

# CRS Report for Congress

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## Cruise Missile Inventories and NATO Attacks on Yugoslavia: Background Information

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### Summary

Press reports suggest that, as of mid-April, there were less than 100 Conventional Air-Launched Cruise Missiles (CALCMs) and between 1,000 and 1,100 Block III Tomahawk land-attack cruise missiles (TLAMs) remaining in the U.S. military inventory. No additional CALCMs will likely enter inventory for at least several months, and only small numbers of additional TLAMs are scheduled for delivery in coming months. Depending on the circumstances, other kinds of weapons can be substituted for CALCMs and TLAMs, but in some cases, particularly for carrying out precision attacks on heavily defended targets in bad weather, CALCMs or TLAMs may be the most (or only) appropriate weapons. This report is intended primarily for Members and staffers who are following Operation Allied Force or who track procurement of Air Force or Navy weapons, particularly cruise missiles. It will be updated as events warrant. The overall status of NATO military operations in and around Yugoslavia is covered in CRS Issue Brief IB10027, *Kosovo: U.S. and Allied Military Operations*.

### Introduction

This short report provides background information on the Air Force's Conventional Air-Launched Cruise Missile (CALCM) and the conventionally armed version of the Navy's Tomahawk land-attack cruise missile (TLAM). The use of dozens of these weapons in Operation Allied Force, the NATO air campaign against Yugoslavia that began on March 24, 1999, has raised concerns in Congress and elsewhere about whether the U.S. military has sufficient numbers of these weapons in inventory for the remainder of Operation Allied Force and for other potential military operations that may be carried out over the next few years.

# Report Documentation Page

Form Approved  
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>20 APR 1999</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-1999 to 00-00-1999</b>	
4. TITLE AND SUBTITLE <b>Cruise Missile Inventories and NATO Attacks on Yugoslavia: Background Information</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Congressional Research Service, The Library of Congress, 101 Independence Ave SE, Washington, DC, 20540-7500</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

## CALCM and TLAM

The CALCM and the conventionally armed version of the TLAM are the U.S. military's primary long-range, conventionally armed land-attack cruise missiles. Essentially, these weapons are small (about 20-foot-long), pilotless aircraft propelled by turbofan engines that guide themselves to their programmed targets using a combination of satellite navigation data and on-board guidance systems.

**CALCM.** The CALCM (pronounced KAL-cum) is launched by Air Force B-52 bombers. It has a range of several hundred miles and reportedly can carry a warhead weighing as much as 3,000 pounds. A single B-52 can carry as many as 20 CALCMs — 8 in a rotary launcher in the plane's internal bomb bay, and 6 under each wing. B-52s in recent combat operations reportedly have carried only 8 CALCMs each in their internal launchers because the additional aerodynamic drag caused by underwing missiles increases in-flight refueling requirements for long-distance missions.

CALCMs are produced by converting existing nuclear-armed air-launched cruise missiles (ALCMs) into conventionally armed versions of the weapon. Procurement of ALCMs began at the start of the 1980s and ended in FY1984; a total of more than 1,700 missiles were delivered between 1982 and 1986. Conversion of limited numbers of ALCMs into CALCMs started in the latter 1980s; the first CALCM may have entered service around 1988. Existence of the CALCM was not made public until Operation Desert Storm in early 1991, when the weapon was first used in combat.

