

AN/TPQ-53 Counterfire Target Acquisition Radar

The Army intends to extend the range for the currently fielded Q-53 target acquisition radars using hardware and software upgrades. Preliminary developmental test data demonstrate an improved Q-53 performance compared to the legacy variant. The Army plans additional Q-53 upgrades to further improve its performance in a contested environment and is scheduled to conduct operational testing to evaluate its operational effectiveness, suitability and survivability.



System Description

The Q-53 is a mobile, counterfire target acquisition radar designed to detect, classify, and track projectiles fired from mortar, artillery, and rocket systems. The Q-53 radar is fielded to the target acquisition platoons in Brigade Combat Teams, target acquisition batteries in Field Artillery Brigades, and Division Artillery headquarters. Field Artillery units employ the Q-53 to locate and suppress, neutralize, or destroy adversary rocket, artillery, and mortar systems through effective counterfire engagements. Air Defense Artillery units integrate the Q-53 radar to warn friendly forces and engage incoming threat indirect fires. The Q-53 is transportable by C-17 aircraft.

Program

The Q-53 is an Acquisition Category IC program that entered full-rate production in December 2015. The Army has since implemented hardware and software upgrades to improve reliability and address parts obsolescence to extend the range over which the radar can acquire rockets, artillery, and mortars. The Army plans additional upgrades using a Distributed Digital Receiver Exciter (DDREX) to further improve the Q-53 performance.

Major Contractor

Lockheed Martin Missile Systems and Training – Syracuse, New York.

Test Adequacy

The Army conducted a Customer Test 5 from July 12 to August 6, 2021 of the extended range radar using civilian operators to provide a baseline performance for comparison with the future DDREX radar. The Army conducted a Cooperative Vulnerability and Penetration Assessment (CVPA) on the Q-53 extended range radar in October 2020 and again in February 2021 given the software upgrades. Using the CVPA findings, the Army

planned and executed an Adversarial Assessment in July 2021. Tests were conducted in accordance with DOT&E-approved test plans. The Army also executed a Soldier Touchpoint using two systems. The Army has not yet started developing the Q-53 DDREX Test and Evaluation Master Plan.

Performance

Effectiveness

The operational effectiveness of the Q-53 extended range radar using hardware and software upgrades cannot yet be evaluated. Preliminary developmental test results demonstrate an improved Q-53 performance compared to the previous Q-53 variant evaluated in 2015.

Suitability

The operational suitability of the Q-53 extended range radar using hardware and software upgrades cannot yet be evaluated. Preliminary developmental test results demonstrated an improved Q-53 performance compared to the previous variant evaluated in 2015 that also exceeded the reliability requirement.

Survivability

The survivability of the Q-53 in a cyber-contested environment has not yet been evaluated.

Recommendations

The Army should:

1. Execute an operational assessment on the extended range Q-53 radar as part of the DDREX upgrade.
2. Continue to improve and assess the radar's reliability.
3. Develop the Test and Evaluation Master Plan for the planned DDREX upgrade.
4. Plan and execute an IOT&E, CVPA, and Adversarial Assessment for the DDREX upgrade and associated software and hardware upgrades in an operationally relevant and stressing environment with threat munitions and countermeasures.