

Aviation Human Factors Industry News

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

Hello all,

To subscribe send an email to: rhughes@humanfactorsedu.com

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FAA Orders 737 Cabin Pressure Warning System Mods

Boeing 737 operators have six years to modify cabin pressurization loss warning systems, including installing redundant pressure switches and new warning modules, FAA orders in an airworthiness directive (AD 2012-19-11) issued Wednesday. The AD, which applies to all 737 models, was **prompted by a probe** into an inflight cabin depressurization and passenger oxygen mask deployment.



Boeing says the plane's pilots **did not receive an aural warning** when cabin pressure exceeded 10,000 ft.; a cabin crew member informed them about the problem. The depressurization had nothing to do with the defective warning system, FAA and Boeing are careful to note.

FAA's AD is based on service bulletins originally issued by Boeing in 2010. The changes include a second altitude warning switch, aural warning modules (AWM) and wire bundle modifications. "The installation of a second 10,000 ft. pressure switch and a new digital AWM with two fully independent channels will **reduce the probability** of the flight crew being not aware of a depressurization event," Boeing explains in the bulletins.

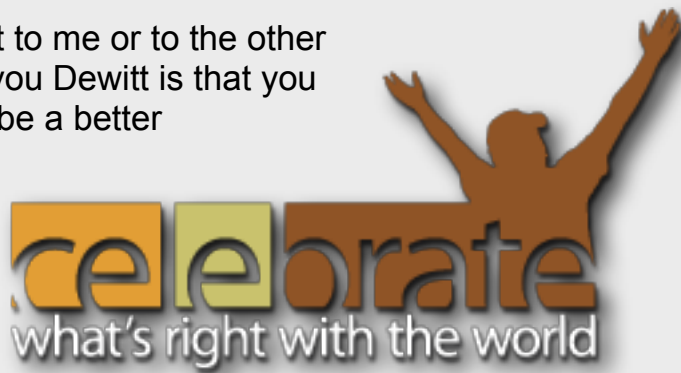
FAA says the AD applies to 1,405 U.S.-registered airframes. Cost per aircraft is estimated at about \$39,000, including \$33,000 for required hardware. The compliance deadline is Nov. 7, 2018.

<http://www.gpo.gov/fdsys/pkg/FR-2012-10-03/html/2012-23800.htm>

Improve and Share

Dewitt Jones a National Geographic (NG) photographer and a keynote speaker was given **a gift of advice** by his new boss when he first began shooting for the magazine. He was told that if you work here, you're part of a team of photographers that are the best in the world.

You don't have to prove yourself, not to me or to the other photographers. What is required of you Dewitt is that you improve yourself everyday, strive to be a better photographer, a better visual storyteller and everything that you learn, [share it openly](#) with the other photographers at the NG. Improve and share; if you do that, you'll do fine. If not, you won't work here long.



Throughout Dewitt's career with the NG, Dewitt kept reminding himself; don't worry about proving yourself just improve yourself! He discovered that he got better results a lot faster by focusing on [improving rather than proving](#). He learned more by sharing than by hoarding. The quickest way to learn is to trust and share rather than compete. Good advice. Pass it along.

I encourage you to visit Dewitt Jones website to become inspired by his motivational message to see the extraordinary from the ordinary in life. Are you looking at life through the right lens? Click onto "[Celebrate What's Right With The World – The Film](#)". You will not be disappointed.

<http://www.celebratewhatsright.com/film>

A Not So Routine Task

Draining fuel from the tanks of the E-6B Mercury is [a routine and frequent task](#) for the VQ-4 Line Division. It is a procedure practiced early and often by the squadron's newest Sailors, many of whom spend their first year in the line shack prior to joining their respective shops. The notion of a routine task practiced often by the least experienced personnel might raise a red flag or two in the minds of the more seasoned and experienced maintainers reading this; readers who know that sometimes the [greatest danger lies](#) in those mundane tasks done everyday.



Such a stage was set on the morning of 22 August when the Line Division was tasked to “pencil drain” the [No. 3 fuel tank](#) of a E-6B in the hangar. Sump draining, also known as pencil draining, is required to completely empty a fuel tank so that fuel cell maintenance can be done.

The tank is first defueled by means of aircraft pumps, which are able to transfer the vast majority of the fuel. The remaining few hundred pounds in the tank sump, which is located beneath the pump intake, is emptied by manually opening a drain at the bottom of the sump and collecting those few hundred pounds in a small defuel tank known as a fuel “bowser”. The fuel bowser is attached via a hose to the underside of the wing at the lowest point of the tank desired to be emptied.

Since each wing on the E-6B contains three separate fuel tanks, inboard, outboard, and reserve, personnel pencil draining fuel must be cognizant of which tank needs to be drained. In this case, the fuel in the No. 3 fuel tank had been defueled and only contained a few hundred pounds of fuel in its sump. The adjacent No 4 tank was nearly full, containing over 15,000 pounds of JP-8 fuel.