**TLAM.** The conventionally armed version of the TLAM (pronounced TEE-lam) is launched from U.S. Navy cruisers, destroyers, and attack submarines. It has a range of up to about 1,000 miles and carries either a single warhead of up to 1,000 pounds (TLAM-C), a submunition dispenser with 166 bomblets (TLAM-D), or other specialized warheads. A Navy cruiser or destroyer equipped with a vertical launch system can carry several dozen TLAMs, the exact number depending on the particular class of ship in question, while a Navy attack submarine can carry as many as three dozen TLAMs.<sup>1</sup>

Tomahawks entered service in the early to mid-1980s in several variants, including a conventional anti-ship variant and a nuclear land-attack variant. The conventional land-attack variant has been upgraded over time; the latest and most capable version is the Block III, which entered service in 1993. The Block III upgrade added satellite navigation (which permits easier and more flexible route planning), the ability to precisely control the

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<sup>1</sup>U.S. Navy surface combatants use vertical launch systems to store and fire both TLAMs and other weapons (primarily surface-to-air missiles). Depending on the mix of TLAMs and other weapons loaded, Ticonderoga (CG-47) class Aegis cruisers with hull number CG-52 and higher (the final 22 ships in the 27-ship class) can carry as many as 122 TLAMs, Arleigh Burke (DDG-51) class Aegis destroyers can carry as many as 90, and most Spruance (DD-963) class destroyers can carry as many as 61. Sturgeon (SSN-637) and Los Angeles (SSN-688) class attack submarines can carry up to two dozen TLAMs in their internal torpedo magazines, depending on the mix of TLAMs and other weapons loaded. Los Angeles class submarines with hull numbers SSN-719 and higher (the final 31 ships in the class) can carry an additional 12 TLAMs in a Tomahawk-only vertical launch system installed in their forward ballast tanks. The Navy's three Seawolf (SSN-21) class attack submarines can carry as many as 50 TLAMs in their internal torpedo magazines, depending on the mix of TLAMs and other weapons loaded.

time of arrival at the target, an improved warhead, and greater range. U.S. military theater commanders tend to prefer the Block III version over the older and less capable Block II version of the weapon; the Navy testified to the Senate Armed Services Committee in March 1999 that of TLAMs used in recent military operations, about 90% have been Block IIIs.

Procurement of Tomahawks began in the early 1980s and concluded in FY1997; a total of about 4,200 Tomahawks of various kinds were procured during this period. The final 120 new-production Tomahawks procured in FY1997 were scheduled to enter inventory at a rate of 10 per month during the 12 months of FY1999 (October 1999-September 2000).

### Recent uses of CALCM and TLAM

Table 1 below shows the unclassified numbers of CALCMs and TLAMs believed to have been fired in Operation Desert Storm (the first combat use for both weapons) and in subsequent combat operations.

**Table 1. Numbers of CALCMs and TLAMs fired in combat, 1991-present**

Date	Operation name	Location of targets	Number of missiles fired	
			CALCM	TLAM
Jan.-Feb. 1991	Desert Storm	Iraq	35	288
Jan. 17, 1993	Southern Watch	Iraq	0	45
June 26, 1993	Bushwhacker	Iraq	0	23
Sep. 10, 1995	Deliberate Force	Bosnia	0	13
Sep. 3-4, 1996	Desert Strike	Iraq	13	31
Aug. 20, 1998	Resolute Response	Afghan., Sudan	0	79
Dec. 17-20, 1998	Desert Fox	Iraq	~90	~325
Mar. 24-Apr. 16, 1999*	Allied Force	Yugoslavia	~60?	~150?

Sources: For operations prior to Resolute Response: For CALCM: Information supplied to CRS by U.S. Air Force Office of Legislative Affairs, April 2, 1999. For TLAM: U.S. Congress. House. Committee on National Security. Hearings on National Defense Authorization Act for Fiscal Year 1999 — H.R. 3616, and Oversight of Previously Authorized Programs. 105<sup>th</sup> Cong., 2<sup>nd</sup> Sess., Title I — Procurement [and] Title II — Research, Development, Test and Evaluation, Hearings Held February 26, March 4, 5, 10, April 1, and June 11, 1998. Washington, 1999. p. 263. For Resolute Response and subsequent operations: newspaper and trade press reports.

\* Operation Allied Force still ongoing as of April 16, 1999; data presented are estimated numbers fired through April 16, 1999.

