Helliprops
Helicopter Professional Pilots Safety Program
PROMOTING AERONAUTICAL PROFESSIONALISM & SAFETY

Understanding the Relationship between Stress & Performance

By Craig Geis • CraigGeis@CTI-home.com

In Part 1 of this series we looked at the basic functions of the nervous system. Can you recall ever hearing this conversation? "Watch your airspeed, check your rate of descent, pay attention to your attitude, oh never mind I have the controls." If you are like me you felt stressed and overwhelmed at the moment.

Part 2 of this series will be presented in Part A and Part B. Part A will introduce you to the relationship between stress and performance and Part B will allow you to look at an aircraft accident and go in depth into the physiological, perceptual, and cognitive effects of the different levels of stress.

Part 2A

Any threat we perceive to our well being, either consciously or unconsciously, evokes a stress response in the nervous system. That threat could be an emergency, weather, personal problems, time constraints, etc. The nervous system's response to stress is an evolutionary design whose purpose it is not only to help us cope with the stress, but to make sure we survive whatever happens during the encounter.

When we think of the word "stress" mental-emotional strain usually comes to mind. Anxiety, fear, emergency situations, fatigue, overload, repetitious tasks, dissatisfaction, and frustration also qualify as stress.

The common identifier that qualifies all of the above as stress is the ability to activate the body's stress response. It doesn't matter if the stress is mental-emotional, physiological, or environmental. The body responds one response to stress; only the intensity of the response varies depending on how threatening the perception.

Figure 1 tracks the five stage stress cycle.

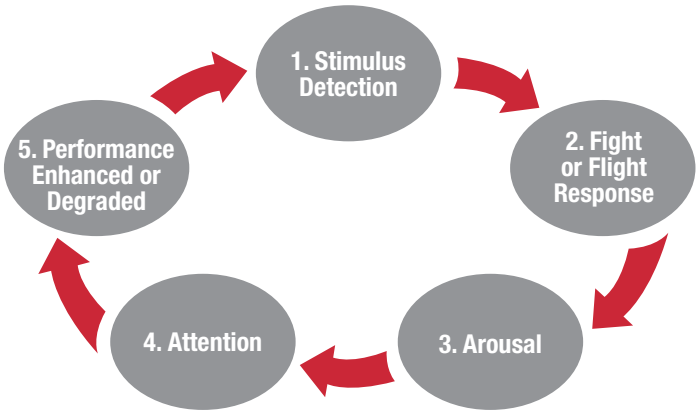


Figure 1: Five Stage Stress Cycle

CONTINUED ON PAGE 2

VOLUME 23 • NUMBER 1 • 2012
HumanAD
AIRWORTHINESS DIRECTIVE FOR HUMANS

P.O. Box 482 • Fort Worth, Texas 76101
Bell Helicopter
A Textron Company

Stage 1: Stimulus Detection – Incoming stimulus is processed in the brain by a structure in the limbic system called the amygdala, which assesses all incoming stimulus for threat potential. The amygdala deals with memory storage relating to threats with emotional impact. In threatening situations the amygdala gets totally absorbed in managing our response to fear and stress.

State 2: Fight or Flight – This response gives us assistance by releasing stress hormones. The structures involved in the "fight or flight" response include the hypothalamus, pituitary, and adrenal glands.

The level of hormone produced depends on the *perceived* level of stress. It is not the threat/stressor but the individual's perception of the threat that matters. These hormones cause an immediate increase in heart rate.

When we talk about an increased heart rate affecting human performance, either in a positive or negative way, it is critical to understand the cause of the increase in heart rate, because a change in performance comes from the increased heart rate due to stress, *not exercise*.

There are two ways to increase heart rate: through physical exertion or through fear. Physical exertion can take up to 5 minutes to push the heart rate from 60-80 beats per minute (BPM) to 160 BPM. On the other hand, when the nervous system is sufficiently activated through the "fight or flight" response, it is not uncommon for the heart rate to go from 60-80 hormonal beats per minute (HBPM) to 160 HBPM in 1 second, and 200 HBPM in 2 seconds.

Therefore performance changes related to heart rate only occur when the heart rate change is due to stress. **It's not the heart rate that matters but what drives the heart rate that is important.**

Performance is not significantly impacted when the heart rate increases due to exercise. If you don't believe me, imagine yourself on the treadmill, running so hard that you are out of breath and your pulse is pounding. You can still think, plan, and even do math problems in your head! Ever go for a long run just to clear your head and think?

Stage 3: Arousal – Arousal is the impact of stress, and the hormones and neurotransmitters released activate the entire nervous system. Arousal refers to the level of nervous system activation, also known as "the readiness to work." In simple terms, how much of the brain is active and ready at any point in time to deal with a threat?

Arousal is defined and measured by specific elements of our physiology. Those elements are things like mental activity, heart rate, blood pressure, and respiratory rate. The level of arousal is proportional to the level of a person's perceived threat. In other words, the greater the perceived threat, the higher their arousal level will be.

Arousal levels affect a human's physiology which ultimately translates into ability to perform. In Figure 2 we can see that too low or too high a level of arousal will lead to decreased performance.

State 4: Attention – Defined as the cognitive process of selectively concentrating on one aspect of the

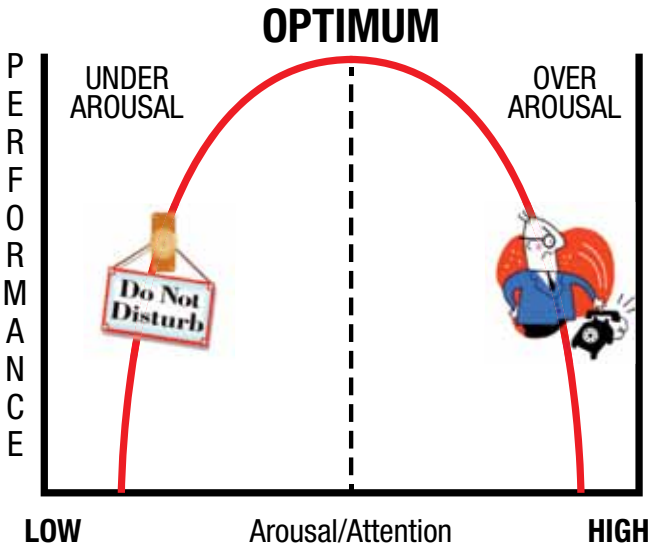


Figure 2: Arousal & Attention

environment while ignoring other aspects. Attention is also referred to as *the allocation of processing resources*. Attention level is determined by our level of arousal. Attention requires mental resources to direct and focus our mental processes. The mental resources available to us are limited; the more attention one task requires, the less attention is available for performing others tasks.

