com](http://www.AMTAUSA.com)), the association promotes the "**proud craft of the Aircraft Maintenance Professional.**" MacTiernan employs the history and image of Charles E. Taylor, the Wright Brothers' mechanic, as a cornerstone for recognition of the aircraft maintenance professional. He has raised money for and placed Charles E. Taylor Busts in at least nine prominent locations around the country including a bust at the Smithsonian's Tomas F. Udvar-Hazy Center — no small feat, considering each bust costs more than \$6,000. He is currently raising funds to place one at the Smithsonian Air and Space museum at the mall in Washington DC.

<http://www.AMTAUSA.com/>

# Qantas “Take 5” Poster for Aircraft Maintenance Engineers

