



Source: Raytheon Corp.

Next Generation Jammer Mid-Band (NGJ Mid-Band)

The Navy's Next Generation Jammer (NGJ) is an external jamming pod system that will be integrated on EA-18G Growler aircraft. It will augment, then replace, the ALQ-99 jamming system and provide enhanced airborne electronic attack capabilities to disrupt adversaries' use of the electromagnetic spectrum for radar detection, among other purposes. The Navy plans to field the system that jams mid-band radio frequencies in 2022. The Navy has a separate program for low-band frequencies and will roll out a high-band frequencies program at a later date. We assessed the Mid-Band program.



Program Essentials

Milestone decision authority: Navy
Program office: Patuxent River, MD
Prime contractors: Raytheon; Boeing
Contract type: CPIF (development—Raytheon) (development and integration—Boeing)
Software development approach: Mixed
Next major milestone: Low-rate initial production (August 2020)

<https://www.gao.gov/assets/700/698933.pdf>

Program Performance (fiscal year 2019 dollars in millions)

	First full estimate (04/2016)	Latest (06/2018)	Percentage change
Development	\$3,629.80	\$4,064.20	+12.0%
Procurement	\$4,206.20	\$4,062.3	-3.4%
Unit cost	\$58.10	\$60.25	+3.7%
Acquisition cycle time (months)	98	110	+12.2%
Total quantities	135	135	0.00%

Total quantities comprise 7 development quantities and 128 procurement quantities.

MAY 2019

Funding and Quantities (fiscal year 2019 dollars in millions)



Attainment of Product Knowledge As of January 2019

	Status at	Current Status
Resources and requirements match	Development Start	
• Demonstrate all critical technologies are very close to final form, fit and function within a relevant environment	●	●
• Demonstrate all critical technologies in form, fit and function within a realistic environment	○	○
• Complete a system-level preliminary design review	●	●
Product design is stable	Design Review	
• Release at least 90 percent of design drawings	●	●
• Test a system-level integrated prototype	○	○
Manufacturing processes are mature	Production Start	
• Demonstrate Manufacturing Readiness Level of at least 9, or critical processes are in statistical control	NA	NA
• Demonstrate critical processes on a pilot production line	NA	NA
• Test a production-representative prototype in its intended environment	NA	NA

● Knowledge attained, ○ Knowledge not attained, ... Information not available, NA Not applicable

NGJ Mid-Band Program

Technology Maturity and Design Stability

Nearly 3 years after development start, the NGJ Mid-Band program's seven critical technologies continue to approach maturity—an approach inconsistent with best practices. The program also reports that it has released all of its planned design drawings following a redesign of the jamming pod to address structural issues. However, until the program fully matures its critical technologies—by demonstrating each in a final form, fit, and function within a realistic environment—existing design drawings face risk of change. Further, the program has yet to test a system-level integrated prototype, which best practices hold as a key criterion for achieving design stability.

The program entered system development in April 2016 with its critical technologies approaching maturity. These technologies include two separate arrays—each with different transmit/receive modules, circulators, and apertures—as well as a power generation system. The program plans to have its critical technologies fully mature, integrated, and in testing in January 2020.

The NGJ Mid-Band program discovered design deficiencies with the jamming pod structure at its April 2017 critical design review, which caused a 1-year schedule delay and contributed to an over \$400 million increase in the program's development cost. The program identified several other deficiencies in modeling, assumptions, and methodologies regarding the structural analysis and design of the pod structure, which required redesign. According to the program office, the pod redesign did not affect the program's critical technologies, subsystems, or software.

As of September 2018, the contractor had released 100 percent of the design drawings. Program officials said that they considered the design of the pod structure to be stable, although the contractor continues to make minor changes to it. In addition, the program office has yet to test a system-level integrated prototype of the jamming pod, which runs counter to the GAO-identified best practice for demonstrating design stability. The program office plans to begin testing the redesigned pod on an EA-18G in January 2020.

Production Readiness

The program office plans to demonstrate its critical manufacturing processes prior to the start of production in August 2020, which would be an approach consistent with best practices. However, the program office does not plan to test a production-representative prototype or complete system-level developmental testing (which includes demonstrating the full functionality of the system) until 7 and 15 months, respectively, after production starts. DOD policy allows some concurrency between developmental testing and initial production, but we have previously found that starting production

before demonstrating that a system will work as intended increases the risk of deficiencies that require substantial and costly design changes. Program officials told us that they plan to mitigate the risk associated with the concurrency between developmental testing and initial production to what they consider to be an acceptable level by gathering extensive data about pod performance in specialized ground test chambers and through flight testing engineering development models. Further, according to program officials, the delay caused by the pod redesign will allow the program to conduct additional ground testing before committing to production.

In addition, the delay associated with the pod redesign introduced a potential production gap in between the last engineering developmental model and the first production system. The program added three additional system demonstration test articles to mitigate this gap and verify that the system can meet all its performance requirements prior to the start of operational testing in January 2022.

Other Program Issues

The Under Secretary of Defense for Acquisition, Technology, and Logistics approved NGJ Mid-Band as the first program in the “Skunk Works” pilot in September 2015, which aims to streamline processes in order to deliver capabilities on time and within budget. NGJ Mid-Band officials said that the pilot helped reduce the length of time spent on the decision making process by providing officials direct access to management and allowing them to focus on execution. Nonetheless, the program has still exceeded original estimates for development cost, unit cost, and schedule.

Program Office Comments

We provided a draft of this assessment to the program office for review and comment. The program office provided technical comments, which we incorporated where appropriate. According to program officials, as of January 2019, all subsystems that contain critical technologies have been manufactured and assembled and are undergoing subsystem-level tests. Program officials reported that this progress has reduced program risk to an acceptable level for system development. Additionally, program officials told us that they plan to test a system-level integrated prototype of the pod on an EA-18G in a sound- and electromagnetic-absorbent chamber beginning in the fourth quarter of fiscal year 2019.