In understanding our limitations it is important that we understand the **basic principles of attention**. We are constantly confronted with more information than we can possibly pay attention to; therefore there are serious limitations in how much we can attend to at any one time. We can respond to some information and perform some tasks with little attention if we have sufficient practice and knowledge. Some repetitious tasks become less and less demanding of our attentional processes.

Attention includes four categories:

1. Inattention
2. Global Attention
3. Selective Attention
4. Hyper-vigilance.

Inattention: At low arousal levels attention really becomes inattention. No perceived threats, we're not paying much attention to anything. The brain shuts down to conserve energy and filters out most of the incoming stimulus. When there are no perceived threats, and arousal levels are low, the brain is essentially running at a low idle. Inattention doesn't mean you are asleep, it just means that you are not effectively filtering the environment for threat signals. This is where complacency occurs.

Global Attention (Vigilance): At our optimal level of arousal we are able to process the maximum amount of information. We also have a heightened ability to concentrate by blocking out elements of information that are not related to the threat. With global attention (vigilance), we are able process large amounts of sensory input, as long as that information is relatively familiar and not too complicated. In order for this to be the case, we

need prior experience or training related to the input. Our capabilities can meet the demands.

Selective Attention: At high arousal levels, when there may be a mismatch between external demand and internal capabilities our arousal increases to cause **selective attention**. Attention under high stress conditions, where arousal is resultantly high, reduces our ability to process information from multiple sources. With selective attention we focus, or attend to the inputs that we perceive to be the greatest threats to survival. The things we don't attend to just get scanned by our senses and often these things are simply not processed by the brain.

Hyper-vigilance (Panic): At the highest levels of arousal the "fight or flight" response gives us a hormone dump. Hyper-vigilance is borderline panic. Under hyper-vigilance a person is constantly shifting attention, from minor to major threats, without discriminating between the threats. This is done in an irrational and frantic attempt to find a way to escape the imminent danger.

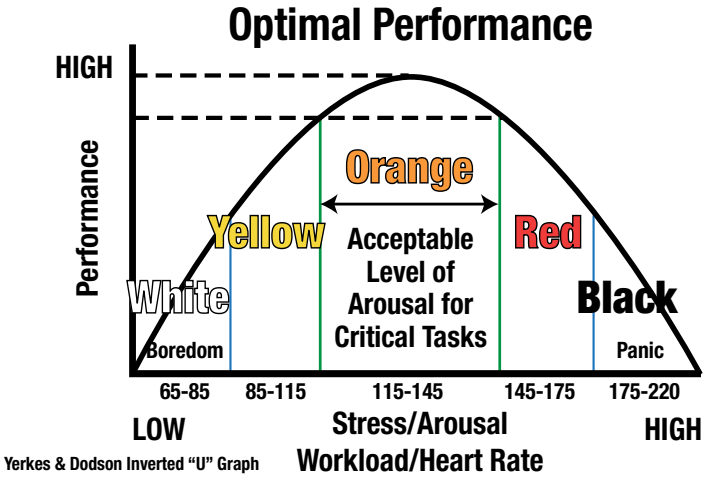


Figure 3: Stress Performance Curve

Stage 5: Performance Enhanced or Degraded

The Yerkes-Dodson law, originally developed by psychologists Robert M. Yerkes and John Dillingham Dodson in 1908, demonstrates the relationship between arousal and performance. The law dictates that performance increases with arousal, but only up to a point. When levels of arousal become too high, performance decreases. Figure 3 has been modified significantly to reflect the current science of stress and performance.

On the vertical axis we measure a human's performance level. Performance can relate to physiological, perceptual, and cognitive performance.

On the horizontal axis are the stress/arousal/workload levels from low to high, the heart rate expressed as hormonally induced heart rate, and a color code reference.

Moving from left to right on this curve this is what we see:

- White Zone: 65-85 HBPM. Performance is low here because a person is ***unconsciously*** filtering information. Here there's little threat discrimination.
- Yellow Zone: 85-115 HBPM. Performance is getting better. This is the stage of basic alertness. Here we are starting to be aware of and are discriminating threats around us.
- Orange Zone: 115-145 HBPM. Performance is optimal for most critical tasks. This is the optimal zone of arousal and awareness. Here we are scanning for potential threats rapidly and efficiently.
- Red Zone: 115-145 HBPM. Performance begins to fall off. Things start getting risky because our arousal level is high enough to start inducing selective attention.
- Black Zone: 175-220 HBPM. Performance is low because panic is setting in. In this highest arousal zone our systems begin to shut down and we lose the ability to think rationally.

Key Points to Remember:

1. In high stress events, success depends on a quick, appropriate, trained response.
2. If you are unprepared for an emergency and have no trained response, it will take at least 8–10 seconds under optimal circumstances and much longer under high stress to assess the situation and come up with a plan.
3. Training, planning, and mental rehearsal can reduce the time sequence to 1–2 seconds.
4. If an appropriate response to such an event has been prepared and embedded in the mental database of behavioral plans, then the speed of response can be as fast as 100 milliseconds. *This is an immediate action.* This is the power of habit patterns.
5. Prepare yourself:
   - *Understand Your Limits:* The performance problems discussed in this article are universal.
   - *Set Goals:* Constantly setting goals keeps the frontal lobe (thinking part of your brain) active. In emergencies you need to engage in conscious, rational thought. Keeping the frontal lobe engaged will allow you to think clearly and reduce the stress response.
   - *Mental Rehearsal:* Works exactly the same in the nervous system as doing the task. Mental rehearsal also creates a memory trace so an unplanned event is not really unplanned.
   - *Positive Self Talk – "Can do" vs. "can't do":* We are telling the amygdala that everything is under control and to back off the stress response.
   - *Control Breathing:* In high stress situations control you breathing, especially long exhales. This tricks the nervous system into thinking everything is okay.

Additional references and articles are available at www.CTI-home.com. Phone us at (707)968-5109 or email CraigGeis@CTI-home.com.

