Tactical Jet Engine Noise Reduction

Study Terms of Reference

Objective

The noise on the flight decks of our carriers is 20 to 30 dB higher than any technology we have to protect the hearing of our Sailors and Marines. We are not in compliance with OSHA standards, and to quote Mr. Tom Rollow, the DASN for Safety, "We are creating a hearing loss certainty, not just a risk." The noise problem cannot be solved by only hearing protection devices. The source of the noise MUST BE REDUCED, and the technology does not exist to achieve the needed decreases in engine noise. This study will investigate current technology for reducing tactical jet engine noise and will make recommendations for actions that can be taken to both reduce jet engine noise in existing engines and to be able to achieve lower noise levels in the next generation of tactical jet aircraft.

Background

Progress is being made in developing improved hearing protection devices to replace the current day cranial helmets that were designed in the 1950's and are still in use on the flight deck. However, there has been no focused effort to reduce tactical aircraft jet engine noise. In fact noise has never been a design parameter for designing a new tactical aircraft, but rather aircraft such as the Joint Strike Forces/ F-35 have a contract specification to only mitigate the noise. No requirement exists for engine noise staying below any threshold noise level. The needed design tools to make such advances do not exist.

F-35A noise levels have undergone some measurement and appear to be comparable to the dB levels of other current tactical aircraft in military power and afterburner. However, the noise power density in watts per square meter generated by the JSF is two times greater than that generated by the F/A-18 E/F. All tactical aircraft engines grow in thrust over time, and that equates to even greater noise in the future.

Specific Tasking

1. Describe the Navy/Marine Corp tactical aircraft noise problem in terms that are understood and will stimulate the needed actions to develop a joint service vision on tactical aircraft jet engine noise.
2. Assess the noise levels that are likely on our flight decks in the future as the planned replacement aircraft are acquired.
3. Near term reductions of up to 3 dB in engine noise are possible as evidenced by the F/A-18 chevron program. Determine the benefits of achieving a 3 dB noise reduction in F-35 engine noise.
4. Review the hearing protection programs and make recommendations for any needed improvements to achieve the physiologically possible levels of hearing protection.

5. Propose an investment strategy that should yield the needed technology improvements to reduce the source noise of tactical aircraft jet engines without incurring unacceptable performance degradations.
6. Propose a next generation tactical jet engine noise reduction technology plan.