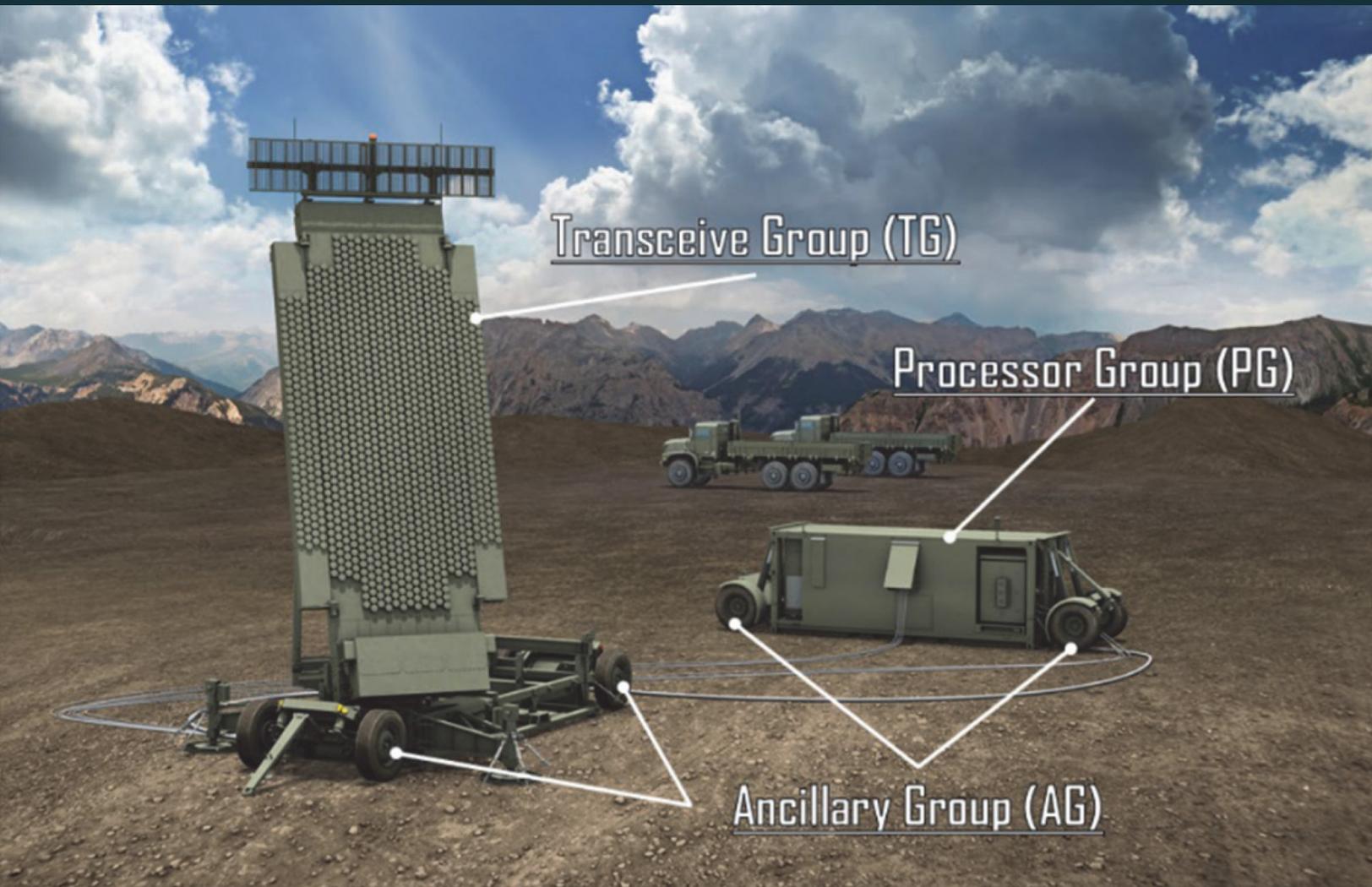


Three-Dimensional Expeditionary Long-Range Radar (3DELRR)



In FY24, the Air Force paused formal government-led developmental testing (DT), due to system deficiencies, and transitioned to a risk-reduction event after one of four planned weeks of testing. Lockheed Martin continued troubleshooting Three-Dimensional Expeditionary Long-Range Radar (3DELRR) performance and reliability problems during the scheduled test period. The Air Force continued with the Lot 2 production contract award in January 2024 and now plans to start 3DELRR government-led DT in 2QFY25 and IOT&E in 1QFY26.

