

C-5M

Executive Summary

- DOT&E issued a Combined Operational and Live Fire Test Report on the C-5M in October 2010. The C-5M is operationally effective but not operationally suitable.
- The C-5 program office is addressing deficiencies identified during the 2010 operational test, including problems with thrust reversers, the Environmental Control System, and autopilot, through an aggressive correction action plan. Operational testing of corrective actions is scheduled to begin in January 2012.
- The Air Force completed the first Large Aircraft Infrared Countermeasures (LAIRCM) modification of a C-5M in July 2011.

System

- The C-5 is the largest four-engine military transport aircraft in the United States. The C-5 has 36 standard 463L pallet positions and can carry a maximum payload of 270,000 pounds. The typical C-5 crew size is seven.
- The C-5M designation is the result of two separate but related modernization efforts:
 - The Avionics Modernization Program incorporates a mission computer, a glass cockpit with digital avionics (including autopilot and autothrottles), and state-of-the-art communications, navigation, and surveillance components for air traffic management.
 - The Reliability Enhancement and Re-Engining Program provides over 50 reliability enhancements, plus new commercial engines, nacelles, thrust reversers, and pylons.



Mission

- Units equipped with the C-5 perform strategic airlift, emergency aeromedical evacuation, transport of brigade-size forces and equipment in conjunction with other aircraft, and delivery of outsize or oversize cargo (cargo that does not fit on a standard pallet).
- Units equipped with the C-5 execute missions at night, in adverse weather conditions, and in civil-controlled air traffic environments around the world. The units are capable of completing extended-range missions because the C-5 can receive in-flight aerial refueling.

Major Contractor

Lockheed Martin Aeronautics Company – Marietta, Georgia

Activity

- DOT&E issued a Combined Operational and Live Fire Test Report on the C-5M in October 2010. The C-5M is operationally effective but not operationally suitable.
- Developmental testing of the next C-5M software version, Block 3.5, began in August 2010. Operational testing is planned to start in January 2012.
- The C-5 program office is addressing deficiencies identified during the 2010 operational test, including problems with thrust reversers, the Environmental Control System, and autopilot, through an aggressive corrective action plan.
- Operational testing of corrective actions is scheduled to begin in January 2012 in conjunction with operational testing of Block 3.5.
- The Air Force completed the first LAIRCM modification of a C 5M in July 2011. Testing was satisfactorily conducted in 2007.

Assessment

- The C-5M is operationally effective. The new General Electric F138-GE-100 engines improve the range/payload performance of the aircraft to deliver cargo worldwide. The increased thrust and modern design of the new engines allow the aircraft to meet the four Key Performance Parameters relating to engine performance: time to climb, one engine climb out gradient, noise compliance, and emission compliance.
- The C-5M had several significant deficiencies, identified before the 2010 OT&E, that persisted throughout testing and affected the ability to successfully accomplish missions without workarounds and additional aircrew workload. Three major deficiency corrections have been undergoing developmental testing and are scheduled for OT&E:
 - Restricted use of thrust reversers in flight – until the thrust reversers can be deployed reliably in flight, there will be

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- a limited capability for procedures such as emergency descent and some tactical operations and descents.
 - Autothrottles – overactive in cruise operations, especially during turbulent conditions; numerous pitch and speed changes occurred, in addition to the failure of the autothrottles to maintain commanded airspeed during critical phases of flight.
 - Environmental Control System – degraded performance because of the autothrottle instabilities. During flight through turbulent air, overactive autothrottles affected the bleed air supply, resulting in little control over the Environmental Control System. This caused cabin pressure fluctuations and cabin temperatures dipped below 50 degrees Fahrenheit.
 - The C-5M is not operationally suitable. The aircraft’s ability to conduct the strategic airlift mission was limited by deficiencies in the All-Weather Flight Control System, by problems with the Embedded Diagnostics System (EDS) and built-in test (BIT) functionality, by inadequate support equipment, and by a lack of dedicated training systems.
 - Deficiencies in several aspects of C-5M support functions, identified before the 2010 OT&E began, had a significant effect on the suitability, specifically the maintainability, of the aircraft. Planned fixes for the following deficiencies are nearing readiness for test and future implementation:
 - BIT – a very high false alarm rate combined with a low fault isolation rate increased the time needed to troubleshoot and complete maintenance actions. BIT detections of critical faults did not meet the requirement of 99 percent during operational testing.
- Training Systems and Devices – aircrew and maintainer training devices specific to the C-5M are not yet available. Simulators at the contractor’s facility and on-aircraft training are used to mitigate the lack of aircrew simulators. Maintainers are trained on the aircraft, which is restricted by the aircraft availability. Some maintenance personnel saw maintenance procedures and performed corrective actions for the first time during IOT&E. This occurred because training had not yet been accomplished.
 - Information Assurance – the C-5M is susceptible to information assurance problems. The additional risk from information operations on the EDS is low. Air Mobility Command is addressing the information assurance deficiencies in the interface of the EDS. Improvements are anticipated in the next block upgrade.

Recommendations

- Status of Previous Recommendations. The Air Force is addressing previous recommendations.
- FY11 Recommendation.
 1. The Air Force should correct the remaining BIT, training, EDS, technical orders, and engine support equipment deficiencies.