GLOC ... an Ever-Present Threat!

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In the June 2001 issue of *Flying Safety*, the friendly folks of the Air Force Safety Center (AFSC) Life Sciences team published an update on G-induced Loss of Consciousness (GLOC) trends within the Air Force. They shared the news that, between Fiscal Year (FY) 1991 and 2000, the fighter/attack communities experienced a steady downward trend in the Class A GLOC rate[1]. But what does the picture look like if we focus on the last ***5*** years within the ***Combat Air Forces*** (CAF)[2]?

Between FY97 and 01, the CAF reported nine GLOC incidents — with a marked decrease in reported incidents in the last 2 years. Seems the downward trend continues in the CAF. But don't get complacent. During the same 5-year period, the CAF experienced four Class A GLOC mishaps — one in FY97, FY98, FY99, and one last year. The FY01 Class A GLOC rate for the CAF was 0.15 per 100,000 flying hours. It should be zero.

GLOC is an ever-present threat that demands respect. Keep your eyes on this killer and know the factors that open the door to GLOC. Even one lost life is too many — especially in light of current man-side equipment, acceleration training, and the caliber of our warrior force.

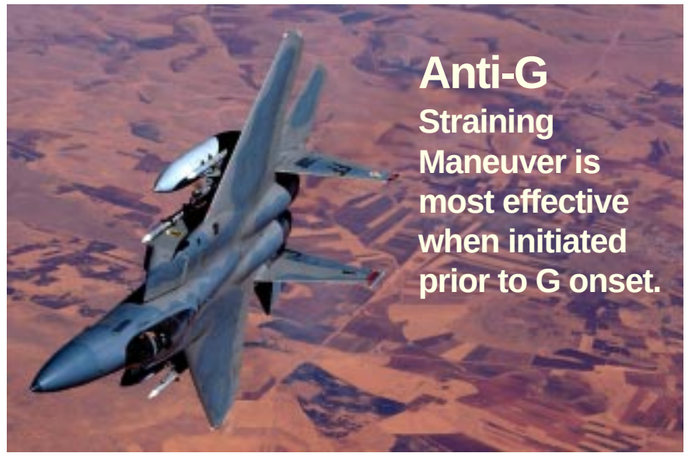
Like so many human factor issues, GLOC is not a simple problem. There are physiological and psychological pieces to this puzzle. Situational awareness plays a huge role. In fact, AFSC data reveals close to 33 percent of GLOC within the Air Force involves a breakdown in attention

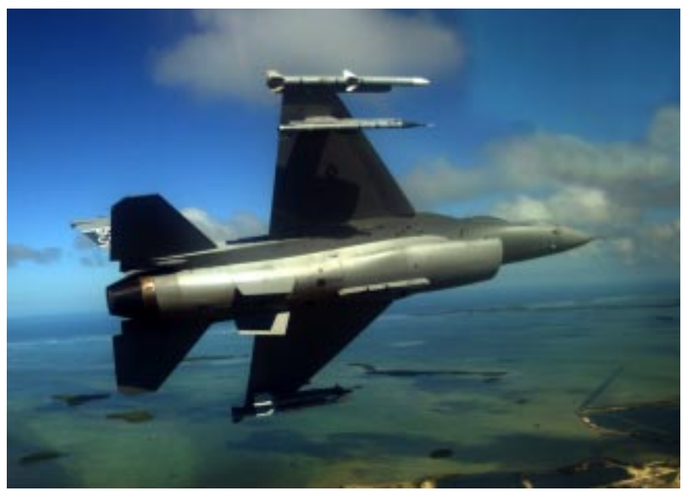
The Aircraft pictured are assigned to the Replacement Training Unit (RTU) at Luke AFB, Ariz.
Photo by SSgt Jeffrey Allen

management — a pilot's attention gets channelized or diverted from the task of G-awareness.

