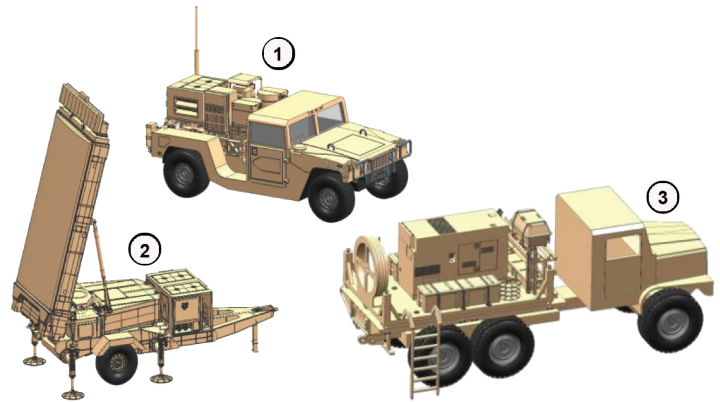


Ground/Air Task Oriented Radar (G/ATOR)

Executive Summary

- The Ground/Air Task Oriented Radar (G/ATOR) is a short- to medium-range, air-cooled phased array radar that will provide an Air Defense/Air Surveillance (AD/SR) radar capability to the Marine Air Ground Task Force (MAGTF) commander. A total of 57 G/ATOR systems are planned for procurement.
- The Program Executive Office, Land Systems Marine Corps is executing the G/ATOR program as an evolutionary acquisition consisting of four capabilities, now referred to as G/ATOR blocks.
 - Block 1 will complete the primary material system acquisition and can support the short-range air defense mission, as well as provide an AD/SR radar capability to the MAGTF Commander.
 - Block 2 will include software to perform the missions of ground counter-battery/fire control (Ground Locating Weapons Radar).
 - Block 3 capabilities have been deferred indefinitely.
 - Block 4 will provide air traffic control capabilities (Expeditionary Airport Surveillance Radar).
- In March 2013, the Program Executive Office, Land Systems Marine Corps delayed an operational assessment scheduled for the spring Weapons and Tactics Instructor (WTI) course (WTI 2-13) to the fall WTI course (WTI 1-14) and rescheduled the Milestone C decision from 4QFY13 through 2QFY14. The change in WTI schedule was due to concerns about software stability affecting overall system reliability. In place of the operational assessment, the Marine Corps Operational Test and Evaluation Activity (MCOTEA) and the Program Office jointly conducted a Field Users Evaluation (FUE) at Marine Corps Air Station Yuma, Arizona, during WTI 2-13 to assess system performance and collect additional reliability data in an operational environment.
- The FUE provided an opportunity to assess G/ATOR's progress toward Critical Operational Issue (COI) resolution. DOT&E assessed that the test methodology and data collected for the FUE were mostly sufficient to support an assessment of the objective COIs and Measures of Performance (MOPs); however, data were lacking for resolution of radar false track MOPs.
- In September 2013, DOT&E concurred with a MCOTEA assessment that data collected from the FUE could be used to support an operational assessment of G/ATOR. However, DOT&E and MCOTEA concluded additional data would also be required from the developmental test (DT)-1B4 test period and WTI 1-14 course in order to adequately develop an operational assessment in support of Milestone C.
- Reliability performance remains low with a reported 42.8 hours Mean Time Between Operational Mission Failure (MTBOMF) during the FUE. Although reliability performance is improving, a robust reliability growth plan



1 - Communications Equipment Group (CEG)
 2 - Radar Equipment Group (REG)
 3 - Power Equipment Group (PEG) on MTVR pallet
 MTVR - Medium Tactical Vehicle Replacement

needs to be put in place to address both hardware and software failures. The system's current reliability key system attribute threshold requirement of 500 hours MTBOMF cannot be realistically achieved within the context of the current G/ATOR test schedule through IOT&E.

- Approval of the Milestone C Test and Evaluation Master Plan is not likely to occur in time to support the program's current January 2014 Milestone C decision. The program has not yet finalized an acceptable reliability growth strategy, has not completed an adequate test design for the IOT&E, and the production configuration (Gallium arsenide (GaAs) versus Gallium nitride (GaN) radar modules) for IOT&E has not yet been agreed to. The Navy desires to conduct IOT&E on a GaAs radar module configuration and currently plans to switch to a GaN configuration during low-rate initial production. Over 80 percent of the Block 1 and Block 2 procurement is planned with GaN radar modules, yet it remains unclear if adequate production representative versions of the system will be available in time for IOT&E. IOT&E must be conducted on the production configuration representing the majority of the planned procurement.

System

- G/ATOR is a short- to medium-range, air-cooled phased array radar under development for the Marine Corps. It is intended to replace five current radar systems and augment the AN/TPS-59 long-range radar. A total of 57 G/ATOR systems are planned for procurement.
- The Program Executive Office, Land Systems Marine Corps is developing G/ATOR in three blocks:
 - Block 1 develops the basic hardware and provides AD/SR radar capability. It replaces the AN/UPS-3, AN/MPQ-62, and AN/TPS-63 radar systems.