## Inventory levels of CALCM and TLAM<sup>2</sup>

**CALCM.** Prior to Operation Desert Fox, the Air Force reportedly had an inventory of about 238 CALCMs. Subtracting the 90 or so reportedly fired in Desert Fox would leave about 148 in inventory prior to Operation Allied Force. This is consistent with trade press reports stating that the Air Force had a total of about 150 CALCMs at the start of Operation Allied Force. If about 60 CALCMs have been used to date in Operation Allied Force, this would leave a total of about 90 still in inventory. Again, this figure is consistent with recent press reports.

**TLAM.** Press reports vary somewhat, but prior to Operation Desert Fox, the Navy reportedly was aiming to have a total of about 3,000 Tomahawks in inventory by the end of 1998, including roughly 1,500 Block III TLAMs. Subtracting the 325 or so TLAMs fired in Operation Desert Fox, would leave something less than 2,700 Tomahawks in inventory, including perhaps something less than 1,200 Block III TLAMs. If about 150 TLAMs have been used in Operation Allied Force, this might leave a total of roughly 2,500 to 2,600 Tomahawks in inventory, including perhaps about 1,000 to 1,100 Block III TLAMs. The figure of 1,100 missiles appears in at least one early-April press report. The Navy also has hundreds of older Block II TLAMs in inventory.

## Plans for additional CALCMS and Block III TLAMs

**CALCM.** In February 1999, the Air Force submitted to Congress a request to reprogram \$51.5 million in FY1999 funding to finance the conversion of 92 ALCMs into CALCMs — 90 to replace the missiles fired in Operation Desert Fox, and 2 for use as test missiles. Also in February 1999, the Air Force submitted to Congress an “unfunded priorities” letter — the service’s so-called “wish list” — for FY2000 which included, as the first item among 20 unfunded modernization priorities, a \$140.2-million proposal to convert an additional 230 ALCMs into CALCMs over the 4-year period FY2000-FY2003.<sup>3</sup> Given the work involved in converting ALCMs into CALCMs, if Congress acts quickly to approve the FY1999 reprogramming request, it likely will be at least several months before any additional CALCMs enter inventory. (The Air Force testified to Congress in late March that it might take about a year.)

**TLAM.** The Navy is now developing a substantially modified and updated version of the Tomahawk known as the Tactical Tomahawk (TACTOM). Compared to the original Tomahawk produced over the years in many versions, TACTOM is to be both more capable and significantly less expensive to procure. Procurement of TACTOM is scheduled to begin in FY2002; a total of 1,353 missiles are to be procured during the period FY2002-FY2008. The first TACTOMs will enter inventory in around 2004.

As part of its FY2000 budget submission and FY2000-FY2005 Future Years Defense Plan (FYDP), the Navy requested about \$50.9 million in FY2000 to remanufacture 148 Block II TLAM-Ds into Block III TLAM-Cs, and plans to request \$59.6 million in FY2001 to remanufacture an additional 176 Block II TLAM-Ds into Block III TLAM-Cs.

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<sup>2</sup>Information in this section is based on newspaper and trade press reports.

<sup>3</sup>Ryan’s Unfunded Priority Letter. *Inside the Air Force*, February 26, 1999: 5.

These requests, if approved, would not increase the total number of Tomahawks in inventory, but they would increase the number of Block III TLAMs within the inventory by a total of 324 missiles — about enough to replace those used in Operation Desert Fox. The 148 remanufactured missiles requested for FY2000 would be delivered at a rate of 12 or 13 missiles per month during the 12 months of FY2002 (October 2001-September 2002); the 176 remanufactured missiles that are to be requested for FY2001 would be delivered at a rate of 14 or 15 missiles per month during the 12 months of FY2003 (October 2002-September 2003).