So how do you minimize the risk for GLOC? Anticipate what's coming your way with thorough mission planning. Maintain an accurate awareness of the jet's energy status. All the things you know and practice. But also keep an eye on the other factors that open the door to GLOC. What factors, you ask? Lots o' factors, but (because of limited real estate, and even more limited attention spans) we're going to focus on only a few:

Anti-G Straining Maneuver (AGSM). The AGSM is your best defense against GLOC, but the majority of GLOC events in the last 5 years resulted from an inadequate strain. By the time you're a mission-ready pilot, straining under Gs is locked in as a natural motor response. That's good. Unfortunately "what we (often) have here is a failure to anticipate" and a failure to perform the AGSM properly. That's bad. Recognize that the AGSM is most effective when initiated prior to G onset and when done by the book. Also, recognize that the level of strain that seemed to work fine yesterday might not work today, because your G-tolerance and endurance vary from day to day. That fact makes it imperative to stay on top of the G-environment. Use the G-awareness turns to gauge your performance and set your personal G-limits for each mission.





Fatigue. You know you're not at your peak after getting only 4, 5, or even 6 hours of sleep. But did you know that after 17 hours of sustained wakefulness, your performance decreases to a level similar to 0.05 Blood Alcohol Content (BAC)[3]? You wouldn't balance your checkbook, make investment decisions, or study Professional Military Education (PME) in that condition (OK, maybe PME), so why step to the jet if you're not good to go?

The story gets worse the longer you're awake; after 24 hours of sustained wakefulness, performance decreases to a level similar to 0.10 BAC.

How's this related to GLOC? Multiple engagements are fatiguing enough. Add pre-existing fatigue (from interrupted sleep, shifting schedules, etc.) and you're asking for trouble. There just happens to be an incident that cements our point (imagine that): A while back (in a galaxy far, far away) a pilot from a sister command flew an air combat maneuver training mission in a fighter aircraft (something that looked remarkably like ... an F-16). Prior to the fifth engagement, he informed flight lead that he was worn out but wanted to keep going. He would "float his turns" ("Danger, Will Robinson!"). A couple of signals screaming out to call it a day right there, but it didn't happen. Instead, "fight's on" — lead and the bandit began to mix it up. Our hero extended to regain a visual. While he's screaming along, the bandit maneuvered to his six and locked onto him. Not fun, but the real problem came when the aforementioned pilot instinctually reacted with a 7-G break turn. The pilot lost consciousness, but awoke in time to notice large rocks rapidly becoming larger. Thankfully he regained enough SA to eject and lived to fly another day.

The moral to the story: On an individual level, listen to your body. Ideally you're at peak performance for every flight, but it's probably not happening every time. Are you really taking a hard look at your physiological condition? Do you take yourself off the schedule if you're not 100 percent? Can you handle the worst the mission might throw at you? During the flight, constantly reassess — you're at greatest risk of GLOC during the fourth engagement of the second sortie on a pit-and-go. On an organizational level, supervisors should watch for troops pushing it up too far — including yourself! Set the example in word and deed. Take folks off the schedule if they're showing obvious signs of fatigue.

Physical Conditioning. A consistent fitness program delivers demonstrated benefits for G-tolerance and sustained performance: High-intensity strength training increases your ability to withstand high G-forces for a longer period of time, while moderate aerobic training decreases the recovery time needed between engagements and sorties. You know, — exercise is good for you. Just like eating your vegetables, getting plenty of rest, and brushing your teeth after every meal. But who has time? You have to make it! Carve precious minutes out of your day and hit the gym at least three times a week. One last tidbit: avoid strenuous activity 3 to 4 hours prior to stepping. Strenuous exercise temporarily reduces the muscles' energy stores and requires time to replenish.

Nutrition. While your muscles have stored energy, your brain does not! Even if you're not a "breakfast person," eat something — granola bar, yogurt, or your favorite fruit smoothie. Throughout the day, you need to sustain your energy levels by eating 4 or 5 small meals per day. Not feasts ... small meals or snacks. Stay away from simple sugars and try not to abuse caffeine. Ideas for your snack arsenal include: beef jerky, fruits, vegetables, tuna fish, protein and/or energy bars, and dried cereal. Anticipate the crunch points in your day and plan accordingly.