Lasers/GPS Blockers

Electronic Threats put Lives at Risk

By Jaime Kammerzell

Modern technology has made navigation in the air, on the ground and on the water virtually error-proof. But when the satellite signal is blocked, many lives are at risk.

The Global Positioning System (GPS) is made up of at least 24 satellites orbiting the Earth from 12,000 miles away. This system of satellites determines position using triangulation, or three points, to pinpoint a location within inches of its actual location. The satellites send an accurate signal back to earth regardless of weather conditions.

While both civilians and the military use GPS today, they work on different frequencies. GPS was initially created for military use, but civilians have adapted it to their needs. Aside from giving step-by-step driving directions to the public, GPS aids the aviation, financial, mining, electric, mobile phone, weather forecasting, farming and oil and gas industries as well.

However, "because they rely on signals from satellites transmitting from an altitude of around 20,000 kilometers (12,400 miles), the signals are very weak, making them vulnerable to accidental or deliberate interference," according to an article written by The GPS Jammers (http://www.thegpsjammers.com/how-gps-jammers-work/).

Military organizations created GPS jammers about 40 years ago to confuse the enemy and track missile and bomb strikes, but spy companies have caught on to the advantages of the technology for civilian use. For instance, civilians driving GPS-tracked company cars or trucks may choose to use a GPS jammer so their boss cannot track their every move. Managers have also been known to use GPS jammers to create quiet zones in schools, theaters and restaurants. However, what the user may not realize is a GPS jammer can unintentionally endanger the public. Not only do GPS jammers block the GPS on your car or cell phone, but also the cell phones of others and radio communications among the police, fire department and emergency medical services in the surrounding area. Navigational aids at nearby airports are also affected.

"The real problem for aircraft, especially civilian ones," Jessie Emspak wrote in *GPS Vulnerable to Dangerous Hacks and Spamming* for MSNBC in May 2012, "is that jamming isn't visible." If the GPS is blocked nearby an aircraft, its electronic compass will cease to work. Emspak quoted Adrian Graham, a consultant in electronic warfare, within her article. "You probably don't know you are being jammed — there will likely be no indication," Graham said. "If it is cloudy or night you will have no external reference."

Such was the case at Newark International Airport in 1999 when engineers noticed anomalies in its GPS reception. After two months of investigation, the Federal Aviation Authority found a truck driver who drove the New Jersey Turnpike each day had a GPS jammer in his truck.

According to the article, "No Jam Tomorrow" from the March 2011 edition of the Economist, "In a way, GPS has become a victim of its own success. Because it is used for such a wide range of civilian purposes, when somebody wishes to disable one GPS-based system, their actions can also disrupt other, unrelated systems."

In the United States, jamming mobile phone communications is illegal. In February 2011 the Federal Communications Commission (FCC) publicly reminded consumers that use of signal blockers, GPS jammers, or text stoppers is a violation of federal law despite marketer's claims.

According to the FCC, "unlawfully marketing jammers in the United States may result in monetary forfeitures of up to $16,000 for each violation or each day of a continuing violation, and up to $112,500 for a single violation, seizure of the unlawful equipment, and criminal sanctions including imprisonment."

Lasers

Jamming GPS is not the only electronic threat that pilots worry about today. Pilots are also affected by lasers aimed at cockpits of airplanes on approach onto the runway or hovering helicopters.

Engineers have increased the power levels of lasers, particularly green and blue ones used by astronomers to point out stars and constellations, which are easier to see than red ones. This enables lasers to reach aircraft at higher altitudes. Not only are the lasers more powerful, but their availability over the internet and low cost (generally under $50) make them more accessible to the general public.

Though some star gazers unintentionally catch an aircraft in the path of a laser, most lasers that reach cockpits are aimed intentionally. Lasers can distract or temporarily blind pilots and put hundreds of passengers in danger. In some cases, if the laser is strong enough and focuses on the eye long enough, permanent eye damage is possible.

In April 2012, the UK Civil Aviation Authority (CAA) developed a self-assessment tool for flight crews to determine if they have suffered eye damage after a laser attack and if they should seek medical help from an eye specialist.

According to the release, the Aviation Laser Exposure Self-Assessment

(ALESA) tool is available free online at www.caa.co.uk/medical. Hard copy cards are also available from the CAA. "The core of the test is a 10cm^2 grid that, when viewed from 30 cm away can be used to detect whether a pilot's vision has been affected by the laser beam," the report reads.

Dr. Ewan Hutchison from the CAA's Medical Department said in the release: "Unfortunately, increasing numbers of pilots are experiencing laser attacks. Pilots obviously need very good eye sight to do their job and are naturally concerned that their livelihoods could be threatened if they are dazzled by a laser. We hope this new self-assessment tool will, in most cases, allay fears but also enable pilots to determine whether they should seek medical attention."

Jamming GPS is not the only electronic threat that pilots worry about today. Pilots are also affected by lasers aimed at cockpits of airplanes on approach onto the runway or hovering helicopters.

Aside from medical attention, pilots need to report the incident to the authorities. In the United States, they should report laser incidents to the Federal Aviation Administration (FAA), which has been tracking laser attacks since 2005.

The FAA says laser event reports have increased steadily since the formal reporting system started in 2005. Reports rose from nearly 300 in 2005 to 1,527 in 2009 and 3,592 in 2011. In October 2011 the FAA created a new website to make it easier for pilots and the public to report laser incidents and obtain information on the subject.

According to the FAA, "the website, http://www.faa.gov/aircraft/safety/report/laserinfo/, collects a wide array of laser information into one location. It includes links for reporting laser incidents, laser statistics, FAA press releases, and FAA research on the dangers lasers can pose to pilots, as well as downloadable videos."

In June 2011, the FAA announced it would "impose civil penalties against individuals who point a laser device at an aircraft." The maximum penalty for one laser strike is $11,000, but some individuals have been charged with multiple laser incidents. The highest penalty to date, according to the FAA, is $30,800.

The FAA says it has charged 28 people with aiming a laser device at an aircraft since June 2011, and has opened investigations in dozens of additional cases, according to the release.

More progress has been made recently as the FAA announced in May 2012 that it "has directed its investigators and staff to pursue stiffer penalties for individuals who purposefully point laser devices at aircraft."