SYSTEM DESCRIPTION

The 3DELRR TPY-4 is designed to serve as the organic radar for the Air Force Control and Reporting Center (CRC) Weapon System (WS), providing the capability to perform long-range detection of both air-breathing threats and theater ballistic missiles. The 3DELRR employs a single-face, rotating, active electronically scanned array with a highly distributed and scalable digital beam forming architecture.

The active electronically scanned array incorporates power-efficient, reliable, and commercially sourced Gallium Nitride transmitters; low-noise digital receivers; and efficient power conversion.

MISSION

The Air Force employs the CRC WS to conduct battle management, command and control, air surveillance, combat identification, airspace management, and tactical data link management to enable fluid, continuous offensive and defense operations. The 3DELRR is designed provide the CRC WS with a precise, real-time air picture of sufficient quality to:

- Conduct long-range, wide-area surveillance
- Detect and track air-breathing threats and theater ballistic missiles
- Support CRC WS threat evaluation for timely defensive and offensive action

- Provide positive control of military aircraft

PROGRAM

The Air Force awarded the Lot 2 production contract in January 2024. The 3DELRR program is currently operating as a Middle Tier of Acquisition rapid fielding program, which the Air Force plans to transition to a major capability acquisition program in 1QFY26. The 3DELRR program has a DOT&E-approved TES, which the program office is revising to capture test strategy updates as a result of schedule delays.

» MAJOR CONTRACTOR

- Lockheed Martin Corporation – Syracuse, New York

TEST ADEQUACY

Due to delays in the Federal Aviation Administration's approval of the Radio Frequency Authorization, the Air Force was unable to complete a planned operational assessment (OA) prior to the 3DELRR Lot 2 production contract award in January 2024. The Air Force planned to complete the OA in two parts: (1) data collection at the production acceptance test (PAT), and (2) data collection during the government-led DT. DOT&E observed the validation and verification of requirements and the PAT on Lockheed Martin's 3DELRR test article at a contractor-owned test facility.

The Air Force initially delayed the OA and government-led DT from 1QFY24 to 3QFY24 to give the Air Force time to gain Federal Aviation Administration approval for 3DELRR to radiate. In May 2024, DOT&E observed a period of government-led DT, using Lockheed Martin's 3DELRR test article. Due to system deficiencies, the Air Force paused the formal government-led DT period after one of four planned weeks of testing. This allowed Lockheed Martin to troubleshoot 3DELRR performance and reliability problems during the scheduled test period. Along with production delays, the testing delays will impact the schedule of planned testing outlined in the approved 3DELRR TES.

The Air Force plans to use integrated testing at every opportunity and resource tests for near-peer, threat-representative targets as part of the planned DT that is now scheduled to start in 2QFY25. The Air Force plans to start dedicated IOT&E in 1QFY26.

PERFORMANCE

» EFFECTIVENESS, SUITABILITY, AND SURVIVABILITY

Lockheed Martin executed the 3DELRR PAT using a pre-production prototype 3DELRR system. Both the 46th Test Squadron and Air Force Operational Test and Evaluation Center personnel were on site for the PAT. While Lockheed Martin assessed that they

met 37 system specification requirements, testing did not provide DOT&E adequate data to determine 3DELRR progress toward meeting key operational effectiveness, suitability, and survivability requirements. The 46th Test Squadron scheduled six instrumented aircraft flights during the PAT to collect data on 3DELRR detection capabilities and accuracy, but none of the scheduled aircraft were able to fly during the PAT, due to poor weather conditions.

The Air Force's major goal of the government-led DT was to characterize 3DELRR detection and tracking performance against calibrated spheres, which have known radar cross sections, as aircraft towed the spheres and flew within the 3DELRR detection envelope. However, the Air Force paused formal testing after discovering two system deficiencies: one related to 3DELRR operational effectiveness; and the other related to 3DELRR suitability.

DOT&E will assess 3DELRR progress towards operational effectiveness, suitability, and survivability after the Air Force completes a planned OA in 3QFY25.

2. Update the 3DELRR TES to include describing how the Air Force will mitigate the current schedule-induced risks for an adequate and successful IOT&E and submit to DOT&E for approval.
3. Update the 3DELRR OA test plan to account for the change in testing timelines and scope and submit to DOT&E for approval, prior to transitioning the program to the major capability acquisition pathway.

RECOMMENDATIONS

The Air Force should:

1. Plan and resource for appropriate threat representative targets, as recommended in the FY22 and FY23 Annual Reports.

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