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- Block 2 adds a ground counter battery/fire control mission capability and replaces the AN/TPQ-46 radar system.
- Block 3 has been deferred and Mode 5/S will be incorporated into Block 4.
- Block 4 provides an air traffic control capability and replaces the AN/TPS-73 radar system.
- The G/ATOR baseline system configuration is comprised of three subsystems:
 - Radar Equipment Group (REG). The REG consists of the phased-array radar mounted on an integrated trailer. The trailer is towed by the Medium Tactical Vehicle Replacement.
 - Power Equipment Group (PEG). The PEG includes a 60-kilowatt generator and associated power cables mounted on a pallet. The generator pallet is carried by the Medium Tactical Vehicle Replacement.
 - Communications Equipment Group (CEG). The CEG provides the ability to communicate with and control the radar and is mounted inside the cargo compartment of the High Mobility Multi-purpose Wheeled Vehicle.
- The G/ATOR program completed Milestone B and entered the Engineering and Manufacturing Development phase in August 2005 as an Acquisition Category II program. However, in October 2011, G/ATOR was re-designated an Acquisition Category IC program due to increases in Research, Development, Test, and Evaluation funding required to meet mandatory Force Protection requirements.

Mission

The MAGTF commander will employ G/ATOR within the Marine Air Command and Control System to provide enhanced situational awareness and additional capabilities to conduct short- to medium-range radar surveillance and air defense, ground counter-battery/fire control, and air traffic control missions using a single system.

Major Contractor

Northrop Grumman Electronic Systems – Linthicum, Maryland

Activity

- The Marine Corps conducted three developmental test periods of G/ATOR Block 1 from July 2012 until February 2013 with a corrective action period following each developmental test.
- In March 2013, Program Executive Office, Land Systems Marine Corps delayed an operational assessment scheduled for the spring WTI course (WTI 2-13) to the fall WTI course (WTI 1-14) and rescheduled the Milestone C decision from 4QFY13 through 2QFY14. The change in schedule was due to concerns about G/ATOR reliability metrics and system performance. In place of the operational assessment, MCOTEA and the Program Office conducted an FUE at Marine Corps Air Station Yuma, Arizona, during WTI 2-13 to assess system performance and collect additional reliability data in an operational environment.
- The Program Office initiated a re-evaluation of its reliability growth program because of G/ATOR reliability concerns.
- The Program Office added a fourth developmental test period (DT-1B4) from July through September 2013 to evaluate software updates primarily for reliability improvements.
- In September 2013, DOT&E concurred with a MCOTEA assessment that data collected during the FUE would be sufficient to support a G/ATOR operational assessment if supplemented by additional data collected during DT-1B4 and WTI 1-14.
- The Program Office and MCOTEA will use data collected during DT-1B4 and WTI 1-14 to support an operational milestone assessment report of G/ATOR. Milestone C and low-rate initial production contract award for G/ATOR Block 1 is currently scheduled for 2QFY14.

Assessment

- The FUE provided an opportunity to assess G/ATOR's progress toward COI resolution. DOT&E assessed the FUE test methodology and data collected as nearly sufficient to support an assessment of the objective COIs and MOPs; however, data were lacking for resolution of radar false track MOPs and data supporting track ambiguity metrics were not sufficiently analyzed.
- MCOTEA and DOT&E concluded data collected during the FUE were not sufficient to support an operational assessment in support of a Milestone C decision and additional data collection during the DT-1B4 event and WTI 1-14 was required. DOT&E and MCOTEA agreed that additional testing and data collection were necessary to assess G/ATOR reliability performance metrics, false track rates, radar track ambiguity metrics, training, and user workload to better identify G/ATOR's technical maturity in preparation for the Milestone C decision.
- Reliability performance remains low relative to the requirement with 42.8 hours MTBOMF reported during the FUE. Although reliability performance is improving, a defensible reliability growth plan needs to be established to address both hardware and software failures. The system's current reliability threshold requirement of 500 hours MTBOMF cannot be realistically achieved within the context of the current G/ATOR test schedule through IOT&E. Moreover, the operational rationale for the 500-hour requirement is unclear.
- An update to the Milestone C Test and Evaluation Master Plan will be required. The program has not yet finalized an

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acceptable reliability growth strategy, and has not completed an adequate test design for the IOT&E. Progress is being made in resolving these issues; however, it is unlikely they will be fully resolved prior to the currently planned January 2014 Milestone C review. The Navy now plans to produce about 20 percent of these radars using GaAs transmit/receive modules, with 80 percent using GaN modules. IOT&E will be conducted on the GaN production configuration representing the majority of the planned procurement.

Recommendations

- Status of Previous Recommendations. This is the first annual report for this program.
- FY13 Recommendation.
 1. The Program Office should re-evaluate the G/ATOR reliability program and ensure that reliability growth plans and curves are realistic and that reliability requirements are based on a clear operational rationale. In addition, appropriate adjustments should be made to meet and demonstrate operational reliability, availability, and maintainability requirements.

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