The FAA has suggested that individuals who accidentally aimed a laser at a cockpit receive moderately high civil penalties and those who deliberately aimed at a cockpit receive maximum penalties.

Air-One is a volunteer law enforcement helicopter unit based near Chicago. The enhanced photo was made by Dave Youngblut, Ground Support Officer, AIR-ONE Emergency Response Coalition, Rockford, Illinois.

VOLUME 23 • NUMBER 1

Heliprops

Helicopter Professional Pilots Safety Program

The HELIPROPS HUMAN A.D. is published by the Training Academy, Bell Helicopter Textron Incorporated, and is distributed free of charge to helicopter operators, owners, flight department managers, mechanics and pilots. The contents do not necessarily reflect official policy and unless stated, should not be construed as regulations or directives.

The primary objective of the HELIPROPS program and the HUMAN A.D. is to help reduce human error related accidents. This newsletter stresses professionalism, safety and good aeronautical decision-making.

Letters with constructive comments and suggestions are invited. Correspondents should provide name, address and telephone number to:

Bell Helicopter Textron Inc.
John Williams, HELIPROPS Manager
P.O. Box 482, Fort Worth, Texas 76101
817.280.3688, fax 817.278.3688
or the Comment/Feedback link at: www.heliprops.com

RELEASE STATEMENT: For photos or written submissions, please include a brief statement releasing your material to Bell Helicopter for use in the Human AD newsletter.

HumanAD
AIRWORTHINESS DIRECTIVE FOR HUMANS

TEXTRON Sigma

Pressure to fly comes from many directions. Many times it shouts much louder than the whisper of your conscious. Listen to doubt as it could be the last chance you get. This article can help condition you to make the safe decision.

Pressure to Fly

by Paul Lusker, Customer Service Engineer

Have you ever received any of the "pressures" listed below?

- *"Fly the mission or find another job."*
- *"It flew in so it'll fly out, besides there's a backup system."*
- *"The weather looks bad now. By the time we get there it should be okay."*
- *"If we don't transport that child they'll die for sure."*
- *"The bad guys are getting away. We have to support our ground units."*
- *"It's the news story of the year. We must cover it or the other station will."*
- *"The engine almost passed the power check. This company can't afford another overhaul right now."*
- *"Come on, Dad, you promised me a flight this weekend."*

We all know there is much less risk of injury while flying than riding to the airport. This is because thousands of aviation professionals make prudent decisions many times every day. This comes from training, experience, and adhering to good morals. Safety is woven into every fiber of our safety net. From the designers, production personnel, regulators, administrators, all the way to the flight and ground crews, safety in aviation is job one.

The financial burden of an aviation organization can apply severe pressure when it is sustained by you. The lives and livelihood of people rely on your decisions. Your company may have a pilot that will not fly if there is one cloud in the sky. Or, your chief mechanic will not release an aircraft unless it is like brand new. Those are problems that need to be resolved; however, they must happen far from the flight line. If personnel confrontations occur when it is time to fly you should probably revisit your management style. A missed flight could hurt business; an accident might put you out of business. If you are pressuring others to operate an aircraft when they feel they shouldn't, aviation may not be your calling.

Please, even if you are a pilot or CEO, take the time to read the Aviation Mechanics Creed. It may help you understand why mechanics keep you on the ground or cost you so much money. If you are a mechanic, please commit the Creed to memory.

At times the safest decision is not the most popular. You might lose your business or your job. You can replace either of those. You can not replace a life.

In conclusion, the toughest decision in aviation is when the mission is to save a life. You must rely on your training. If your conditioning tells you it is not safe, you should not fly or release the aircraft. You are responsible for the safety of the aircraft in your charge.

AVIATION MECHANICS CREED

(Reprinted with permission from the Flight Safety Foundation)

Upon my honor I swear that I shall hold in sacred trust the rights and privileges conferred upon me as a certified aircraft mechanic. I know full well that the safety and lives of others are dependent upon my skill and judgment. I shall never knowingly subject others to risks which I would not be willing to assume for myself or those dear to me.

In discharging this trust, I pledge myself never to undertake work or approve work which I feel to be beyond the limits of my knowledge, nor shall I allow any non-certificated superior to persuade me to approve aircraft or equipment as airworthy against my better judgment, nor shall I permit my judgment to be influenced by money or other personal gain, nor shall I pass as airworthy, aircraft or equipment about which I am in doubt, either as a result of direct inspection or uncertainty regarding the ability of others who have worked on it to accomplish their work satisfactory.

I realize the grave responsibility which is mine as a certified airman, to exercise my judgment on the airworthiness of aircraft and equipment. I therefore, pledge unyielding adherence to these precepts for the advancement of aviation and for the dignity of my vocation.

Author – Jerome F. "Jerry" Lederer

The Bell Helicopter Maintenance and Operators Conference met at the India Habitat Centre in Delhi for two days of discussion and safety meetings. The event ran for two days in Mumbai and then Delhi. Standing before the group were representatives and speakers for the Conference.

Armando Elorza

Maintenance Engineer Armando Elorza received a certificate of achievement from Bell's Training Academy Director, Trey Wade for working on Bell Helicopters for the past 59 years. Armando entered the helicopter industry in 1953 while serving with the Colombian Air Force working on the Bell 47D model helicopter. He has been a regular Bell Training Academy student since 1975 and values his experiences there. Armando's recognition was given during the Customer Reception when he completed the Bell 429 maintenance class. Armando works for Helicentro, in Colombia.

Pictured Right

Top – *(L – R) Trey Wade, BTA Director, Armando Elorza, Charles Fisher, Maintenance Manager and Juan Figueroa, Instructor.*

Bottom – *Armando stands next to the Training Academy's Bell 47G4A after his flight. It was piloted by Bell Sr. Flight Instructor, Kevin Brandt.*

A Plea to Personal/Private Helicopter Operators

By Lee Roskop (IHST team member)

If you are a personal/private helicopter operator, the helicopter industry needs your help.

We need your help to reduce the fatalities and injuries to those who travel in helicopters each year. We need your help to significantly reduce accidents. We need your help because too many personal/private helicopter operators and aircraft are now accident statistics.