In mid-April, it was reported that the Navy has expanded this plan to include the remanufacturing of an additional 300 Tomahawks — 100 Block II TLAM-Cs and 200 Tomahawk anti-ship missiles — into Block III TLAMs. According to the report, the total cost for the expanded, 624-missile remanufacturing plan would be about \$420 million.<sup>4</sup>

## Discussion

Given the time needed to convert ALCMs into CALCMs, the Air Force for at least the next several months must manage a fixed inventory of CALCMs. Similarly, given the time needed to remanufacture Block II TLAMs into Block III TLAMs, the only additional TLAMs that will enter inventory over the next several months are the final 120 Tomahawks procured in FY1997, which, as discussed earlier, are to be delivered to the Navy at a rate of 10 per month.

Cloudy, foggy, or rainy weather can make it difficult or impossible to carry out precision air attacks using laser- or video-guided bombs. For conducting precision air attacks in bad weather, the U.S. military consequently is relying on the CALCM, the Block III TLAM, and a third weapon known as the Joint Direct Attack Munition (JDAM). The JDAM is a precision-guided glide bomb dropped from manned aircraft. It has a range of about 15 miles and, like the CALCM and the Block III TLAM, is guided to the target by the satellite Global Positioning System (GPS), which is not affected by bad weather.<sup>5</sup>

Unlike the relatively short-ranged JDAM, CALCMs and TLAMs, with their long standoff ranges, are particularly useful for attacking heavily defended targets that would pose an unacceptable risk of loss of a manned aircraft and the loss or capture of its crew. CALCMs, with warheads reportedly of up to 3,000 pounds in weight (as opposed to 1,000 pounds for Tomahawks or 500, 1,000, or 2,000 pounds for bombs dropped by aircraft), are particularly useful in attacking strengthened targets whose destruction is best accomplished with one or more very large warheads.

If the weather is clear, or if the target is not time-urgent and planners can wait for the weather to clear, laser- or video-guided bombs can be used instead of CALCMs, TLAMs,

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<sup>4</sup>U.S. Navy Scrambles for Tomahawk Missiles. *Defense News*, April 19, 1999: 2.

<sup>5</sup>Compared to traditional, unguided (i.e., “dumb”) gravity bombs, precision-guided weapons can destroy many kinds of targets more thoroughly, at less cost, or with less risk of collateral damage to nearby buildings or populations whose destruction is not desired. Unguided gravity bombs, however, are adequate or more cost-effective for attacking some kinds of targets, particularly wide-area targets. About 90% of the weapons used in Operation Allied Force have been precision-guided weapons.

or JDAMs. If the weather is bad and the target is time-urgent, but the risk to manned aircraft is deemed acceptable, JDAMs can be used instead of CALCMs and TLAMs. If the weather is bad, the target is time-urgent, the risk of aircraft loss unacceptably high, but the target can be destroyed with a combination of 1,000-pound warheads, TLAMs might be used instead of CALCMs. If the weather is bad, the target is time-urgent, the risk to manned aircraft is unacceptably high, and the target cannot be effectively destroyed with something less than a 3,000-pound warhead, then CALCM may be the only appropriate weapon. It is not clear how many such CALCM-specific situations might arise during the remainder of Operation Allied Force.

Although the remaining inventory of Tomahawks, including Block III TLAMs, is much larger than the remaining inventory of CALCMs, Tomahawks are loaded aboard Navy cruisers, destroyers, and attack submarines that are routinely forward-deployed overseas. The cruisers, destroyers, and attack submarines in a forward-deployed Navy aircraft carrier battle group might carry a total of 300 or more Tomahawks in their missile launchers. Since the Navy normally maintains 2 or 3 forward-deployed carrier battle groups at any one point, a total of 600, 900, or more Tomahawks might be forward-deployed at any given moment. When viewed against this number, as well as commanders' preference for using Block III TLAMs and the need for a certain percentage of Tomahawks to be in the factory at any point for recertification and maintenance, the Tomahawk inventory situation, particularly for Block III TLAMs, may be tighter on a fleet-wide basis than total numbers might suggest at first.