Hypoxia Threatens Navy and Air Force Pilots, and the Threat Is Growing

Turns out flying pilots at high altitudes is still biologically tricky.

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By Eric Tegler Jun 25, 2017

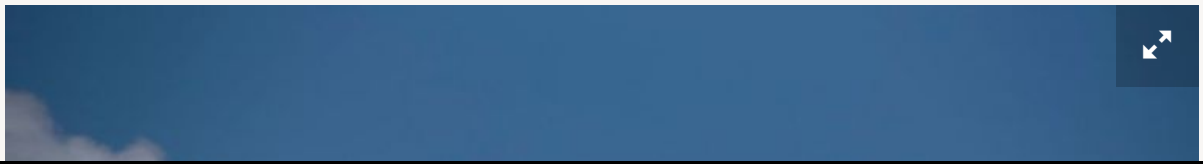
Navy and Air Force pilots are running short on oxygen.

In the last five years, the number of "physiological events" (PEs) where Navy pilots flying the T-45 Goshawk advanced trainer jet experienced oxygen deprivation (aka hypoxia) have risen four-fold. Caused mainly by failures of the airplane's onboard oxygen system, hypoxia can make a pilot dizzy, confused, and potentially incapable of flying an aircraft.

Ten T-45 hypoxia events were reported in March 2017 and 21 over the first three months of the year. A total of 38 PEs were reported in 2016, 27 in 2015 and 12 in 2014 according to USNI News. The situation has become so critical that the T-45 fleet was partially grounded in late March, halting critical production of new pilots for the Navy and Marine Corps.

Unfortunately, the problem hasn't only been contained to the T-45 Goshawk. Navy pilots operating F/A-18 Hornets, Super Hornets, and EA-18G Growlers have also experienced a heightened number of PEs over the same period, and on June 9, the Air Force suspended F-35A Joint Strike Fighter operations at Luke Air Force Base after five hypoxia incidents were reported since early May. The Air Force did resume operations earlier this week, saying they will avoid certain altitudes, improve ground procedures, and increase physiological training.

But the question remains, what's happening with our aircraft oxygen systems?



T-45 Goshawk

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"We don't know the root cause," Vice Chairman of Naval Operations Adm. William F. Moran admitted on a conference call last week. Moran was speaking specifically about the T-45, but the failures in the Hornets and F-35 are also unknown. During a teleconference, the Admiral discussed details of a just-released Navy review concluding that existing oxygen systems are too complex for reliable performance and that the Navy's process for investigating PEs has been "fundamentally flawed".

The Air Force has been less direct in its statements regarding the F-35 hypoxia incidents. Brig. Gen. Brook Leonard sent an official statement to *Popular Mechanics* saying that "the Air Force takes these physiological incidents seriously, and our focus is on the safety and well-being of our pilots. We are

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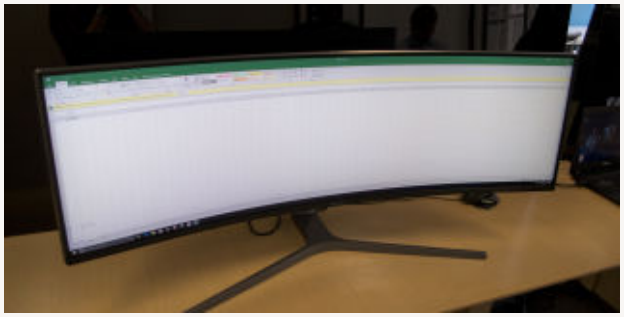

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taking the necessary steps to find the root cause of these incidents."

These are different airplanes operated by different services, but they do have one thing in common—all (except F/A-18A-D Hornets) use similar versions of a life support system called the Onboard Oxygen Generation System (OBOGS).

OBOGS provides aircrew with oxygen by taking bleed-air from the aircraft engine, filtering it through a molecular sieve material to remove nitrogen and other gases, and producing breathable-grade oxygen. Known as Aviator Breathing Oxygen, ABO is passed from a concentrator through piping to an oxygen monitor and then to a regulator connected to the pilot's breathing mask. The system is continuous and constantly generates ABO while the engine is on. Two suppliers–Cobham and Honeywell–make the OBOGS used on these affected jets.

"We've fielded OBOGS for over 30 years with over 8 million flight hours with OBOGS systems on Navy, Marine, and Air Force platforms," Cobham's Craig Case told *Popular Mechanics*. The company says it's working closely with both the Navy and Air Force to determine what's causing OBOGS failures but thus far has been unable to pinpoint the problem. Making the mystery even stranger is the fact that the Marines use the same Cobham OBOGS system on their AV-8B Harriers and have seen no PEs.

Two U.S. Navy F/A-18E Super Hornets fly a combat patrol over Afghanistan in 2008.

U.S. Navy

"That's the conundrum," Derek Woods, director of pneumatic systems for Cobham admits. "You've got very similar systems on platforms which are not seeing similar (PE) events or similar issues."

The Navy has sent two T-45s to Naval Air Systems Command headquarters at Patuxent River Naval Air Station and torn them down completely, lab testing their OBOGS and other systems with Cobham.

"No smoking gun has been found with any of that testing on OBOGS," Case allows.

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The Air Force has sent a team from the F-35 Joint Program Office to get a handle on the situation at Luke AFB. All five F-35 incidents occurred with different jets from multiple squadrons and production batches.

Cobham, the Navy, and the Air Force have launched an all-out effort to gather data to mine for a solution. Key to that effort may be Cobham's Aircrew Mounted Physiologic Sensing System (AMPSS). AMPSS is basically a breathing sensor system which features inhalation/exhalation sensors mounted on the pilot's breathing mask.

"If we're able to analyze what goes into the pilot and what comes out of the pilot, we're then able to paint a physiological picture of what the pilot is feeling during flight," Cobham's Rob Schaeffer says.

Cobham OBOGS

Cobham

On June 15, Cobham delivered the first three AMPSS inhalation sensor kits to Wright Patterson AFB in Ohio where researchers from the Air Force School of Aerospace Medicine, the Navy Aerospace Medical Research Unit will test the sensors before outfitting pilots with them. Cobham expects to deliver exhalation sensors by the end of August.

That'll be right on the Navy's time limit for resuming full pilot training. Any later and the Navy/Marines will face pilot shortages according to Moran.

Moran also detailed plans to get the T-45 flying again, including a new solid state oxygen monitoring device developed by Cobham and new pilot breathing

masks. Instructors will begin limited flying with the new masks this week with students expected to return to the T-45 "in a couple weeks." The Air Force has provided fewer specifics on what actions it will take to address the hypoxic F-35As, but it has instructed pilots to work around certain altitudes where the hypoxia incidents occurred, offered pilots the option of wearing oxygen sensors during flight, refined aircraft ground handling and pilot flight gear procedures, and increased backup oxygen available.

While the hypoxia episodes remain a mystery, combined input and data mining from all concerned will be crucial.

"It is a mystery," Shaeffer says. "We need more information."

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