The somber tone reflects somber data from the NTSB, FAA, and the International Helicopter Safety Team (IHST) with regard to personal/private operations. The IHST was formed in 2005 to lead a government and industry cooperative effort to address factors that were affecting an unacceptable helicopter accident rate. The group's mission is to reduce the international civil helicopter accident rate by 80 percent by 2016.

The Analysis

An IHST sub-committee of helicopter experts from government and industry called the Joint Helicopter Safety Analysis Team worked from 2006 to 2011 to complete an in-depth analysis of three years of U.S. helicopter accident data. The analysis team used 15 different industry categories to categorize each of the 523 accidents. Ninety-seven accidents (19%) were attributable to personal/private operations and were the highest of any industry category. To provide a comparison of how much higher, consider that personal/private operations and the second highest industry category of instructional/training operations (18% of the 523 accidents) each accounted for nearly twice as many accidents as the third highest industry category, aerial application (10%).

Data from the NTSB indicates the sizable proportion of U.S. helicopter accidents attributable to personal/private operations is a dilemma that occurs with a year-to-year consistency that is disconcerting. For the 10 calendar years from 2001-2010, about 20% of U.S. helicopter accidents each year occurred during personal/private flights. There was not a single year during that time period that personal/private flights accounted for less than 18% of the U.S. helicopter accidents.

Calculating Flight Hours

The analytical skeptic will examine these dismal percentages and make the astute observation that only half of the story has been told. After all, couldn't the real reason for the considerably higher number of accidents in personal/private operations be attributable to the fact their exposure is proportionately higher than any other helicopter industry? In other words, personal/private operators probably fly more hours per year than any other helicopter industry (higher exposure); therefore, the predictable result has been more accidents.

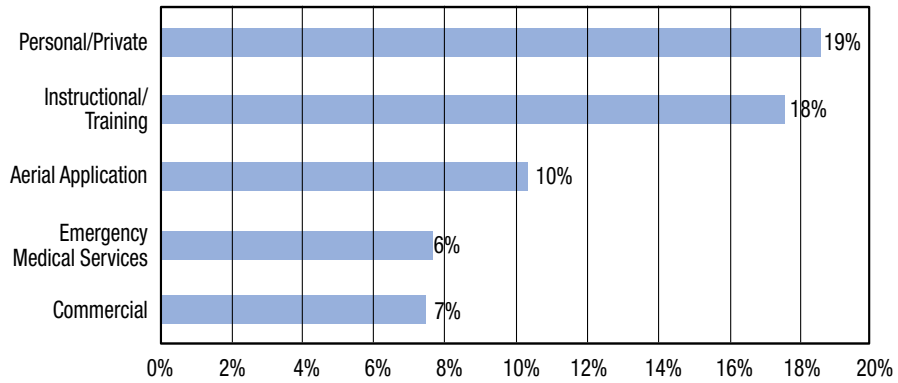
The observation raises a legitimate question worth pursuing, but to do so, the analysis team needed data on flight hours. Helicopter flight hours in the U.S. (and worldwide) are a notoriously slippery commodity since reporting of flight hours is not a mandatory requirement for most industry categories. However, some sources are available.

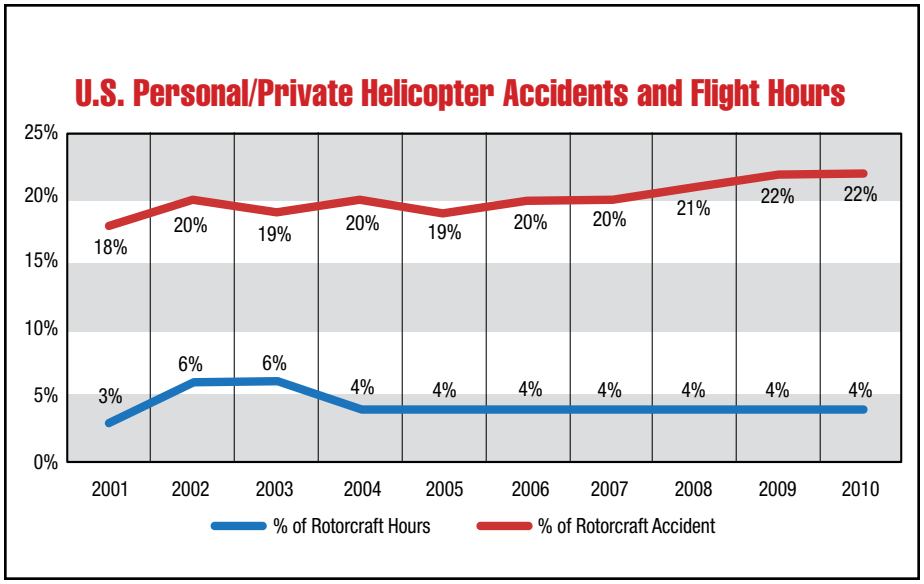
Annually, the FAA conducts a General Aviation and Part 135 Activity Survey (http://www.faa.gov/data_research/aviation_data_statistics/general_aviation/). The survey includes helicopter flight hour estimates by industry categories. Critics will malign that the survey is not complete enough because it builds statistical projections based on a representative sample of helicopters rather than including every helicopter in the U.S. The justifiable rebuttal is that rarely is complete data available for every point in a large population. A representative sample of 40% of the U.S. helicopter population (as was obtained in the 2010 survey) is well beyond the minimum sample required to provide statistically valid estimates for numerous flight hour parameters.

Using the FAA's General Aviation and Part 135 Activity Survey for the 10 years from 2001 to 2010, the percentage of helicopter flight hours attributable to personal/private operations can be calculated. Likewise, using the NTSB's helicopter accident data from 2001to 2010, the percentage of helicopter accidents attributable to personal/private operations can be calculated. Comparing the two measurements alongside each other

Top 5 Industries with the Highest Percentage of Helicopter Accidents

(Based on JHSAT Analysis of 523 U.S. Helicopter Accidents in 2000, 2001, and 2006)





in the following chart can answer the question of whether or not personal/private operations have such a high percentage of accidents because they fly a proportionate higher percentage of flight hours.

As evident, the number of helicopter accidents in the personal/private category is not at all proportionate to the number of flight hours flown. In fact, there is a stunningly large gap between the low percentage of U.S. helicopters hours flown in personal/private operations as compared to the high percentage of U.S. helicopter accidents. The bottom line in the comparison is that for the 10 years analyzed, the personal/private category accounted for only about 5% of

U.S. helicopter hours flown, yet resulted in 20% of the helicopter accidents. As a note to those who are students of statistical analysis, even when accounting for standard error, the personal/private flight hours don't change by more than about a percentage point or so.

