

## **What's the Operating Status of the Most Critical System on Your Helicopter?** *By Lee Roskop (IHST team member)*

It's not unusual for the equipment installed on our helicopters to have built in diagnostics that provide the operator with feedback regarding how well each system is performing. Sophistication of the diagnostics and the feedback can vary. Some of the more intelligent programs may provide an indication of health on a comparative scale such as, "System is operating at 85% of normal capability". Others show when there is degraded performance in a specific function of the system. There also are systems where the feedback to the operator is limited to "pass/fail" and the status simply indicates either the system is or isn't working.

After watching all these systems run through their processes and provide a status, you may come to an interesting realization. What if there was some form of objective analysis that could provide us a real time diagnostic of ourselves and our own current operating capability?

Sound laughable? It really isn't. A real need exists. Consider the importance of the "human system". The pilot (and crew, if applicable) is arguably the most important operating system on the helicopter. Yet, one of three scenarios typically is true when it comes to assessing the health of the "human system" before each flight:

- We don't do it.
- We aren't honest with ourselves if we do take the time to do it.
- We don't consistently take the right action even if we know our "system" isn't quite right.

### **Personal Risk Management**

This leads us to wonder, how often is the most important system on the helicopter (the human system) operating in a degraded state?

The partial answer to this question is that a degraded human system happens frequently enough that its effect contributes to helicopter accidents. This was evident in the work pulled together by the International Helicopter Safety Team (IHST) and its sub-committee, the U.S. Joint Helicopter Safety Analysis Team. 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.

As part of the analysis team's work in reviewing each of 523 U.S. helicopter accidents in a three year data set, the group selected from a list of 285 possible "intervention recommendations". An "intervention recommendation" is an action taken that could have prevented the accident. One of the 285 intervention recommendations is utilization of a Personal Risk Management Program. Essentially, this particular recommendation equates to assessing the health of the human system.

So, how prominent was use of a Personal Risk Management Program in the IHST's analysis work? It was quite prominent. Out of 285 possible intervention recommendations, it ranked within the top ten most frequently used. In essence, this communicated a message that one of the best things we can do to prevent future accidents is do a better job of assessing the health of the human system on the helicopter.

Unfortunately, it is not yet practical for us to get an objective diagnostic analysis of ourselves before we fly that is comparable to the systems of our helicopters. We also don't have the luxury of positioning a flight surgeon everywhere our helicopters operate to perform a "fit to fly" assessment before each flight. Until a better option comes along, the best we can do is use vigilance in doing our own subjective (and hopefully honest) self-assessment.

## **I'm Safe**

One self-assessment from flight training is condensed into an acronym: "**I'M SAFE**". The acronym and its associated explanation can be found in the FAA's Aeronautical Information Manual (AIM), Chapter 8, Section 1. An abbreviated description can also be found in Figure 14-5 of the FAA's Rotorcraft Flying Handbook, FAA-H-8083-21. Listed below is a brief review of some concepts behind each letter represented in the acronym. Consider how principles from the "**I'M SAFE**" acronym could be used for you to better assess just how ready your body is to take on your next flight.

**Illness:** Do you have any symptoms? Do you need to go to the doctor? Even something as simple as the common cold degrades your usual performance. Any illness diverts away internal resources as your body tries to overcome whatever it is fighting.

**Medications:** If you need to take a medication regularly, the flight surgeon needs to know about it. Only the flight surgeon can tell you what medications you can and can't fly with, or what combinations of prescription and over-the-counter medications must be avoided if you are a pilot. Whatever the medication, chances are good there is at least some level of impairment. However, without the counsel of an expert, we are playing the role of amateur pharmacist and truly guessing at the impact the medicine has on our body.

**Stress:** If you know someone without stress, it's probably because they've stopped breathing. A stress scale developed by Holmes and Rahe some years ago attempted to quantify and rank 43 common stressors. Looking at the scale, an abundance of events that are lower on the stress scale (such as change in residence, change in responsibility, or change in sleep habits) can still lead to a cumulative total that is just as bad as a few major life events (such as death in the family or divorce). Some pilots insist that stress events can be "compartmentalized" such that don't affect us when we fly. Yet, there is no diagram of the human brain that shows the door to an attic where we're supposed to be mentally "compartmentalizing" before a flight. It's just not that simple.

**Alcohol:** In 14 CFR 91.17, we're provided the minimum 8 hour "bottle to throttle" rule with regard to alcohol consumption. However, the undesirable effects on our body can last much

longer until the alcohol has been completely processed and eliminated. Despite popular folklore, the elimination process is not expedited by a cold shower or caffeinated drinks. A short but informative brochure about alcohol and flying written by FAA Flight Surgeons Guillermo J. Salazar, M.D. and Melchor J. Antuñano, M.D. is a helpful teaching aid. As the two doctors noted in the brochure, the lingering adverse effects of alcohol primarily impair the brain, eyes, and inner ear. Are there any organs more critical to a pilot?

**Fatigue:** The statement that the U.S. as a whole is a sleep deprived country surely won't surprise anyone. After all, the coffee industry is making billions off of our sleepiness. In their white paper, "How Much Sleep Do Adults Need?", Michael H. Bonnet, Ph.D. and Donna L. Arand, Ph.D. note that our quantity of sleep decreased by one hour per night in the years between 1959 and 1992 and that more recent studies show the number of us that sleep less than six hours per night has increased by up to 30% in the past 20 years. As pilots, fatigue impairs our coordination and alertness. Without guarding our sleep habits, neglect can degrade our systems to the point of chronic (and long-term) fatigue, where prolonged rest is necessary to recover from the damage done.

**Eating:** The vending machine diets of pilots are legendary. Our helicopters would be grounded a lot more if we put the same quality of fuel or oil into them as we do the quality of food and drink that we put into our bodies. With the odd work hours and compressed schedules the aviation industry sometimes demands, too often a pilot's "meals" either amount to whatever is available for \$1 or less, or meals are skipped altogether. The most minor distraction this can generate may be a gnawing in the belly, while a partial list of the more significant degradations can be mood and behavioral change, headache, nausea, increased fatigue, and reduced alertness. As a generalized statement, we eat too much refined sugar, too little protein, and don't drink enough water. The bluntest commentary by Glenn R. Stoutt, Jr., M.D. in his series of articles entitled "Just for the Health of Pilots" flatly states, "Anything that comes out of a vending machine is nutritional poison" due to the quantity of fat, sugar, and salt. His short list of the four best foods: bananas, potatoes, apples, and beans.

## **A More Stringent Standard**

For most of us, the days of our bodies running at 100% were probably left somewhere between the ages of 16 and 24 years old. Age has a way of doing that. However, we still can't allow ourselves to strap in and operate an aircraft when our "human system" is impaired or degraded to a point where it can no longer perform at the least minimum capability required under the worst scenario we could encounter during a flight. That last part is important: when our system is operating at its worst, it still has to be good enough to handle the most challenging situation while we fly. None of us would ever think about taking an aircraft to fly if maintenance told us that one of the critical systems was only working at less than 50% of what we could normally expect. Given the importance of the "human system" for safer flying and preventing accidents, it's imperative that we apply the same stringent standard of minimum acceptable performance to our own bodies.