

AC-130J Ghost Rider

Executive Summary

- DOT&E published a classified IOT&E and LFT&E Report on the Block 20 AC-130J on April 25, 2018, that found the Block 20 AC-130J operationally effective and suitable for most of its Close Air Support and Air Interdiction missions. Survivability analyses did not reveal any unexpected vulnerabilities to operationally significant kinetic threats, as compared to legacy C-130 aircraft.
- The AC-130J Combined Test Force (CTF) and 18th Flight Test Squadron (FLTS) are testing an interim “Block 20+” configuration to support U.S. Special Operations Command (USSOCOM) fielding and deployment.
- Preliminary test data indicate that gun weapon system and software updates have improved gun calibration and mission effectiveness over the Block 20 configuration.
- The CTF conducted early technology demonstrations of two potential All-Weather Engagement (AWE) systems to provide the AC-130J the capability to employ its gun weapon system through cloud layers. Assessments of additional technologies for a future acquisition strategy will occur in 2QFY19. The program has not established a timeline for system selection or fielding.

System

- The AC-130J is a medium-sized, multi-engine tactical aircraft with a variety of sensors and weapons for air-to-ground attack that will replace the AC-130H/U aircraft.
- The AC-130J is operated by nine aircrew members: 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 is developing AC-130J through the integration of modular components onto existing MC-130J aircraft. The AC-130J includes an open architecture to allow for follow-on development and future integration of block capabilities.
- The AC-130J retains all survivability enhancement features on the MC-130J aircraft.
- Block 20 consists of the following modular components:
 - A dual-console mission operator pallet (MOP) in the cargo bay that controls all subsystems with remote displays and control panels on the flight deck.
 - An interim, limited-functionality, carry-on flight deck workstation for a CSO.
 - The weapon suite consists of an internal, pallet-mounted 30 mm side-firing chain gun and 105 mm cannon; wing-mounted GBU-39/B GPS-guided Small Diameter Bombs (SDBs) and GBU-39B/B Laser SDBs; and AGM-176 Griffin laser-guided missiles mounted internally and launched through the rear cargo door.



- Two MX-20 electro-optical/infrared sensor/laser designator pods and multiple video, data, and communication links.
- A side-mounted heads-up display enhances pilot situational awareness.
- Post-IOT&E updates to Block 20, known as Block 20+, include:
 - Software updates to the Gun Fire Control System (GFCS) to correct performance deficiencies observed during Block 20 IOT&E.
 - Additional crashworthy seating, parachute storage, and scanner bubble windows on the right escape hatch and rear paratroop door.
 - Wing-mounted AGM-114 HELLFIRE missiles and internal GBU-69/B Small Glide Munitions (SGM).
 - A permanent CSO station on the flight deck.
 - The Defensive Systems Upgrade (DSU), Electronic Warfare (EW) bus modification, and initial Special Mission Processor (SMP) provision carried over from the baseline MC-130J aircraft, which provides the CSO with refined control of defensive equipment. SMP enables additional situational awareness by passing mission data from the MOP to cockpit displays.
- A future upgrade will equip the aircraft with an active radio-frequency countermeasures (RFCM) system, directed energy weapon, and a GPS hardened MOP.

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

FY18 AIR FORCE PROGRAMS

Activity

- DOT&E published a classified IOT&E and LFT&E Report on the Block 20 AC-130J on April 25, 2018.
- The AC-130J CTF conducted ground and flight testing of the Block 20+ upgrades and other capability demonstrations throughout FY18:
 - Several captive-carry flights with HELLFIRE and SGMs, and one risk-reduction live fire of a HELLFIRE missile.
 - Initial technology demonstration of the Tactical Off-Board Sensor (TOBS) small unmanned aerial system as a potential AWE sensor.
 - Initial technology demonstration of the Thales I-Master Synthetic Aperture Radar turret as another AWE sensor, temporarily replacing the nose-mounted MX-20 sensor for the demonstration.
- Research, engineering, and risk reduction efforts to develop a high-energy laser for the AC-130J continued throughout 2018.
- The 18th FLTS conducted an operational assessment of the CSO workstation and the DSU/EW bus modification from January to February 2018 in preparation for a formal operational test of the Block 20+ configuration scheduled for 1QFY19.
- Air Force Special Operations Command (AFSOC) received 5 aircraft in FY18, bringing the total to 13 operational aircraft out of a planned fleet of 37.
- In 2018, AFSOC updated its AC-130J program strategy to field capability as soon as it is ready as opposed to comprehensive block upgrades. Block 20+ includes hardware, software, and weapon capabilities originally planned for a later Block 30 configuration.
- The separate USSOCOM program that is developing and testing the RFCM system for both AC-130J and MC-130J experienced a 6-month delay of hardware integration due to antenna design deficiencies. Developmental testing on the first aircraft is scheduled to begin in February 2019. The RFCM program conducted early hardware risk reduction testing in the Joint Preflight Integration of Munitions and Electronic Systems facility and the Integrated Defense Avionics Laboratory from May to July 2018 located at Eglin AFB, Florida.
- Survivability analyses revealed the Block 20 Precision Strike Package modifications did not result in any unexpected vulnerabilities to the AC-130J relative to legacy C-130 aircraft.
- Preliminary test results of the updated GFCS software indicate performance improvements address shortfalls observed in IOT&E. Both gun weapon systems are meeting threshold requirements across the full range of test conditions.
- A specific lot of ammunition, not the ammunition rack design, is the cause of the 105 mm ammunition rack problems from the IOT&E report.
- Inadequate training and technical documentation caused the gun calibration procedural problems documented in the IOT&E report. The 19th Special Operations Squadron training unit has rectified the issue.
- Preliminary gun precision and accuracy data indicate that AFSOC should develop quantitative criteria for the 30 mm gun barrel replacement based on round count or other measurable gun parameters in order to predict and control gun performance degradation with usage. AFSOC established standard barrel replacement interval of 15,000 rounds for the 30 mm gun to address this finding.
- The operational assessment of the new permanent CSO workstation, DSU, and EW bus indicate that the CSO workstation has high potential to improve aircrew coordination and reduce workload. DOT&E did not evaluate the performance of the SMP, DSU, and EW bus modification during the majority of the assessment because there was no cybersecurity certification to process classified information on the SMP. Technical and cybersecurity certification problems limited the ability of DOT&E to assess the DSU and EW bus modifications. DOT&E will reassess these modifications during follow-on operational testing.
- Initial demonstrations of both TOBS and I-Master were favorable. USSOCOM has not established a timeline for additional testing and final selection of an AWE system. Assessments of additional technologies for a future acquisition strategy will occur in 2QFY19.
- A fire at the McKinley Climatic Lab, Florida, in July 2017 has indefinitely delayed collection of cold weather deployability data.

Assessment

- The Block 20 AC-130J is effective and suitable for most of its Close Air Support and Air Interdiction missions. Training and technical documentation require improvement. Lethality data are adequate to support most mission planning requirements for intended AC-130J missions and targets.

Recommendation

1. The Air Force should address the recommendations from the classified DOT&E IOT&E and LFT&E report.