Comparing Other Industries

For comparison purposes, notice the prominent difference between the personal/private chart when compared to the same type of chart for a category in helicopter industry that is closely scrutinized for its number of accidents: EMS.

Note how the line representing the percentage of hours flown and the line representing the percentage of accidents switched relative positions in the EMS chart when compared to the personal/private chart. For the 10 years analyzed, helicopter EMS accounted for about 13% of

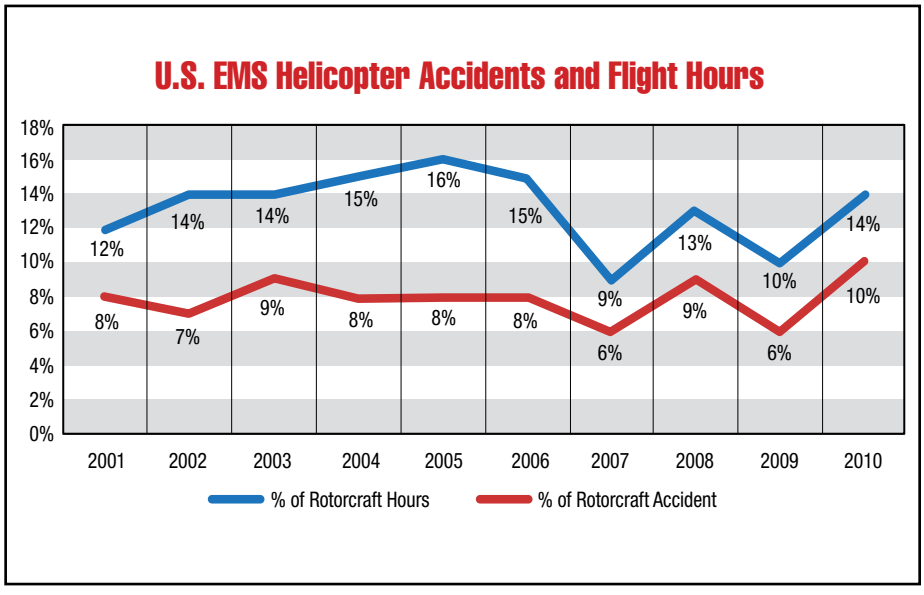
U.S. helicopter hours flown yet only resulted in about 8% of the helicopter accidents. For those who prefer accident rates per 100,000 flight hours the comparison for the nine years between the two categories is as follows:

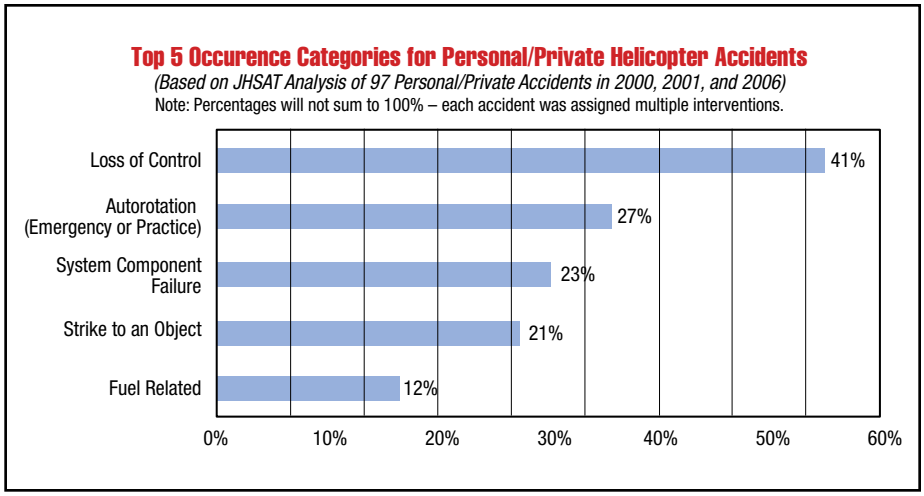
Personal/Private: 29.6 accidents per 100,000 flight hours EMS: 3.9 accidents per 100,000 flight hours

Tragically Upside Down

Incidentally, the IHST based their goal of achieving an 80% accident rate reduction off of a starting point (or baseline) accident rate in the U.S. of 9.1 accidents per 100,000 flight hours with the goal of reducing the rate to 1.8 accidents per 100,000 flight hours. The point of all these comparisons is to show the substantial magnitude of the problem in the personal/private category. The personal/private chart is tragically "upside down" in that a low volume of flight hours results in a disproportionately high volume of accidents. Based on the data sources used, the personal/private accident rate is more than 7 times higher than helicopter EMS and more than 3 times higher than the ***starting point*** for IHST's accident rate reduction effort. When considering the data regarding personal private data, the question becomes less, "Should we be alarmed?" and more "How alarmed should we be?"

To better understand how to address this problem, we need to study the personal/private helicopter accidents that have already occurred to determine what happened to cause so many accidents. The IHST's analysis team accomplished this type of work for the 97 personal/private accidents they analyzed. The team used the term "occurrence category" to refer to what happened in the accident. Any single accident could be categorized into up to four different occurrence categories. For the 97 personal/private accidents in 2000, 2001, and 2006, the most frequently





cited occurrence categories are shown in the following chart.

What Happens and Why?

To go from "What happened?" and progress further to the "Why did the accident happen?" question, the IHST analysis team used "Standard Problem Statements" to describe the combination of contributions that led to a given accident. "Pilot Judgment & Actions" was the most frequent contributor cited in their analysis of the 97 personal/private accidents in 2000, 2001, and 2006. To add more specificity to what the JHSAT found as leading problems encompassed under the general description of "Pilot Judgment & Actions", consider the following more detailed breakdown.

What Can Be Done?

