

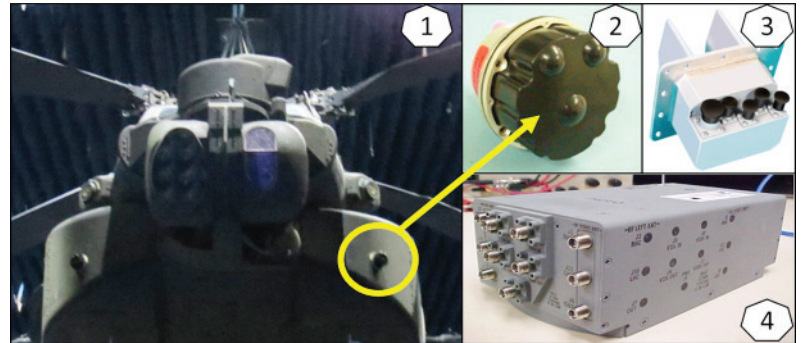
## AN/APR-39D(V)2 Radar Signal Detection Set (RSDS)

### Executive Summary

- Preliminary results from the Army's FOT&E and Cooperative Vulnerability and Penetration Assessment (CVPA) indicate the AN/APR-39D(V)2 radar signal detection set is effective and suitable as installed on the Army AH-64. It is effective because the D(V)2:
  - Overall, declares threat radio frequency emitters in a timely manner.
  - Overall, provides sufficient situational awareness for AH-64 aircrews to identify required threat systems and perform the prescribed tactics, techniques, and procedures (TTPs).
  - The CVPA did not identify any specific D(V)2 vulnerabilities.
- It is suitable because the few software failures had minimal mission effect because the D(V)2 system recovered immediately and automatically from each failure without requiring aircrew action.
- The Navy developmental testing identified several critical deficiencies related to aircraft integration on the MV-22B.

### System

- The AN/APR-39D(V)2 is a digital upgrade to the AN/APR-39 family of analog radar warning receivers used by nearly all DOD rotorcraft.
- The AN/APR-39D(V)2 consists of the following:
  - Four new high band antennas, and a low band antenna
  - New quadrant receivers
  - A new radar data processor with two digital receivers
- The system uses either a separate display unit or integrates with the onboard aircraft displays to visually and aurally alert the pilots to active threat radars.



1. AH-64 Antenna Installation  
 2. High Band Quadrant Antenna  
 3. Low Band Directional Antenna  
 4. Quadrant Receiver

- For Navy aircraft, the system also acts as the electronic warfare bus controller.
- The lead Army aircraft is the AH-64 D/E and the lead Navy aircraft is the MV-22B.

### Mission

Commanders employ units equipped with the AN/APR-39D(V)2 radar signal detection set to improve the mission survivability of Navy and Army aircraft by identifying radio frequency signals from threat surface-to-air missiles, airborne interceptors, and anti-aircraft artillery through cockpit alerts.

### Major Contractor

Northrop Grumman – Rolling Meadows, Illinois

### Activity

- All testing was completed in accordance with the DOT&E-approved test plan.
- The Army completed a CVPA at the Redstone Arsenal, Alabama, with the D(V)2 installed on an AH-64E aircraft in June 2018. This was the last test activity of the FOT&E that started in 3QFY17.
- DOT&E produced a classified report assessing the FOT&E in November 2018.
- The Navy completed Electromagnetic Environmental Effects testing on the MV-22B at Patuxent River, Maryland, in March 2018.
- The Navy completed an Integrated (combined developmental and operational) Test Three (IT-3) period with the MV-22B at the Electronic Combat Range (ECR), California, in February 2018.

- The Navy completed an anechoic chamber test with the D(V)2 installed on an MV-22B in December 2017 at the Air Combat Environment Test and Evaluation Facility (ACETEF) located in Patuxent River, Maryland.

### Assessment

- The Navy IT-3 testing and anechoic chamber testing identified several critical deficiencies related to aircraft integration on the MV-22B.
- Preliminary results from the Army FOT&E demonstrated that the D(V)2 provides sufficient situational awareness for AH-64 aircrews to identify required threat systems and perform the prescribed TTPs. Aircrew operational response times, composed of the D(V)2 declaration time and the aircrew reaction time, were consistent across the different operational

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missions for the AH-64. Specific detail is provided in the DOT&E classified FOT&E report.

- Preliminary results from the Army CVPA did not identify any D(V)2-specific vulnerabilities as installed on the AH-64E.
- Preliminary results based on the Army FOT&E suitability data demonstrated that the few software resets had minimal mission effect because the system recovered immediately and automatically without requiring aircrew action.

## Recommendations

The Army and Navy should:

1. Implement fixes to all critical deficiencies identified in Navy integrated and anechoic chamber testing for the MV-22B before preceding into operational testing.

2. Conduct a cybersecurity Adversarial Assessment based on the CVPA to assess the ability of operational aircrews and maintainers to detect and mitigate cybersecurity threats then prioritize and implement corrective measures.
3. Implement corrections for software failures identified during the Army FOT&E to improve reliability.
4. Conduct a maintenance demonstration for both the AH-64 and the MV-22B to identify and mitigate any shortfalls that reduce system availability.