After being instructed to pencil drain the No. 3 fuel tank, a 3rd Class Petty Officer and an airman from the line shack took a fuel bowser and headed to the aircraft inside the hangar to begin the job. Being such a routine task, neither Sailor thought twice when they attached the fuel bowser’s hose to the sump of the [No. 4 tank](#). When the drain was opened, instead of a slow and controlled stream of fuel coming through the hose, the drain erupted under the weight of thousands of pounds of jet fuel in the No. 4 tank.

The fuel quickly exceeded the capacity of the bowser and began leaking through the hose fittings. Within seconds, jet fuel was flowing freely from the drain, drenching both of them and flooding the surrounding area with JP-8. The gushing fuel [disoriented both](#), and they immediately found themselves unable to contain the spill. The pressure of the fuel overcame the protective goggles of the airman holding the fuel bowser spout, covering the Sailor’s face and eyes with JP-8.

After struggling to close the sump drain, the PO3 quickly escorted the injured airman to the nearest eye wash station. The airman was transported subsequently to Medical in order to ensure all the fuel had been properly flushed and that no significant injuries had been sustained. Fortunately, neither one sustained permanent injuries and the fuel spill was quickly contained.

Nevertheless, this incident highlights the [ever present danger](#) that can turn a routine task into something catastrophic. No doubt these two expected this job to be completed like so many times before.

Perhaps if they had approached it with the same caution and careful apprehension they possessed [the first time](#) they did a pencil drain, this article would not have been written. Regardless of how experienced we are at doing a certain job, we must never forget the [inherent danger](#) that lurks under the guise of being cursory.

Workarounds – Part I

As a former air safety investigator, I was often presented with an accident or incident where one of the key elements of the event was the presence of a [workaround or deviation to published procedures](#) established by the organization or mandated by the manufacturer. It's a common problem in all organizations and [is rooted](#) in our innate ability to problem solve coupled with resource driven pressures to get the job done better, cheaper, faster. By resource I mean time, money, and labor.



Learn from experience

It is said that our experience is the sum of our mistakes. However, we are fortunate that by [reading about other mechanics' experiences](#) — some of them bad — we have the opportunity to learn and improve our own performance daily.

Here is a famous accident that hit the news many years ago: This was an workaround supported by internal work instructions. The process failed to anticipate the failure of ground support equipment as a DC-10 engine was hung with the pylon attached to the engine rather than separately as called out by the manufacturer. The engine is left over night with the forklift supporting the forward portion of the engine. The [forklift loses pressure](#) and the forks settle creating a twist in the rear engine mount which then cracks. The next day the engine change is completed, but the [crack goes unnoticed](#). As the aircraft departs the airport the left engine departs the airplane along with most of the left wing lift devices. The aircraft goes down.

Here's another (It didn't make the news): An aircraft elevator jack screw was removed and sent for overhaul. Upon completion of the overhaul, it was received and sent back to the aircraft for re-installation. After some time, it was installed and when the required inspection was accomplished it was found to have broken limit switch seals and a damaged switch housing.

The unit was sent back to the overhaul agency who estimated the damage at \$15,000. Further investigation revealed that the unit was the wrong part number for that aircraft. The project manager objected because the unit was originally removed from the aircraft; however, it was found that the unit had been modified by the previous owner, and installed years before. The [assumption and accepted practice](#) was that, since it was the unit removed previously, it was acceptable for re-installation.

Anti-Laser Eyewear to Protect Pilots

There are already special “anti-laser” glasses and goggles out there, [but the problem is](#) that they can only filter out one wavelength of light. That poses a major hazard for pilots, since they can be hit with all kinds of lasers. And so, the Ministry of Defense (MoD) in the UK is developing some new anti-laser eyewear that is able to filter out a wider range of laser wavelengths. We’ve all been told that it’s dangerous to shine a laser pointer straight

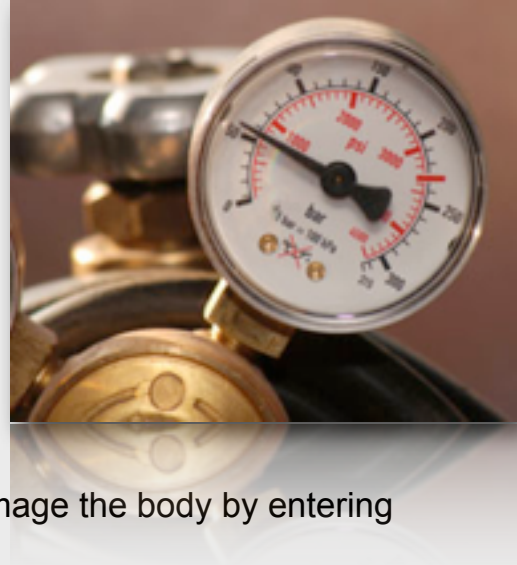


into someone’s eye, but that’s just with the laser pointers you can pick up at your local dollar store. Now, imagine far more powerful laser dazzler weapons—using multiple wavelengths—that boast enough energy to pop a balloon. This can cause pilots not only to get [distracted or temporarily blinded](#), but they could even suffer from more permanent eye damage. In fact, the US FAA says that there are over [2,000 incidents](#) each year where pilots have lasers pointed at their planes. Protecting pilots against one wavelength at a time just isn’t good enough, so the UK MoD turned to Thin Film Solution, based out of Glasgow. The resulting prototype has a composite structure where the polycarbonate layer has a special light-absorbing dye. When bonded with the glass lens, the wavelengths can then either be filtered out or reflected out, helping those pilots retain their optimal vision. They’re still working on it, but I can see how these laser-filtering goggles can become standard issue for at least all military operations.