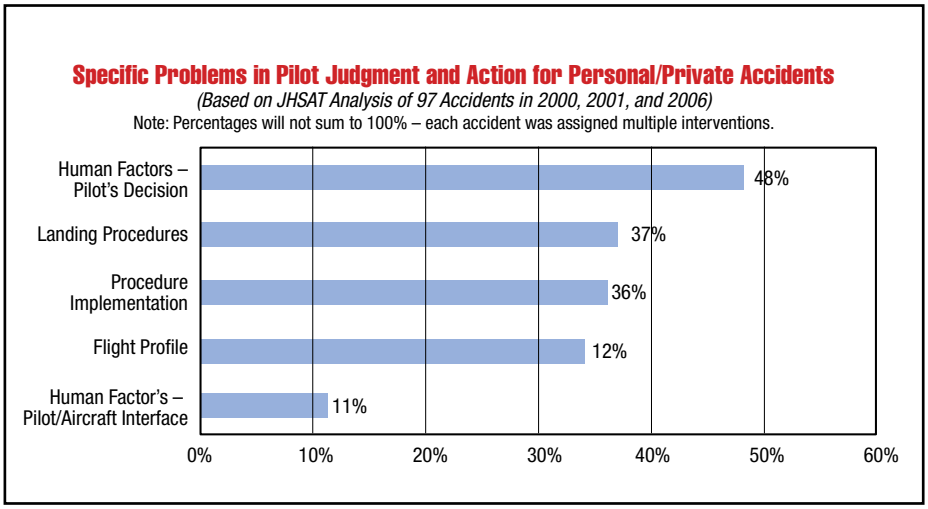
While "What happened?" and "Why?" are ways to summarize and understand the past, answering the question of "How could we have prevented the accident?" is how we can make the changes that will influence the future. The JHSAT used "intervention recommendations" to describe what combination of factors could have kept the accident from occurring. "Training/Instruction" was the recommendation most often cited, delineated distinctively into the following types of training.

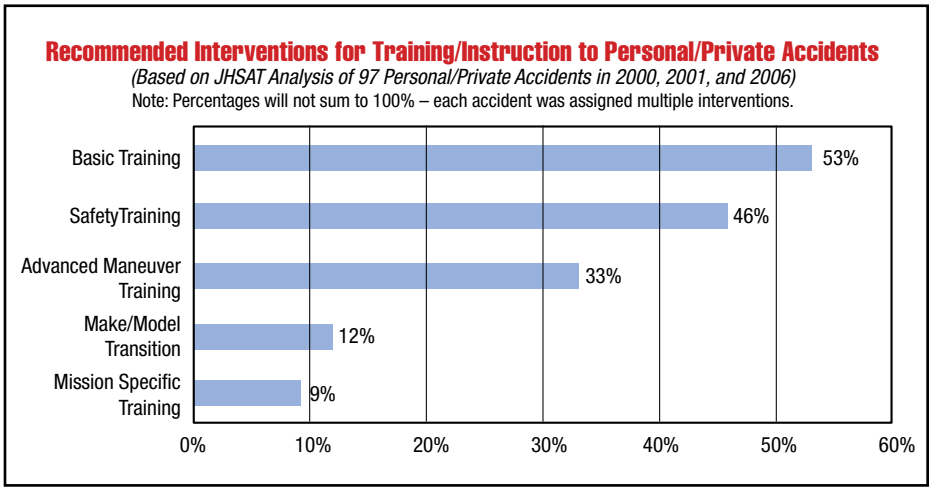
Reaching the Community

The message of these observations and statistics has value only if they reach enough of the personal/private helicopter community and provides an impetus for doing things differently. What's going on right now in personal/private operations is not working; the unreasonably high number of accidents for the number of hours flown makes that an indisputable case.

The motivation for changing course to fix this problem goes well beyond pursuing IHST's goal of an 80% reduction in the accident rate by 2016. The real endeavor is to keep personal/private helicopter pilots from continuing to put themselves at an unnecessarily high risk of an accident. Every helicopter accident offers the potential of a debilitating injury or loss of life for those involved. What a tragedy to those affected people and their families if we know where those who have gone before us have stumbled, yet fail to learn from their mistakes.

If you are a personal/private helicopter operator, the helicopter industry needs your help. Join the IHST effort to reduce helicopter accidents. Free toolkits are available on the IHST web site, www.ihst.org, to help personal and private operators manage their safety risks and develop a new safety culture. From the multi-helicopter operator to the lone pilot flying for pleasure, everyone is responsible for safety.





Speaking of Safety

By John Williams • Jwilliams2@bh.com

Understanding the Relationship between Stress & Performance by Craig Geis

I first learned about Craig Geis when I took his **Threat and Error Reduction Course for Pilots** at last year's HAI, in Dallas. Craig's analysis of the human body under stress was an eye-opener for me and the rest of the class. I am certain everyone found something unique for them, but for me the time spent with Craig answered many questions about experiences from my own 40 years of flying helicopters.

Pilots always function under some stress. It could be because of time pressures, long duty days, or perhaps underlying personal problems, just to name a few. But the question is whether the stress perceived causes a decrement to performance of the pilot. Are some stress levels okay and others not? You might answer, "It just depends on the type and amount of stress perceived by the pilot. What may be stressful to a young inexperienced pilot might not have the same impact with say, someone having years of dealing with unusual situations." Certainly, much of it has to do with the **perception** of the threat by any pilot.

The series of articles by helicopter pilot/psychologist Craig Geis clearly describes those internal processes that impact a pilot's performance. It is my desire that the reader will come away better prepared to handle threats and the associated stress by understanding how these processes work.

Not since Roy Fox wrote "The History of Helicopter Safety" has the HELIPROPS Newsletter dedicated so much space to this vital safety subject. I invite you to read and study Craig's series of explanations and instruction and trust you will gain as much insight as necessary to deal better with stress in your life.

Craig will once again lecture at the next HAI in Las Vegas on the subject of "Human Factors."

Lasers/GPS Blockers Electronic Threats put Lives at Risk by Jaime Kammerzell

Once again Jaime tackles the "hot button" problems facing our helicopter industry. She has done extensive research in the areas of "lasers aimed at pilots" and a lesser known problem of GPS jammers and how they can threaten safe helicopter operations. Some GPS jammers have the capability of jamming the signal up to 300 feet above the transmitter. For instance, that amount of intensity could interfere with an aircraft performing a GPS approach that passed over a vehicle jammer traveling on a freeway near the approach end of a runway. Think the odds or that something like that couldn't happen? You might think again. Even Reasoner's "Swiss cheese model of accident causation" would allow for such an event to occur. If you suspect this type of activity in your area, immediately report it to your local aviation authority.