Hydration. **STAY HYDRATED!** Constantly sip water versus uploading prior to a mission. All pilots, but especially female pilots, may try to cut back on their water intake to avoid the "piddle pack pirouette" during a sortie. Not good practice. Folks are working a solution to this human contortionist problem, but in the interim ... drink! We've said it before and we'll say it again — if you're thirsty, you're dehydrated. If you're dehydrated, your G-tolerance can be reduced up to 50 percent[4]. Best way to combat that reduction is to get into the habit of sipping water throughout your fine Air Force day.

Proper fit, wear, and testing of life support equipment. Common sense stuff, but equipment problems (self, gear, or aircraft-induced) bit seven CAF pilots in the last 5 years. Ensure daily and periodic inspections are performed. Check and completely close the comfort zippers. Make sure your G-garments fit properly and are snug. Check the G-suit connection in the cockpit and perform ops test. Sounds simple, but we've seen problems in the past. Classic "missed procedure" as a pilot gets bumped to the spare, rushes checklists to make range times, gets airborne and to the range, engages a bandit, but then GLOCs — never realized he didn't connect his G-suit. It's happened before. Don't let it happen again.

Bringing It Home. OK. We said we'd only cover a few of the factors impacting your G-tolerance and potential for GLOC. We lied — but with good intentions. GLOC may not show its ugly head very often in the CAF, but it's alive and well. It comes at you on multiple fronts and involves your physiological and psychological performance: misperception of energy state, ineffective AGSM, and decreased G-tolerance because of _____ (you fill in the blank). Defeating this enemy requires enhanced situational awareness that includes tactical and spatial awareness, but also includes an accurate assessment of your own G-performance for the day. Control the factors you can, anticipate and plan for the factors you can't. Every little bit counts in keeping our GLOC rate where it needs to be — at zero!

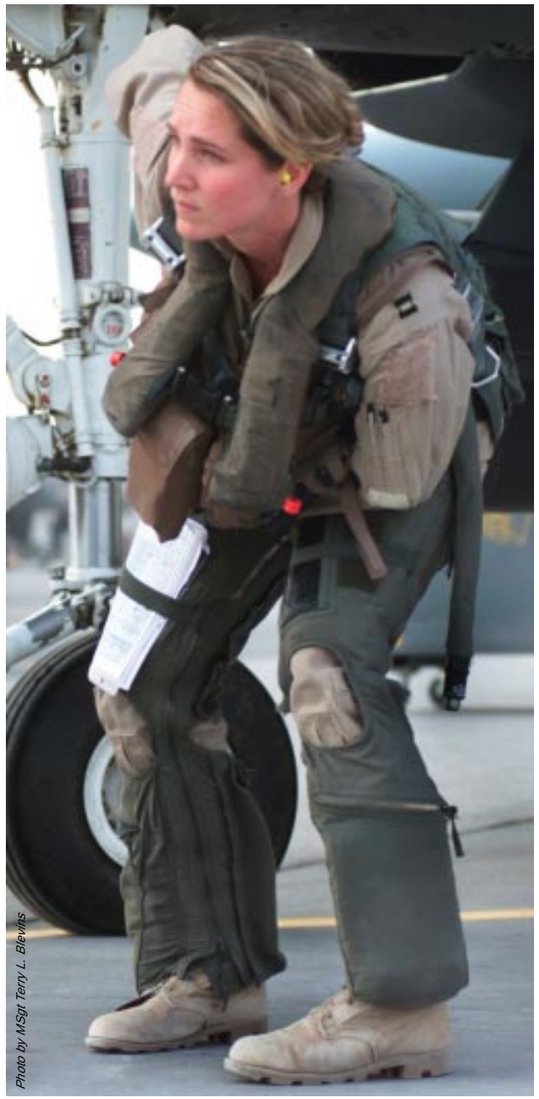


Photo by MSgt Terry L. Blevins

An F-15E weapons system officer checks her G-suit side panel zippers and connects her harness leg straps prior to an Operation IRAQI FREEDOM mission.

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[1]"Acceleration Bites" (Flying Safety, June 2001).
[2] Information derived from Air Force Safety Center mishap database, FY96-01, Combat Air Forces only (excludes AETC fighter/attack events).
[3]Center for Sleep Research, University of South Australia, and University of Adelaide, South Australia (Nature, 1997).
[4]G-Awareness for Aircrew (Air Force Pamphlet 11-419, 1 Dec 99).