When Good Air Goes Bad

You might be able to survive for weeks without food and days without water. You cannot survive even minutes without air to breathe.

The air that ordinarily surrounds us is the correct mixture of gases and is relatively free of poisons. But under certain conditions, [life-sustaining air can turn deadly](#). One such situation is in a [confined space](#). Without adequate ventilation, harmful gases can reach lethal levels. Other gases that don't support human life can [displace](#) the necessary oxygen. You can also be exposed to air contaminated with gases or particles, which [damage](#) the body by entering through the lungs.



Lack of oxygen and contaminated air are known as [respiratory hazards](#). The harmful air enters the body through the lungs and can cause damage to the respiratory system and to other body organs.

Some respiratory hazards are quickly fatal, such as lack of oxygen or exposure to hydrogen sulfide. Some cause severe injury, such as acid and alkaline gases, which burn the nose, throat and lungs. Others cause long term effects such as particles that lodge in the lungs and cause cancer.

You have to be [trained and properly equipped](#) to deal with respiratory hazards - starting with hazard recognition. Do you handle chemicals that give off harmful vapors? Are there particles in the air that can cause lung damage years from now? Does your work area have any confined spaces where oxygen deficiency may develop?

Know how to protect yourself by using the correct respirator for the hazard involved. Some respirators purify the air you breathe with mechanical or chemical cartridge filters. When the air cannot be made safe that way, or when there is an oxygen deficiency, you have to use a [supplied air respirator](#). This gives you a separate safe source of air while you are in the confined space or another danger area. Talk to your supervisor about the correct respirator to use.

You need expert advice on the kind of respirator to wear and how to use it. A respirator must fit perfectly to block out the harmful air. It also must be [maintained properly](#) so it will work when you need it.

Manufacturers of respiratory equipment often provide extensive training programs, even at no charge.

Don't forget that the work done in the confined space may affect the atmosphere. For example, welding or painting inside a confined space can turn a safe atmosphere lethal.

Taking Sleeping Remedies Without Advice Increases Health Risks

Research from the Royal Pharmaceutical Society shows that 51% of people with insomnia have diagnosed themselves with the condition and bought sleeping remedies **without seeking advice from a health professional first**. This could be putting their health at risk as insomnia is often the result of an underlying physical or mental health problem. When questioned, 30% of people with insomnia admitted they had taken sleeping remedies for longer than a month without getting advice, including 14% who had taken them for more than 6 months. A further 18% could not recall how long they had taken the remedy. Paul Johnson, community pharmacist, said: "It's worrying that so many people are **over-using** sleeping remedies. They can be effective for short-term treatment of mild insomnia but should not be taken for long periods without advice because they can **hide a serious health problem**, which could get worse if it remains untreated."



http://www.rpharms.com/pressreleases/pr_show.asp?id=659

Cognitive Engagement Combats Transport Workers' Monotony

A study published in the September issue of the journal *Ergonomics* suggests simple solutions for mitigating the problem.

Two Australian researchers have published the results of their study seeking to ameliorate the problem of [monotonous work by workers in various transportation](#) modes, including trains and [aircraft](#).

Operators' [performance declines](#) due to and low task demand, and co-authors Naomi Dunn and Ann Williamson of the University of New South Wales' School of Aviation in Sydney provide evidence for the importance of making these tasks [more cognitively engaging](#). Their study subjects completed simulated train-driving scenarios, one of low cognitive demand and the other of high demand.

"Although monotony is widely recognized as being detrimental to performance, its occurrence and effects are not yet well understood," their abstract states. "This is despite the fact that task-related characteristics, such as monotony and low task demand, have been shown to contribute to [performance decrements](#) over time.... These results highlight the seriously detrimental effects of the combination of monotony and low task demands and clearly show that even a relatively [minor increase](#) in cognitive demand can mitigate adverse monotony-related effects on performance for extended periods of time. Monotony is an inherent characteristic of [transport industries](#), including rail, aviation and road transport, which can have adverse impact on safety, reliability and efficiency. This study highlights possible strategies for mitigating these adverse effects."



Their paper is published in Volume 55, [Issue 9](#) of the Taylor & Francis journal *Ergonomics*, offered by [The Institute of Ergonomics & Human Factors](#) of Loughborough, England.

<http://www.tandfonline.com/doi/abs/10.1080/00140139.2012.691994>

<http://www.ergonomics.org.uk/>

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