

Next Generation Jammer (NGJ) Increment 1

Executive Summary

- The USD(AT&L) signed an Acquisition Decision Memorandum (ADM) on April 5, 2016, approving Milestone B and entry into the Engineering and Manufacturing Development (EMD) phase for the Next Generation Jammer (NGJ) Increment (Inc) 1 program.
- The Navy's Commander, Operational Test and Evaluation Force (COTF) conducted an Early Operational Assessment (EOA) between June, and October 2015, to assess the current status of the NGJ Inc 1 technical design, examine the NGJ Inc 1 potential capabilities to satisfy future EA-18G Airborne Electronic Attack (AEA) mission requirements, and identify any risks to successful completion of the IOT&E in FY21.
- DOT&E submitted an EOA report on February 10, 2016, in support of the Milestone B decision. The EOA was a preliminary assessment and thus did not present conclusions on NGJ Inc 1 operational effectiveness, suitability, or survivability. The EOA did assess the potential strengths and weaknesses of the NGJ Inc 1 design, effects on the EA-18G aircraft while carrying the NGJ Inc 1, and potential limitations to the successful completion of IOT&E.
- Given the current state of the test ranges, the NGJ Inc 1 testing was adequate, albeit with substantial limitations. However, with the DOT&E-recommended DOD Enterprise-wide range improvements, which will serve numerous acquisition systems for testing, the upgraded ranges will enable both adequate open air testing and validation of modeling and simulation against operationally relevant threats during the NGJ Inc 1 IOT&E.
 - The improved ranges will require numerous programs, to include NGJ Inc 1, to revisit their respective evaluation frameworks.
 - The electronic warfare range upgrades that DOT&E has identified and recommended for funding to the Department's Leadership are needed to conduct adequate testing of NGJ and other key systems without the substantial degradations in operational realism limitations that current test capabilities impose.

System

- The NGJ system is a replacement for the ALQ-99 Tactical Jamming System pods that were initially developed and fielded in 1971 on the EA-6B aircraft to perform AEA against radars associated with threat integrated air defense systems. The ALQ-99 pods have been flown more recently on the EA-18G aircraft that entered full-rate production in FY09.
- The NGJ system is an evolutionary acquisition program designed to provide capability in three increments: Inc 1 (Mid-Band), Inc 2 (Low-Band), and Inc 3 (High-Band).



- The order of development was determined by the assessed capabilities of the developing threat and shortfalls of the legacy system to counter those capabilities, with Inc 1 covering the most critical threats. Inc 1 was the only increment in development during FY16.
- NGJ Inc 1 will be deployed as an AEA system on the EA-18G aircraft, working with the organic ALQ-218 receiver system and off-board assets as a component of future carrier air wings and expeditionary forces, providing capabilities against a wide variety of radio frequency targets. NGJ Inc 1 is intended to expand the current ALQ-99 mission set to include non-kinetic attack against a full spectrum of agile and adaptive communications, datalinks, and non-traditional radio frequency targets.

Mission

- Commanders will use the NGJ Inc 1 to deny, degrade, or deceive the enemy's use of the electromagnetic spectrum employing both reactive and pre-emptive jamming techniques, while enhancing the friendly force's use of the electromagnetic spectrum.
- AEA increases the survivability of joint forces tasked to enter denied battlespace and engage anti-access threats/high-value targets and provides additional means via Information Operations to thwart enemy offensive actions.

Major Contractors

- Raytheon Space and Airborne Systems – El Segundo, California
- The Boeing Company, Defense, Space & Security – St. Louis, Missouri

FY16 NAVY PROGRAMS

Activity

- The USD(AT&L) signed an ADM on April 5, 2016, approving Milestone B and entry into the EMD phase. The ADM also:
 - Designated the NGJ Inc 1 program as an Acquisition Category ID Major Defense Acquisition Program
 - Authorized the Navy to proceed with the award of the EMD contract, which includes a future modification for four System Demonstration Test Article ship-sets (two pods per ship-set) and support to operational testing
 - Authorized a low-rate initial production quantity of up to 30 ship-sets
- An EOA was conducted by COTF between June and October 2015, in accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan. The EOA was conducted to assess the current status of the technical design, to examine potential capabilities to satisfy future EA-18G AEA mission requirements, and to identify any risks to successful completion of the IOT&E in FY21. DOT&E submitted an EOA report on February 10, 2016, in support of the Milestone B decision.
- An operational assessment is scheduled for 3QFY19.
- COTF identified potential limitations to the successful completion of IOT&E through visits to modeling and simulation (M&S) facilities and focus groups with test resource staff, test engineers, test aircrew, and operational stakeholders. The currently-approved M&S plan sufficiently covers M&S for EMD. This plan will need to be updated prior to Milestone C to incorporate specific IOT&E requirements. Additionally, scheduling of the test ranges, test aircraft, test aircrew, and maintenance personnel needs to be planned for well in advance of the beginning of IOT&E due to limitations in availability and conflicting EA-18G test programs.
- Given the current state of the test ranges, the NGJ Inc 1 testing was adequate, albeit with substantial limitations. However, with the DOT&E-recommended DOD Enterprise-wide range improvements, which will serve numerous acquisition systems for testing, the upgraded ranges will enable both adequate open air testing and validation of modeling and simulation against operationally relevant threats during the NGJ Inc 1 IOT&E.
 - The improved ranges will require numerous programs, to include NGJ Inc 1, to revisit their respective evaluation frameworks.
 - The electronic warfare range upgrades that DOT&E has identified and recommended for funding to the Department's Leadership are needed to conduct adequate testing of NGJ and other key systems without the substantial degradations in operational realism limitations that current test capabilities impose.

Assessment

- The EOA was a preliminary assessment and thus did not present conclusions on NGJ Inc 1 operational effectiveness, suitability, or survivability.
- Potential strengths of the NGJ Inc 1 design demonstrated during the EOA were:
 - High Effective Isotropic Radiated Power (EIRP) for larger stand-off ranges
 - Wide frequency range to counter more frequency diverse threats
 - Large field of regard for operations in a dense threat environment
 - Sufficient Ram-air Turbine Generator power generation to provide the pod system with the power required without drawing from the host platform
- Potential weaknesses of the NGJ Inc 1 design demonstrated during the EOA were:
 - Degraded ALQ-218 host platform receiver capability due to radio frequency interoperability problems caused by higher EIRP requirements
 - Hazards of Electromagnetic Radiation to Ordnance effects on the AGM-88 High-speed Anti-Radiation Missile/Advanced Anti-Radiation Guided Missile affecting reliability
- Based on early small-scale wind tunnel testing and current computational fluid dynamics (CFD) modeling, there is decreased margin to meeting the EA-18G mission radius.

Recommendations

- Status of Previous Recommendations. This is the first annual report for this program.
- FY16 Recommendations. The Navy should:
 1. Perform planned wind tunnel and CFD modeling of the NGJ Inc 1 configuration as it matures during EMD to predict installed aircraft performance.
 2. Perform planned testing and analysis to determine the extent of Hazards of Electromagnetic Radiation to Ordnance effects on operational use of the AGM-88 High-speed Anti-Radiation Missile/Advanced Anti-Radiation Guided Missile.
 3. Update the M&S plan prior to Milestone C to incorporate specific IOT&E requirements.
 4. Prioritize resources to ensure the test ranges, test aircraft, test aircrew, and maintenance personnel needed to execute IOT&E are available when required.
 5. Fund range upgrades and have all programs, to include NGJ Inc 1, test against the improved ranges.