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Military Airlift: C-17 Program Background

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Summary

The C-17 *Globemaster III* is a long-range cargo/transport aircraft operated by the U.S. Air Force since 1993. To date, Congress has funded 190 C-17s for the Air Force. The C-17 program remains a key issue as Congress evaluates the needs of DOD's strategic airlift force. This paper provides program background for the C-17. For more detailed analysis of current issues regarding the C-17 acquisition, see CRS Report RL34264, *Strategic Airlift Modernization: Analysis of C-5 Modernization and C-17 Acquisition Issues*. This report will be updated as events warrant.

Background

The Boeing C-17 *Globemaster III* is a strategic airlift aircraft.[1] The C-17 complements the larger Lockheed-Martin C-5 *Galaxy* in the inter-theater airlift role and the Lockheed Martin C-130 *Hercules* in performing intra-theater airlift for the Department of Defense (DOD). C-17s can carry some 169,000 pounds of outsize or oversized cargo, such as an Abrams tanks or three Apache helicopters to or from small, austere runways.

The program had a difficult time winning congressional support in the late 1970s. In the absence of demonstrated additional strategic airlift requirements, C-17 development was delayed until initial funding was finally approved in FY1981. By 1982, DOD was concerned its airlift shortfall was too urgent to await development of a new plane and decided to purchase aircraft readily available for production. Thus, Congress approved funds in the FY1983 budget to purchase 50 additional C-5B cargo planes and 44 new KC-10 *Extender* aerial refueling aircraft to quickly bridge the airlift gap.[2] Because DOD wanted to develop the C-17 and buy additional C-5s, Congress directed DOD to develop a comprehensive description of its future acquisition plans. The result was the Airlift Master Plan of September 1983, which compared several alternatives for modernizing the airlift fleet and concluded that the C-17 was the most cost-effective.

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[1] Boeing acquired original C-17 manufacturer, McDonnell Douglas, in 1997.

[2] Based on McDonnell Douglas' DC-10 airliner, the KC-10 is capable of carrying 356,000 lbs. of fuel, up to 75 troops, and 170,000 lbs. of cargo. KC-10s represent approximately 12% of DOD's organic airlift capability. For more information, see CRS Report RS20941, *Air Force Aerial Refueling*, by Christopher Bolkcom.

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Performance Considerations

The Air Force states that performance characteristics of the C-17 are significantly better than those of other cargo/transport aircraft. The C-17 can land on shorter, more narrow runways and is more maneuverable on the ground in comparison to larger C-5s or commercial transport planes, such as the Boeing 747. These characteristics expand the number of bases that C-17s can operate into and the number of aircraft that can be at an airfield simultaneously.[3] In explaining the November 1995 decision to buy another 80 C-17s, DOD officials cited as a critical feature their calculations that eight C-17s could land and offload 3,852 tons per day in a space where only three modified 747s could operate delivering 1,754 tons per day.

DOD also expected the C-17 to be more cost-effective than its competitors based on projected life-cycle costs. The C-17's performance in the "reliability, maintainability, and availability evaluation" exercises of July-August 1995 confirmed its supporters' expectations about operational capabilities with favorable cost implications, in part because fewer people are needed to operate and maintain the aircraft.

As part of the 1993 omnibus agreement between the Air Force and McDonnell Douglas, DOD agreed to change certain contract specifications that were causing design and cost problems. The most noteworthy of these changes included reducing cruise speed from Mach 0.77 to Mach 0.74, maximum payload from 172,200 to 169,000 pounds, and ferry range from 4,600 to 4,300 nautical miles. Then Commander, U.S. Transportation Command, General Ronald Fogleman, said these changes did not affect critical operational requirements, explaining that a 3,200-mile mission with a 110,000-lb. payload had been established as a goal and that the C-17 would meet or exceed this requirement.

Production and Schedule

The C-17 program has experienced noteworthy turbulence as acquisition plans have fluctuated over time. The FY1985 budget included $129 million to begin full-scale development of the C-17 — with a plan to produce 210 aircraft. The Airlift Master Plan had projected a requirement for 210 C-17s, with 180 in the active fleet and 30 additional aircraft for backup and spares and for testing and evaluation. DOD was also expected to retain 114 C-5s, many of which would be turned over to the Air Force Reserve and Air National Guard. By the mid-1980s, the C-17 program appeared on track but somewhat behind schedule. Production difficulties later contributed to slipped delivery schedules and increased development costs. In April 1990, Defense Secretary Dick Cheney reduced the program from 210 to 120 production C-17s, reflecting revised estimates of airlift requirements in view of the collapsed Soviet Union and domestic budgetary constraints.