ROTOR BREEZE

BELL HELICOPTER

HSL-1 Flies 1465 Miles To Patuxent

ROTOR WING

Bell Reveals New 'Copter Design

Bell History 1954 – This once-considered "All-Wing Helicopter" never advanced beyond the preliminary design phase. Chief Engineer, Bart Kelley opted for its cousin, the convertiplane, which accommodated converting the rotors into forward flight. The tilt-rotor emerged as the product of this evolutionary design process.

Awards & Recognitions

BELL HELICOPTER AWARD PROGRAMS

Many Bell pilots and operators have requested information on what type of Bell Helicopter wings and safety awards are available to them. There are two ways to obtain recognition for pilots who fly Bell helicopters. The first recognition is a Pilot Safety Award issued on the basis of safe flying hours in Bells. The second is a wings award based on th pilot's flight hours in Bell helicopters. It is possible for a pilot to obtain both awards.

How Recognitions May Be Obtained

For pilots attending classes at the Bell Training Academy's (BTA) Fort Worth Alliance Airport Facility (KAFW), the award is made available to them either in the classroom or at the Monday afternoon customer reception. Pilots who fly Bell Helicopters (not attending the BTA Classes) are also eligible. Wings and certificate recognitions are based on the pilot's flight hours in Bell helicopters only. All military pilots worldwide are invited to participate.

The Bell Training Academy issues the Wings Lapel Pin and a Certificate of Achievement beginning in increments of 1,000 hours up to 25,000 flight hours in Bell Helicopters. The hour level (in thousands) is mounted on top of the Wing's crest.

Example: If a person had 2,500 hours in Bells they would receive a Wings Pin with 2,000 hours fixed on its crest and the certificate would read 2,500 hours. That person's next opportunity for an increased hour pin would be at the 3,000 hour level.

For the hour level recognition to be awarded, the pilot, military unit or company must provide the following: Name of pilot as they would like it printed on the certificate, verified flight time documentation as proof of the pilot's time in Bells, by the Chief Pilot or a Company / Unit administrative official. An email request on the organization's letterhead is acceptable.

In the case of an individual pilot making the request, a signed copy of the page in the pilot's log book that verifies the hour level in Bell Helicopters is required. Include your email (in case of fax or mail request), shipping address, telephone number and a Point of Contact name. Mail, fax or email the information (including copy of documentation) to John Williams at: JWilliams2@bh.com. Facsimile number: 817-278-3688. Mailing Address: Bell Helicopter Textron Inc., P.O. Box 482, Attn: John Williams, Dept. 9S - Bldg. 61, Fort Worth, TX 76101 – USA.

Pilot Safety Award

Recognizing an individual pilot for flying safely is far too rare. Most pilots only hear of mistakes made by another pilot in an accident. Bell provides a Pilot Safety Award certificate for hours flown without an accident in a Bell helicopter. This can be achieved in either military or commercial aircraft. The award is given in thousand hour increments to recognize those pilots with a proven commitment and history of safe flying. To apply for this recognition certificate, please send a request letter from the chief pilot, CEO, military commander, or other individual who can confirm how many accident-free flight hours you have flown in Bell helicopters. If you are an individual pilot/owner, you can write the statement yourself. Let us know how you would like the name to appear on the certificate. If you want to include a military rank, you need to indicate that.

The award is maintained through the Bell's Flight Safety Department within Bell Engineering; Bill Sarles is the Bell point of contact. His mailing address is: Bell Helicopter Textron Inc., Attn: Bill Sarles, P.O. Box 482 M.S. 1405, Fort Worth, TX 76101 USA

The pilot's name and safe flight hours are posted on Bell's Flight Safety web page www.heliprops.com. Follow the link to the Heliprops Pilot Safety Award Program.

Flight Time Wings and Certificate Recognitions

Pilots with Accident Free Filght Time

Pilot's Name	Bell Flight Hours
NAS FALLON SAR TEAM, NEVADA	
LCDR Craig Huffnagle	1,886
U.S. MARINE LIGHT ATTACK HELICOPTER SQUADRON 267, AIRCRAFT GROUP 39, CAMP PENDLETON, CA	
Lt. Col. Matthew T. Mowery	2,456
Major Richard B. Ashford	3.033
Major Brad J. Butler	2,202
Major Brian L. Lipiec	2,049
Major Ricardo R. Moreno	1,340
Major Danny G. Raymond	2,664
Major Christopher J. Rozsypal	1,727
Captain Porter B. Jones	1,477
Captain Nicholas J. Molder	1,493
Captain Thomas C. Wisdom	1,001
GySgt James E. Garner	1,212
GySgt Russell J. Hufsey	2,460
SSgt Antonio E. Aranda	1,506
SSgt Damian M. Root	2,084
SSgt Benjamin A. Spitz	2,003
Sgt Adam J. Gajewski	1,447
Sgt Shannon M. Ziemann	1,601
DEPARTMENT OF THE NAVY, HELICOPTER TRAINING SQUADRON EIGHT, MILTON, FLORIDA	
Maj. Shawn T. Robinson, USMC	1,464
Maj. William J. Casler, USMC	2,388
LCDR Mark A. Fleenor, USN	2,025
LCDR Scott Bell, USN	1,435
LCDR Thomas Lami, USN	2,235
LT. Michael J. Osterhaus, USN	1,392
LT. Nicholas Ahlen, USN	1,188
LT. Michael Lukaszonas, USN	1,120
LT. Chad D. Christensen, USN	1,200
LT. Jamis Seals, USN	1,064
LT. Jared L. Slabicki, USN	1,195
Capt. Christopher Phillips, USMC	1,010
LT. Geoff Nordling, USN	1,001

Subscription Form

☐ I would like to request a free subscription of the HELIPROPS HUMAN A.D.

☐ I would like to renew my free subscription of the HELIPROPS HUMAN A.D.

NAME _____

TITLE _____ E-MAIL _____

COMPANY _____

ADDRESS _____

CITY/STATE/ZIP/COUNTRY _____

MAIL, FAX, OR E-MAIL TO: Bell Helicopter Textron Inc., John Williams, HELIPROPS Manager, P.O. Box 482, Fort Worth, Texas 76101 • Fax 817-278-3688 • e-mail: HELIPROPS@bh.com