

# Getting the Edge on G-LOC

By Stephen P. Cloak, Jr.

**A**s you put your F/A-18 *Hornet* through its paces, you suddenly notice that you are no longer pointed in the direction that you meant to be, and that the edges of your vision are turning black. But you can't remember how you got there, and you stare in wonder at all the pretty lights in the panel in front of you. The sight of the ground rushing up at you sets off no warning bells inside your head. That high-G turn you just made has placed you in a physical state with potentially catastrophic consequences: G-induced loss of consciousness (G-LOC).

To protect Naval Aviators during high-G maneuvers, G-suits (trousers with air-inflatable bladders) that apply pressure to the legs to sustain blood flow to the brain have long been a requirement. G-tolerance training instituted in the 1980s enabled aircrew to recognize symptoms of G stress and to prepare for and counter high Gs. However, something more was needed to allow aviators to use the full performance envelope of their aircraft.

Enter the Navy Combat Edge (NCE).

In 1988, the Crew Systems Department at Naval Air Warfare Center Aircraft Division (NAWCAD), Warminster, Pa., began looking for a way to adapt proven technology to the Navy's unique G-suit requirements. Using the Air Force Combat Edge advanced tactical life support system's oxygen mask, counterpressure vest and anti-G valve, the NCE team added a lower garment that provides 40 percent more coverage than those currently used in the fleet. The team also



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**The author models the Navy Combat Edge advanced tactical life support system. Clearly visible is the chest-mounted mini regulator with additional tubing to the vest component. The inflatable helmet bladder holds the helmet and oxygen mask assembly firmly in place.**

developed a dramatically improved and reliable chest-mounted mini regulator, and employed a newly introduced lightweight helmet that had proven effective during 600-knot wind blast and ejection tests.

Below the +4 G threshold, the ensemble functions like the current CSU-13 or CSU-15 G-suit in that only the trouser section inflates. When the aircraft's anti-G valve senses the onset of higher positive G forces, pressurized air inflates the trouser section, and high-pressure oxygen inflates the vest and helmet bladders. The Navy Combat Edge also provides aircrew with assisted-pressure breathing between +4 and +9 Gs to an altitude of 50,000 feet.

(In initial centrifuge testing, a few subjects wearing the NCE system remained conscious while subjected to +11 Gs!)

In 1996, the NCE team shifted to NAWCAD Patuxent River, Md., where the Strike Directorate conducted technical evaluations. That year, operational evaluation by Air Test and Evaluation Squadron 9 proved successful; in fact, some pilots didn't want to give their NCEs back at the end of the testing cycle.

Strike Fighter Squadrons 113 and 25 are slated to conduct initial operational capability testing of the NCE later this year. Several hundred units should be available in the supply system by the end of the year, and about 2,000 will be delivered to the fleet by the year 2000.

Eventually, every active and reserve Navy or Marine Corps F/A-18 *Hornet* squadron will be using the Navy Combat Edge. And a squadron will not have to gamble with G-LOC because it can't afford the new system; funded by the Chief of Naval Operations' Air Warfare Division, NCE will be available at no cost to the squadrons.

In the future, a *Hornet* pilot will stare at the gauges only to note the amount of Gs just sustained, not because G-LOC has taken over. Suited up with the Navy Combat Edge, pilots will be able to push the flight envelope further than ever before. ✈

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