In December 1993, DOD agreed to buy another 12 C-17s during FY1994-FY1995, but Defense Secretary Les Aspin stated that the contract would end with the 40 aircraft then on order if McDonnell Douglas failed to resolve production and cost problems during that two-year period. In that event, DOD would buy a mix of C-17s and modified commercial transport planes, or C-5 military transports to replace aging C-141 *Starlifters*.

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[3] Logisticians use a concept known as "maximum on ground" (MOG) as a planning factor to measure the potential flow of various aircraft types through a mobility airfield.

By accepting the 1993 agreement, McDonnell Douglas incurred a loss of nearly $1.5 billion on the development phase of the program. In addition, the company agreed to spend $456 million in process improvements and testing. DOD agreed to provide an additional $438 million for the program — $237 million to settle claims with McDonnell Douglas and $201 million for flight testing.

In November 1995, with the C-17 program back on track, DOD decided to continue procurement of the C-17 for a total program of 120 aircraft. DOD argued that additional airlift capacity was critical and that if C-17s were not procured, other less capable cargo/transport aircraft would be needed to make up the shortfall. Most Members of Congress recognized the need for additional airlift, although some questioned the need to buy as many as 80 more C-17s.

In January 1996, the Defense Acquisition Board (DAB) approved plans to buy 80 C-17s (for a total of 120 aircraft) over a seven-year period (FY1997-FY2003) in a multiyear contract. This plan was expected to yield a 5% savings of the program's projected $18 billion cost and was viewed as less expensive in comparison to single-year buys or multiyear procurement over a longer period. Further, DOD argued buying C-17s in six or seven years would provide the planes sooner and more cost-effectively and would avoid expected funding competition with other programs after 2003. Critics argued that the long-term contract could entail financial penalties for reducing annual buys, if budgetary constraints in future years forced the DOD to choose between buying C-17s and other aircraft, such as F-22A *Raptor*.

On May 31, 1996, the Air Force and McDonnell Douglas (now owned by Boeing) signed a $16.2-billion multiyear procurement contract for 80 aircraft to be produced over seven years. The first of these 80 aircraft was delivered on August 10, 1998, bringing total deliveries to 41 aircraft. In late 1998, 14 more aircraft were added to planned buy, bringing the planned total to 134 C-17s. By late 2002, the Air Force had 100 C-17s.

In early 2002, Air Force officials asked for more C-17s. Then Commander, U.S. Transportation Command, General John Handy, said he needed 222 C-17s to meet the nation's airlift needs, representing an increase of at least 42 aircraft over his predecessor's estimate.[4] In April 2001, his predecessor General "Tony" Robertson stated that 170 to 180 C-17s were needed to meet requirements outlined in DOD's Mobility Requirements Study 2005 (MRS-05).[5] In August 2002, Boeing was awarded a $9.7 billion contract to produce an additional 60 C-17s, which would bring DOD's inventory to 180. This contract was expected to keep the Long Beach, California, production line open until 2008,[6] but appropriations conferees added an unrequested $2 billion in FY2007 to purchase an additional 10 C-17 aircraft bringing planned production to 190 C-17s and delaying scheduled production closure until 2009.

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[4] Harry Levins, "Transportation Command's Chief Emphasizes the Need for More C-17 Cargo Planes," *St. Louis Post-Dispatch*, February 2, 2002, p. 9.

[5] Marc Selinger, "DoD Needs More C-17s to Eliminate Airlift Shortfall, AMC Commander Says," *Aerospace Daily*, April 27, 2001.

[6] Peter Pae, "Boeing Lands $9.7 Billion C-17 Contract," *Los Angeles Times*, August 16, 2002.

