

AOC ISSUE BRIEF: Next Generation Jammer

The Next Generation Jammer System (NGJ) is the next step in the evolution of Airborne Electronic Attack (AEA) and is needed to meet current and emerging Electronic Warfare gaps, ensure kill chain wholeness against growing threat capabilities and capacity, and to keep pace with threat weapons systems advances and continuous expansion of the AEA mission area.

Background

The ALQ-99 Tactical Jamming System is an external carriage AEA system carried by the EA-18G Growler and previously carried by the EA-6B Prowler. It is used against radar and communications targets for the suppression of enemy air defenses and other electronic attack missions. Designed in the 1960s, the system countered the radar surface-to-air missile (SAM) threat that included primarily single-digit Soviet made SAMs built in the 1960s, 1970s, and 1980s. During the Vietnam War, American fighters were threatened by systems such as the SA-2, and the ALQ-99 was optimized against such threats.



Today's threat environment is dynamic, advanced, and highly contested. For instance, the S-300 family of Russian made SAMs are capable of engaging aircraft and unmanned aerial vehicles (UAVs) at distances two, three, and four times longer than previous SAMs.ⁱ Advanced radars on these systems are more adaptable and agile, they can hop frequencies to avoid detection and jamming.

The ALQ-99 faces a material and technological obsolescence, which was foreseen. Even though it has been integrated onto a new platform, the EA-18G, it is an aged system, rooted in analog technology. It is increasingly difficult to maintain and is insufficient against today's modern threat. There are a series of key analyses underpinning AEA strategy and investments, including:

- AEA Analysis of Alternatives (2002)
- Initial Capabilities Document for Denying Enemy Awareness through AEA (2004)
- Electronic Warfare Capabilities-Based Assessment (2008)
- Electronic Warfare Initial Capabilities Document (2009)
- Electronic Warfare Strategy of the Department of Defense report to Congress (2010)ⁱⁱ



The NGJ Solution

The Department of Defense, led by the Navy, is more than 15 years into an effort to develop the technology that will replace the ALQ-99, a program known as the NGJ. Initial funding began with a \$168 million Technology Maturation (TM) contract awarded in 2010 to four companies – Northrop Grumman, Raytheon, Exelis (formerly ITT), and BAE – and split into four \$42 million contracts.ⁱⁱⁱ

Key to this technology maturation has been the development of Gallium Nitride (GaN) amplifiers in active electronically scanned array (AESA) radars. GaN is considered by some to be the biggest semiconductor innovation since silicon. It is a material that can operate at a much higher voltage than other semiconductor material, which means more power, less heat, and better efficiency. And when phased array transmitters can steer their beams electronically without physically moving an antenna, at much higher powers, at much faster rates, the enemy SAM threat may not be as insurmountable as many believed.^{iv} As the former program manager of the NJG, Captain John “Bails” Bailey, noted at the Sea Air Space seminar in May 2016, the NGJ will be able to handle “quadruple the number of assignments” and will be able to switch from target to target almost instantaneously.^v

The NGJ is an evolutionary acquisition program that will be fielded in three increments: Mid-Band (NGJ-MB), Low Band (NGJ-LB), and High Band (NGJ-HB). This order of development was based on the threat and available capability.

In April 2016 the Navy awarded Raytheon a \$1 billion sole-source contract to conduct engineering and manufacturing development (EMD) for the NGJ-MB, and in July 2019 Raytheon delivered the first Engineering Development Model (EDM) to the government. Those pods have accumulated more than 400 developmental test hours, with expected first aeromechanical test flight and the first mission systems (radiating) test flight both in the 3rd quarter of Fiscal Year 20 (3QFY20). The Initial Operational Test and Evaluation completion is expected in 3QFY22, and Initial Operating Capability (IOC) is anticipated in 4QFY22.

Of note, the NGJ-MB is a Joint Program with the Royal Australian Air Force, which is the only other country who operates the EA-18G. A cooperative development agreement between the two countries was signed in October 2017.

The NGJ-LB is currently executing Demonstration of Existing Technologies (DET) contracts, which are a collaborative effort with industry partners to assess technical maturity. Two contracts were awarded to L3 and Northrop Grumman, each worth just over \$35 million.^{vi} The next step will be an award of NGJ-LB Capability Block 1 (CB1) in late FY20. The expectation is that CB1 will design, integrate, test, and deliver four test articles to the government in FY22 and eight operational prototypes to the fleet in FY25.

The NGJ-HB will require further study of alternative solutions and affordability. **No money has been appropriated nor contracts awarded for this part of the NGJ.**

Following is a PB21 budget summary of NGJ budgeting:

COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost to Complete	Total Cost
NGJ-MB R&D	2,394.259	426.729	491.884	477.680	215.696	4.336	0.000	0.000	0.000	4,010.584
NGJ-MB APN-5 Procurement	0.000	0.000	0.000	176.638	311.537	457.986	511.251	536.543	2,707.497	4,701.452
NGJ-LB R&D	80.355	91.216	90.922	170.039	224.359	243.027	244.466	249.367	1,668.498	3,062.249

Note 1: FY2019 funding for the NGJ-MB R&D does not reflect the enacted rescission amount of \$81 million.

Note 2: FY2021 funding for NGJ-MB is requested to procure three shipsets (two pods per shipset) of AN/ALQ-249 Next Generation Jammer Mid-Band pods for Low Rate Initial Production Lot 1 and its associated support.

ⁱ <https://missilethreat.csis.org/defsyst/s-300/>

ⁱⁱ <https://www.gao.gov/assets/590/589765.pdf>

ⁱⁱⁱ <https://www.aviationtoday.com/2010/07/15/nextgen-jammer-moves-to-technology-maturation/>

^{iv} <https://www.ni.com/en-us/innovations/white-papers/18/4-game-changing-underlying-technologies-for-advanced-radar.html>

^v <https://www.army-technology.com/features/look-us-navys-next-generation-jammer/>

^{iv} <https://news.usni.org/2018/10/26/gao-denies-raytheon-next-generation-jammer-protest-navy-signs-contracts-l3-northrop>