

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 airland and airdrop modes, and augment aeromedical evacuation and special operations missions.

Significant features of the C-17 include a supercritical wing design and winglets to reduce drag; in-flight refueling capability; externally blown flaps; direct lift control spoilers; high impact landing gear; a forward and upward thrust reverser system that provides backing capability; a cargo handling system that permits operation by a single loadmaster; a two-person cockpit; and maximum use of built-in test equipment to reduce maintenance troubleshooting times.

BACKGROUND INFORMATION

IOT&E of the C-17 was conducted in four phases from May 1992-June 1995. Based upon results of IOT&E and live fire testing, DOT&E submitted an Operational and Live Fire Test and Evaluation Report (B-LRIP) to Congress 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. Survivability was not sufficiently evaluated to make an assessment. A full-rate production decision, Milestone IIIB, was made in November 1995. A three-year initial period of FOT&E commenced in June 1996.

IOT&E cited deficiencies associated with personnel airdrop, including equipment and procedural shortcomings. Specific areas requiring further evaluation during FOT&E included exit rate for static line personnel drops, combination paratrooper and bundle drops, and development/refinement of personnel airdrop formations.

The C-17A completed LFT&E in 1994. Since completion of that testing, two major structural modifications have been incorporated that may require further LFT&E. The horizontal tail has been changed to a composite material construction, and an extended range fuel containment system (ERFCS) has been added in the center-wing area of the fuselage. These changes could significantly affect aircraft survivability. Furthermore, based on the total cost of these changes, the upgrades could constitute a new

program since their costs exceed that of a major system development. DOT&E has initiated a review of all changes made to the C-17 since the LFT&E report was published in November 1995.

Most of the sub-standard items identified in IOT&E have been closed. This includes deficiencies (did not meet ORD criteria), inadequacies (qualitative assessment that failed), recommendations (met criteria but had problems which could be improved), and deferrals (test not accomplished during IOT&E). Although all deficiency items are considered closed, fault isolation procedures/manuals and built-in test equipment require improvements, and the Strategic Brigade Airdrop mission has operational limitations. Efforts to include dual-row cargo/equipment airdrop are in progress to shorten the drop zone delivery time.

TEST & EVALUATION ACTIVITY

One high visibility FOT&E item still in progress is an improvement to the On-Board Inert-Gas Generating System (OBIGGS). High failure items (e.g. compressor, air separation module and bleed pressure regulator) are tracked on a weekly basis to ensure adequate spares exist. Funding for the OBIGGS improvement program is being considered for FY03.

Developmental Test and Evaluation will continue at Edwards AFB under the heading of the Follow-On Flight Test Program. AFOTEC-Detachment 5 at Edwards AFB will maintain involvement through ongoing communication with the Program Office and the C-17 Test Team resident at Edwards AFB.

C-17 FOT&E activities and program developments that affect program limitations identified in the B-LRIP report to Congress are being monitored. These include the OBIGGS, the composite material horizontal tail construction, ERFCS, crew protection armor, liquid oxygen bottle design, and other changes.

TEST & EVALUATION ASSESSMENT

The apparent limited capability for dual-row airdrops (release of two rows of cargo platforms positioned side-by-side in the aircraft) may necessitate sequential (side by side) release rather than simultaneous release of the special 88-inch wide by 16-foot long platforms to prevent collisions after they exit the aircraft. The resultant effect is an increase in delivery time and required drop zone length; however, the total number of aircraft required to drop equipment for a brigade has been reduced. At present, the combined effects of dual-row airdrop and aircraft spacing for personnel drops have positively impacted the strategic brigade airdrop execution time, which is approaching the Army's goal. In addition, the C-17 is incurring erroneous displays while flying in formation (SKE2000 station keeping equipment). These problems occur without adequate warning to the crew. Testing to verify fixes should result in operational restrictions being lifted by February 2002.

The Program Office is revising the TEMP to better address continuing flight tests, particularly the Follow-On Flight Test Program at Edwards AFB and continued operational testing by the 33 Flight Test Squadron (FLTS) at McGuire AFB. The current TEMP was approved in 1995. A revised TEMP will better address follow-on developmental testing at Edwards AFB and operational testing by AFOTEC and the 33 FLTS. In addition, an updated OT test plan will be submitted. The updated plan will focus a more detailed scope of the proposed testing for the next four years. In addition, AFOTEC will have an

increased role in future operational testing to include Global Air Traffic Management upgrades. The TEMP will also define the future LFT program.

Challenges to developmental and operational flight testing in 2002 and beyond include constraints to individual project budgets, test resources, and aircraft availability for test. Only a single dedicated aircraft exists for developmental flight testing. Requests for flight test time on operational aircraft are in stiff competition with high operational mission demands. Also, the large number of aircraft scheduled for modification has limited the available aircraft to perform mission requirements and testing. These challenges have affected the depth and duration of testing conducted following aircraft modification and upgrade.

The C-17 passed the 296,000 flight-hour mark in August 2001. The Mission Capable (MC) and Fully Mission Capable (FMC) rate have been tabulated. Results of both measures, presented as a range of monthly averages over three different measurement periods, are shown below, together with standards from the 1993 ORD and the 1998 ORD.

C-17 Flight-Hour Mission Capable (MC) and Fully Mission Capable (FMC) Rates

Measured Values

	Jun 93-Aug 95	Sep 95-Aug 97	Sep 97-Sep 99	Oct 99-Sep 01
MC	30.5-83.5%	75.7-93.0%	81.7-91.1-%	78.6-85.9%
FMC	0-74.4%	7.8-75.0%	41.6-71.5%	37.6-64.3%

Standards

	1993 ORD	1998 ORD	AMC FY98 Standards
MC	82.5%	90.0%	87.5%
FMC	74.7%	80.0%	77.5%

Notes: Standards for MC are threshold (minimum acceptable) values while FMC standards are deemed objective values (goals).

Aircraft are experiencing main landing gear post lug failures. A fleet post lug inspection is being considered using the ultrasound non-destructive inspection method to investigate this problem.

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