

## C-17 Globemaster III Airlift Aircraft

The C-17 is a four-engine turboprop aircraft capable of airlifting large payloads over intercontinental ranges without refueling. It is intended to allow delivery of outsize combat cargo and equipment directly into austere airfields. The C-17 is required to deliver passengers and cargo between continents, provide theater and strategic airlift in both air/land and air-drop modes, and augment aeromedical evacuation and special operations missions.

IOT&E of the C-17 was conducted in three phases from May 1992 to August 1995. Based upon results of IOT&E and live fire testing, DOT&E submitted an OT&E/LFT&E report to Congress to support the full-rate initial production decision in November 1995. The report assessed the operational effectiveness and suitability of the aircraft to conduct operational missions within the context of the existing airlift system. The C-17 was judged to be operationally effective (with limitations) and operationally suitable. Combined developmental test and evaluation and follow-on test and evaluation involving the contractor, the Air Force Flight Test Center, Air Mobility Command, and the Air Force Operational Test and Evaluation Center (AFOTEC) occurred on a nearly continuous basis since the production decision in 1995.

### TEST & EVALUATION ACTIVITY

C-17 follow-on tests that verify correction of operational limitations are being monitored. These include the On-Board Inert Gas Generating System (OBIGGS), introduction of the composite material horizontal tail, an extended range fuel containment system, crew protection armor, liquid oxygen bottle design, and changes related to the Strategic Brigade Airdrop mission.

One important survivability upgrade still in progress involves improvements to the OBIGGS. High failure items (e.g., compressor, air separation module, and bleed pressure regulator) are tracked on a weekly basis to ensure spare parts are available. FY03 funding supported the initiation of a two-stage effort to improve OBIGGS. In stage one, reliability upgrades are being implemented for high failure rate items in the current OBIGGS system. In stage two, OBIGGS will be redesigned for improved reliability. The first production aircraft with the redesigned OBIGGS is aircraft P138, planned for delivery in FY05.

DT&E will continue at Edwards Air Force Base, California, as part of the Follow-on Flight Test Program. AFOTEC's Detachment 5 at Edwards Air Force Base and the Air Mobility Command's 33<sup>rd</sup> Flight Test Squadron remain involved through ongoing communication with the program office and the combined contractor/government C-17 Test Team resident at Edwards Air Force Base.

The C-17 aircraft are delivered in a block configuration with each block containing approximately fifteen aircraft. Block XIII/XIV has software modifications and improved station-keeping equipment used in flying formation with testing scheduled to be complete in 2004. Block XV is planned to contain the upgraded on-board inert gas generating system along with navigation and safety modifications. The Block XVI will contain an avionics modernization package and a weather radar modification with testing to be complete in 2006. Additional enhancements, modifications, and corrections to existing deficiencies are concurrent and include a fuel system retrofit, main landing gear deficiency corrections, and a wheel brake and tire cost saving initiative. Detailed developmental and operational test planning is underway.

Since completion of initial LFT&E testing, two major structural modifications have been incorporated that require further analyses and additional testing. The horizontal tail has been



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# AIR FORCE PROGRAMS

changed to a composite material construction, and an additional fuel tank – the Extended Range Fuel Containment System – has been added in the center-wing area of the fuselage to extend the aircraft's flight range. An agreement was reached between DOT&E and the Program Executive Office, Airlift & Trainers in January 2003 to provide available test data on the structural changes to DOT&E. The report (dated April 1984) contained data on generic composite materials rather than the composite materials actually used in the C-17 tail section. This data is considered insufficient to validate the assumptions and simulations used by the Air Force in their ballistic vulnerability analyses. To address this data void, DOT&E has requested the Air Force conduct ballistic tests on coupons of the actual C-17 composite horizontal tail structure.

## **TEST & EVALUATION ASSESSMENT**

The combined efforts of the Program Executive Office, program office, the flight test center, the test team and the user, resulted in an additional production representative aircraft will be provided to the test community to achieve a greater tempo of testing. Requests for flight test time on operational aircraft compete with high operational mission demands. Also, the large numbers of aircraft undergoing planned modifications further limit the aircraft available to perform operational missions, training, and testing. These challenges have affected the depth and duration of testing conducted following aircraft modification and upgrade.

The C-17 Test and Evaluation Master Plan (TEMP) is four years out of date. An update to the TEMP must be submitted to better address continuing flight tests, particularly the Follow-On Flight Test Program at Edwards Air Force Base, California, and operational testing by AFOTEC and the Air Mobility Command. The TEMP must also define the future LFT&E program. In addition, an updated operational test plan must be submitted for DOT&E approval that defines the scope of testing for the next four years and delineates specific responsibilities. A team has been formed to scope and define the contractor/developmental test/operational test required for that time period.