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# Improvements to MIL-STD-3050 to fix the military's On Board Oxygen Generation System (OBOGS) problems

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# Caveats

- I’m not a doctor
- I’m not a physiologist
- I’m not aircrew
- I’m not a technical SME in the field of ACBS, OBOGS, or Aircrew systems
- Just an engineer working standardization issues

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# History

- Pre-1980 LOX systems used; reliable, simple
- Transitioned to OBOGS to reduce logistics footprint
- Rise in F-22 rate of “hypoxia-like” incidents in 2008
- Feb 2012 Air Force Safety Advisory Board
  - Recommendation: “Develop and implement a comprehensive Aviation Breathing Air Standard”[1]

**1.** United States Air Force Scientific Advisory Board Report on Aircraft Oxygen Generation, SAB-TR-11-04, 1 February 2012

# History

- **May 2015: MIL-STD-3050 *Aircraft Crew Breathing Systems Using On-Board Oxygen Generating System (OBOGS) published***
- **Continued issues on F/A-18, T-45, F-35A, A-10, T-6A**
- **Jan 2018, Air Force Physiological Episodes Action Team (AFPEAT) was established**
  - **May 2019: BGen Edward Vaughan: "we've learned so much… since that standard was published that we need to update it"[1]**

**1.** Hawkins, Dan, *Air Force looks at faster, smarter hardware acquisition and big data to help solve T-6 OBOGS issues*, AETC News, 12 Jun 2019

# History

- **July 2019: Air Force Audit Agency Report on On-Board Oxygen Generation Systems**
  - **Finding: "Air Force did not properly implement military standard design specifications for oxygen system acquisitions"**
  - **Cause: "MIL-STD-3050 did not clearly define which acquisitions must comply with the standard design specifications"**
  - **Recommendation: "update MIL-STD-3050 to clarify which acquisitions, including new, retrofits, upgrades, and modifications, require compliance with MIL-STD-3050 criteria"[1]**

**1.** Air Force Audit Agency On-Board Oxygen Generation System Audit Report, F2019-0003-L30000, 12 July 2019

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# Ground Rules for the Update

- Broaden the scope from OBOGS to all ACBS
- "Humanize the standard"
  - Draft with the human in mind; engineers ensure it can be designed to, tested to, complied with, etc
- Expand non-mandatory supplemental information
- Incorporate new physiological research
  - Continue to invest and consider promising research that is yet to be definitive

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# Current Status

- Doctors and flight physiologists have developed a ‘medical draft’
  - Initial draft developed by AFPEAT, HQ AETC/SG, AFMC research physiologists, 711 HPW, and NASA flight surgeon subject matter experts
  - Engineers from HQ, LCMC, and Navy Aerospace Medical Research Unit - Dayton have reviewed it
  - Comment resolution ongoing

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# Path Forward

- Review of next iteration will include broader medical and engineering communities and industry partners who develop ACBSs
- “Final” version will be uploaded to the Acquisition Streamlining and Standardization Information System (ASSIST) for formal review/publication
- Assessing updates to policy to include reference to MIL-STD-3050

# Final Caveats

- Standards are slow, arduous work
- Once finalized, will only take effect at the speed of acquisition
- Iterative updates planned based on continuing research

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# *Bonus! Ongoing Research*

- **711 HPW: researching open architecture physiological/cognitive status suite of sensors**
- **Potential effects of “hyperoxia” (prolonged exposure to high levels of oxygen)**
- **Physiological reaction to fluctuations in oxygen concentrations**
- **OBOGS Lab at 711 HPW , Wright-Patterson AFB**
- **Pilot Surveys**

# QUESTIONS?