Operational Performance

C-17s first flew in a major contingency in December 1995, when U.S. and allied nations deployed peacekeeping forces to Bosnia for Operation Joint Endeavor. In the first three months, mobility forces flew 3,827 missions, carried over 18,539 troops, and delivered more than 45,000 short tons of cargo. The C-17 — used to satisfy the Army's need for a high-capacity, short-distance airlift for peacekeepers, equipment, and outsize cargo from Central Europe to Bosnia — flew over 26% of the missions but delivered more than 44% of the cargo.[7] On one mission, C-17 crews reportedly offloaded 165,000 lbs. of cargo in less than 15 minutes.[8] A GAO assessment of the C-17's performance during Joint Endeavor (GAO/NSIAD-97-50) found mission capable rates to be 86.2% — 5 % higher than required. However, the GAO noted that the C-17 was not required to perform many tasks it had previously struggled with during operational testing, such as landing at austere airfields on short, wet runways; performing strategic airdrops of both troops and equipment; and providing aeromedical evacuation capability.

The C-17's ability to operate from austere airfields in Albania and Macedonia was demonstrated during Operation Allied Force in March-June 1999, when C-17s achieved a 96% mission-capable rate. In joint testimony before the Senate Armed Services Committee, Secretary of Defense William Cohen and Chairman of the Joint Chiefs of Staff General Henry Shelton extolled the C-17's contributions to the Kosovo conflict stating, "...the C-17 was the workhouse of the airlift force, providing for the rapid deployment of critical warfighting and humanitarian materiel." They further testified that

> Throughout Operation Allied Force, U.S. forces had to overcome many limitations in transportation infrastructure. Poor airport surface conditions in Tirana, Albania, for example, slowed aircraft turnaround times, limited throughput, and slowed the onward movement of forces and humanitarian supplies. Our transportation and other logistic assets proved to be flexible, effective, and efficient in responding to these limitations. In particular, the C-17 made the concept of direct delivery — the strategic air movement of cargo from an aerial port of embarkation to an airfield as close as practicable to the final destination, a reality.[9]

DOD stated that the C-17s high payload capacity; ability to land on short, austere airfields; and its ground maneuverability were the keys to success during this operation. Nearly all 50 of the Air Force's 50 C-17s were involved in the Balkans, flying half of the strategic airlift missions required by the operation.[10] The Air Force reported that C-17s

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[7] U.S. Army Office of Public Affairs, *Task Force Eagle SFOR X Stabilization Force*, [http://www.globalsecurity.org/military/ops/joint_endeavor.htm].

[8] U.S. General Accounting Office, *C-17 Globemaster — Support of Operation Joint Endeavor*, GAO/NSIAD-97-50, February 1997.

[9] Joint Statement of Secretary of Defense William S. Cohen and Chairman of the Joint Chiefs of Staff General Henry H. Shelton, in U.S. Congress, Senate Committee on Armed Services, *Kosovo After-Action Review*, hearing, 106th Congress, 1st Session, October 14, 1999, pp. 11-12.

[10] U.S. Department of Defense, Report to Congress, *Kosovo/Operation Allied Force After-Action Report*, January 31, 2000, p. 40.

flew 1,092 missions into the theater, with a departure reliability rate of 96%. The C-17 was also used extensively for intra-theater operations where 12 C-17s flew 430 sorties.[11]

In 1999, C-17s delivered cargo to peacekeepers in Darwin, Australia, who were preparing to quell the ethnic fighting in East Timor, Indonesia. Also in 1999, C-17s from the 437th Airlift Wing delivered cargo to victims of Hurricane Mitch in Honduras and Nicaragua. In 2001, they carried federal relief workers and supplies to flood-soaked Houston, Texas.[12]

C-17 performance has drawn praise during combat operations in Afghanistan. For example, C-17s have flown lengthy missions from Germany to Afghanistan — approximately 26 hours and 10,000 miles round trip while also moving supplies from U.S. bases directly to forward operating locations.[13] In addition, C-17s conducted humanitarian airdrops beginning on October 7, 2001, the first day of the war. Flying two to four food-drop flights per day from an altitude of 25,000 feet, each C-17 unloaded about 17,000 humanitarian daily rations over Afghanistan.[14]

In Iraq, air mobility missions accounted for 16,740, or 40%, of the 41,404 sorties (excluding sorties by special operations forces and Army helicopters, and "coalition sovereignty flights") during the Iraqi invasion.[15] U.S. Transportation Command reported that by April 10, 2003, it had flown 16,213 air mobility missions for the war, besting its total from the 1991 Persian Gulf war.[16] When Turkey declined access to attack northern Iraq from bases in Turkey, C-17s enabled a U.S. ground presence in northern Iraq, as 15 C-17s airdropped 1,100 paratroopers from the Army's 173rd Airborne Brigade before buttressing the force with an additional million pounds of equipment, M-1 Abrams tanks, and an additional 1,000 soldiers. In late 2004, C-17s stepped into the tactical airlift role along side C-130s to counter increasing convoy ambushes helping to "relieve nearly 3,500 vehicles and 9,000 convoy operators per month."[17]

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[11] Anthony Cordesman, "The Lessons and Non-Lessons of the Air and Missile Campaign in Kosovo," Center for Strategic and International Studies, March 5, 2000.

