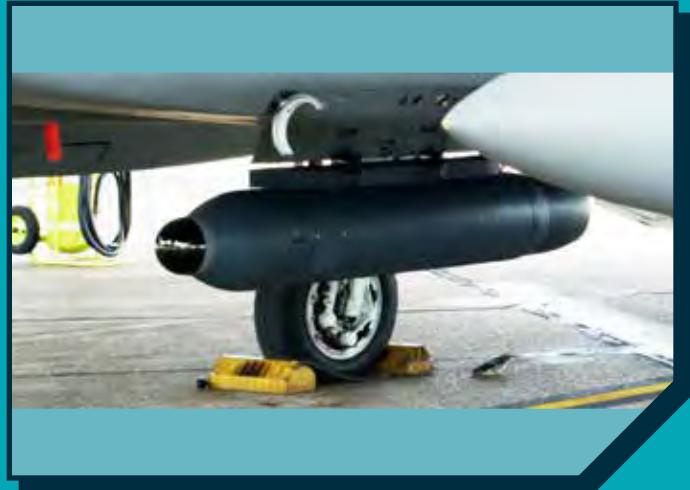


F-15 Eagle Integrated Infrared Search and Track

The F-15 Eagle Integrated Infrared Search and Track (EI-IRST) Legion Pod Block 1.5 is operationally effective, providing the F-15C a new capability to engage airborne targets. The Air Force will need to monitor the Legion Pod to determine if the system is suitable for operational use and complete the cyber assessments to determine the survivability of the Legion Pod in a cyber-contested environment. The 53d Wing submitted a Capabilities and Limitations Report to Headquarters, Air Combat Command to allow for operational use of EI-IRST Legion Pod Block 1.5 on F-15C Eagle aircraft.



System Description

The EI-IRST Legion Pod is a passive, long-wave, infrared sensor system intended to allow the F-15C to detect, track, target, engage, and employ weapons against enemy aircraft within its field of regard in a contested, degraded operations environment. Its primary function is to generate precise tracking and targeting data in a radio frequency-contested environment. The F-15C EI-IRST also complements the fire control radar to enhance F-15 effectiveness, lethality, and survivability.

Program

The F-15 EI-IRST Legion Pod is an Acquisition Category II program intended to procure 38 Legion Pods. DOT&E concurred with the Air Force on the F-15C EI-IRST Block 1.5 Risk Assessment Level of Test, dated May 2020, resulting in a Level II OT&E plan (a limited operational test) adequate to evaluate the F-15C EI-IRST Block 1.5. The program has completed Block 1.5 development, and the Air Force started the fielding of the Legion Pods to select F-15C combat squadrons in 4QFY21. The Air Force has not funded the follow-on Block 2 pod in the FY22 budget submission. Due to the lack of funding, the milestone decision authority has not yet approved the Milestone C decision, delaying the approval of the Milestone C Test and Evaluation Master Plan for the Block 2 effort.

Major Contractors

The Boeing Company – St. Louis, Missouri – F-15C integration. Lockheed-Martin – Legion Pod development.

Test Adequacy

The Air Force 53d Wing conducted a Force Development Evaluation from August 2020 to May 2021, during which 140 missions and 214 sorties were flown with the Block 1.5 Legion Pod. During the test, the Air Force 85th Test and Evaluation Squadron employed two AIM-9X Block II missiles cued from the Legion Pod. Due to problems associated with the AIM-120C and -120D missiles, the test squadron did not execute a live fire employment testing with those two missile types. In coordination with DOT&E, the test team has deferred these live fire tests to follow-on testing. The Legion Pod Block 1.5 Force Development Evaluation was adequate to determine operational effectiveness, but not adequate to determine system suitability or survivability.

Performance

Effectiveness

The Legion Pod Block 1.5 is operationally effective, providing the F-15C a new capability to engage airborne targets. The one effectiveness challenge noted with the Legion Pod is an angle-of-attack restriction imposed on the F-15 when carrying the pod. Funding was not available to perform the flight sciences missions required to clear the Legion Pod to basic aircraft limits. As a result, the F-15C with the Legion Pod is limited in angle-of-attack and unable to operate in the entirety of the aircraft's basic envelope.

Suitability

Operational suitability of the Legion Pod is currently unknown due to the lack of sufficient data collected

during the Force Development Evaluation. Testers highlighted three Line Replaceable Units in the Legion Pod as having potentially high failure rates but there were insufficient data to determine the reliability of the Environmental Cooling Unit, Infrared Receiver, and Inertial Measurement Unit. The Legion Pod experienced numerous problems related to connectivity with the Data Transfer Module, which required the pilot to do a hard reset of the Legion Pod.

Survivability

The 53d Wing conducted an incomplete Cooperative Vulnerability and Penetration Assessment and Adversarial Assessment of the Legion Pod, precluding an adequate survivability assessment of the Legion Pod in a cyber-contested environment.

Recommendations

(U) The Air Force should:

1. Plan and fund flight science missions to expand the operational envelope of the F-15 with the installed Legion Pod.
2. Continue to collect suitability data for the Legion Pod, to include the Environmental Cooling Unit, Infrared Receiver, and Inertial Measurement Unit to determine if the system is suitable for operational use.
3. Investigate the cause of the Data Transfer Module-induced resets and provide a correction in a future release of the Operational Flight Program or Legion Pod software.
4. Plan, fund, and complete a cybersecurity assessment of the Legion Pod.