

AC-130J Ghostriider

Executive Summary

- Preliminary DOT&E analysis of test data indicates that the AC-130J Ghostriider Block 30 upgrade provides both gun weapon systems the capability to support precision strike missions in a GPS-degraded environment.
- The U.S. Special Operations Command (USSOCOM) Airborne High Energy Laser (AHEL) system on the AC-130J is progressing towards flight demonstration in late FY22.

System

- The AC-130J is a medium-sized, multi-engine tactical aircraft with a variety of sensors and weapons for air-to-ground attack to replace the AC-130U/W aircraft.
- Nine aircrew members operate the AC-130J: two pilots, one Combat System Officer (CSO), one weapons system operator, and five special mission aviators (one sensor operator, one load master, and three gunners).
- USSOCOM developed AC-130J through the integration of a modular Precision Strike Package (PSP) onto the baseline MC-130J aircraft. The PSP includes an open architecture to allow for follow-on development and integration of block capabilities.
- The AC-130J's survivability has been upgraded to include the Advanced Threat Warning sensors for improved infrared threat detection.
- The current Block 30 PSP includes the following components and capabilities:
 - A dual-console mission operator pallet in the cargo bay that controls all subsystems with remote displays and control panels on the flight deck
 - An integrated flight deck workstation for a CSO
 - A weapon suite consisting of an internal, pallet-mounted 30-mm side-firing chain gun and 105-mm cannon; wing-mounted munitions racks for up to eight GBU-39/B GPS-guided Small Diameter Bombs (SDB), GBU-39B/B Laser SDBs, and AGM-114 HELLFIRE missiles; and 10 launch tubes in a modified cargo door for laser-guided AGM-176 Griffin missiles and GBU-69/B Small Glide Munitions



- Two electro-optical/infrared sensor/laser designator pods (MX-20 and MX-25) and multiple video, data, and communication links
- Improved GPS hardening to support fire control under degraded GPS conditions
- Dual special mission processors (SMPs) that provide enhanced flight deck situational awareness and CSO control of PSP weapon functions
- A side-mounted heads-up display to enhance pilot situational awareness of weapon engagements
- Future upgrades will equip the aircraft with an active radio frequency countermeasures (RFCM) system, Infrared Suppression System, and Advanced Threat Warning sensors for improved survivability. USSOCOM will demonstrate a prototype high-energy laser weapon on AC-130J for possible development into a program of record.

Mission

The Joint Task Force or Combatant Commander will employ units equipped with the AC-130J to provide close air support and air interdiction using battlespace wide-area surveillance, target geolocation, and precision munition employment. Additionally, the AC-130J provides time-sensitive targeting, communications, and command and control capabilities.

Major Contractor

Lockheed Martin – Bethesda, Maryland

Activity

- The 18th Special Operations Test and Evaluation Squadron (SOTES) conducted an 11-sortie, 57-flight hour Force Development Evaluation (FDE) of the Block 30 AC-130J in two phases, in 1QFY20 and 3QFY20. Testing focused on fire control performance under GPS-degraded conditions and included live fire of both guns and simulated launch of

- precision-guided munitions. The FDE informed a fielding and deployment release decision for the Block 30 configuration.
- The 18th SOTES also conducted cybersecurity testing through a cooperative vulnerability and penetration assessment (CVPA) in August 2019 and an adversarial assessment (AA) in June 2020, with cyber threat operations executed by the Naval

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Information Warfare Systems Command Red Team for both events.

- The 18th SOTES conducted the FDE in accordance with a DOT&E-approved test plan. DOT&E reviewed and provided comments to the 18th SOTES on both cybersecurity test plans, but did not formally approve them, due to late submittal of the CVPA test plan and the coronavirus (COVID-19) pandemic effects on the AA test plan.
- COVID-19 restrictions caused an approximately 2-month delay in developmental flight test activity.
- USSOCOM awarded a new contract to Sierra Nevada Corporation in June 2020 to integrate a Northrop Grumman RFCM suite on the AC-130J in FY21. This replaces a previous RFCM contract with BAE that USSOCOM suspended in FY19.
- USSOCOM began critical design review of the AHEL system in August 2020, which is scheduled for flight demonstration on AC-130J in late FY22.

Assessment

- The Air Force has addressed four of the recommendations from the classified IOT&E report, including the most important for mission effectiveness. The Block 30 FDE demonstrated that two of the previous recommendations, specific to improving communications and datalink equipment configuration procedures, have not yet been successfully addressed.
- DOT&E analysis of Block 30 FDE data is ongoing; DOT&E will publish an operational assessment of Block 30 AC-130J in FY21. Preliminary analysis indicates:
 - Both gun weapon systems demonstrated the capability to support precision strike missions in a GPS-degraded

environment with the Block 30 upgrade; specific weapon performance is classified.

- Block 30 upgrade system usability, as measured by aircrew surveys on the System Usability Scale, improved over the Block 20 IOT&E, but remain in the “marginal” range of acceptability.
- Operator survey responses indicate that both gun weapon systems and sensor systems experienced malfunctions throughout the FDE that degraded precision strike missions. However, FDE data do not support a statistically relevant evaluation of Block 30 reliability because Joint Reliability and Maintainability Evaluation Team (JRMET) meetings ceased after IOT&E.
- Technical orders for operating and maintaining the Block 30 upgrade are incomplete, resulting in increased workload. Aircrew experienced difficulty configuring datalink and classified radio systems, in part because of incomplete technical data and training. DOT&E reported on this persistent problem in the Block 20 IOT&E report.

Recommendations

1. The AC-130J Program Office should:
 - Resume JRMET meetings in order to guide future reliability improvements.
 - Complete the publication of comprehensive technical data necessary for operation and maintenance of each fielded block configuration of the AC-130J, with particular focus on improving the instructions for communications and datalink systems.
2. The Air Force should update DOT&E on plans to address or accept risk on the remaining classified IOT&E report recommendations.