[12] Harold Kennedy, "Charleston's C-17s Flying Wherever There's a Runway," *National Defense*, December 2000; "C-17 Hauls Supplied to Houston," *Charleston (SC) Post and Courier*, June 13, 2001.

[13] David Castellon, "C-17s Get Roar of Approval For Role In Afghanistan," *Air Force Times*, May 27, 2002, p. 34, and Tony Capaccio, "Boeing $9.6 Bln Deal for More C-17s To U.S. Said Due Next Month," *Bloomberg.com.*, April 26, 2002.

[14] Richard Newman, "Tankers and Lifters for a Distant War," *Air Force Magazine*, January 2002.

[15] Lt. Gen. T. Michael Moseley, USAF, *Operation IRAQI FREEDOM — By the Numbers*, USCENTAF, Assessment and Analysis Division, Unclassified, April 30, 2003, pp. 7-8.

[16] Chuck Roberts, "C-130 Crews Keep The Supplies Coming," *Air Force News*, April 16, 2003.

[17] TSgt Don Nelson, "Increased C-130, C-17 Flights Relieve Army Ground Convoys," Air Force Print News, December 15, 2004, and Gen T. Michael Moseley, USAF, "CSAF's Vector: Air Mobility's Strategic Impact," May 23, 2007.

Recent Funding Highlights

FY2008. The Administration requested $653 million to fund C-17s in FY2008 but did not request any additional aircraft. The House DOD Authorization Bill (H.R. 1585) recommended funding for 10 additional C-17s and supported an Air Force request to retire C-5 aircraft to facilitate the purchase. However, the House stipulated that retirements could not commence until after the delivery of the 189th C-17 aircraft and until the Air Force submits an analysis comparing the costs of purchasing new C-17s versus modernizing the entire C-5 fleet.[18] The Senate DOD Authorization Bill (S. 1547) also enabled the Air Force to contribute one C-17 to NATO's proposed Strategic Airlift Capability Partnership.[19] The FY2008 DOD Authorization bill remains in conference. Appropriators deferred funding decisions on additional C-17s until the FY2008 war supplemental.[20]

FY2007. The President's budget requested approximately $3 billion in overall C-17 funding in FY2007, including funds for 12 C-17s. Both authorizers and appropriators expressed concern over DOD's plan to end C-17 procurement with FY2007 funds and directed DOD to apply funds provided in FY2006 for closing the production line, to purchasing additional aircraft and required the Air Force to maintain a minimum of 299 strategic airlift aircraft beginning in FY2009.[21] Appropriations conferees gave the C-17 program a significant boost by providing $2 billion in unrequested funding for 10 C-17s.

FY2006. The Bush Administration requested a total of $4.1 billion in C-17 funding in FY2006 and authorizers expressed support for DOD to enter into a new multiyear procurement contract for 42 additional C-17s.[22] However, DOD has not subsequently budgeted funds necessary to pursue this contract, nor did congressional appropriators fund C-17s beyond the President's budget request.[23]

FY2005. The Administration sought $4.1 billion in FY2005 C-17 funding. Appropriations conferees supported the House position to procure 15 C-17s in FY2005 and provide advance procurement for 15 aircraft in FY2006. House appropriators voiced displeasure with "the Air Force's continued use of a flawed and irresponsible financial strategy for the C-17 multi-year procurement contract." Committee members opined that Air Force C-17 funding was "an incremental financing scheme that abused the political support for the program and flaunted acquisition regulations and standard practices."[24]

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[18] H.Rept. 110-146, pp. 110-111.

[19] S.Rept. 110-77, pp. 392-393.

[20] H.Rept. 110-279, p 262.

[21] H.R. 5122, Section 132.

[22] 110th Congress, H.R. 1815, Section 131 and S. 1042, Section 133.

[23] 109th Congress, H.R. 2863.

[24] H.Rept. 108-553, p. 192.