

Trident Nuclear Weapon Submarines in the United Kingdom and the United States



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The UK-US Relationship on Trident

The United Kingdom's Trident missiles are purchased directly from the United States under the terms of the 1963 UK-US Polaris Sales Agreement, amended in 1980 and 1982 to govern cooperation over the Trident I (C4) and Trident II (D5) generations of submarine-launched ballistic missiles (SLBMs), respectively. Cooperation between the two states' nuclear weapons complexes operate under the 1958 Mutual Defence Agreement, renewed every decade and up again for renewal next year (2014). The UK does not actually own any individual missiles, but purchased the rights to 58 missiles from a common pool held at the US Strategic Weapons facility at the Kings Bay Submarine Base, Georgia.

Arsenals

The Trident system is composed of four parts: the nuclear warheads, their Trident missile delivery system, the nuclear-powered submarines (SSBNs), and the supporting infrastructure.

UK Vanguard-Class Fleet¹

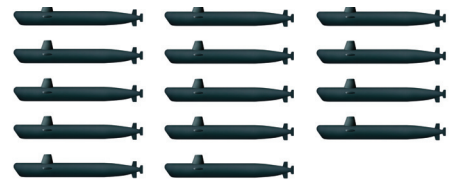
- The UK fleet consists of four submarines, with at least one out on patrol at any one time (a policy of continuous at-sea deterrence, or CAS-D).
- Each submarine can carry up to 16 Trident II (D5) submarine-launched ballistic missiles (SLBMs), each with an approximate range of 4,600 miles and with a high confidence of landing within 90 metres of its target.
- Each Trident missile can deliver up to 12 independently-targeted warheads, giving each Vanguard submarine the capability to deliver 192 warheads. This was limited to 48 by the Labour government in 1998, and further to 40 by the current government in 2010.
- The UK's total warhead stockpile as of 2010 was 225 warheads (all allocated to the Trident system), of which 160 are classed as 'operationally deployed'. The government decided in 2010 to limit by the mid-2020's the total to 180, of which 120 will be operationally deployed.

US & UK Trident nuclear weapon submarines

Four UK submarines



Fourteen US submarines



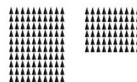
Each UK submarine can carry up to 16 Trident missiles



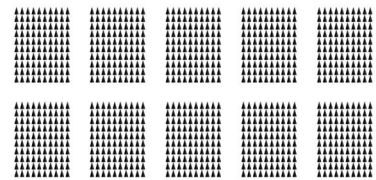
Each US submarine can carry up to 24 Trident missiles



Each Trident missile can carry up to 12 warheads



The UK has 160 'operational' warheads
The US has about 1000



US Ohio-Class Fleet²

- The US fleet currently consists of 14 Ohio-class Trident submarines, with eight deployed in the Pacific Ocean and six in the Atlantic. There are thought to be around eight submarines on patrol at any one time.³
- Each submarine can carry up to 24 Trident II (D-5) missiles (identical to those available to the UK).
- The fleet currently has around 1,000 warheads operationally available; that number will decline as the United States completes implementation of the New START Treaty before 2018.

1 Ritchie, Nick, *Replacing Trident: Background Briefing for Parliamentarians*, Bradford Disarmament Research Centre, Department of Peace Studies: University of Bradford, January 2011, pp. 1 - 7: <http://www.york.ac.uk/media/politics/documents/research/MPs.pdf>

2 Lindborg, Chris and Christopher Carr, *What's next with Trident in the United States?*, BASIC Backgrounder, April 2011, page 2: <http://www.basicint.org/sites/default/files/BASICBackgrounder-TridentUS-April2011.pdf>

3 Kristensen, Hans, *Declining Deterrent Patrols Indicate Too Many SSBNs*, FAS Strategic Security Blog, April 30, 2013, <http://blogs.fas.org/security/2013/04/ssbnpatrols/#more-6006>

The future of the fleets

- The first US Ohio-class submarine is due to retire in 2027; the remaining will be retired at a rate of roughly one boat per year thereafter, with the last in 2040.
- The US plans to finalise a new submarine design by 2018, begin construction in 2021 and deploy the first of 12 new submarines in 2028.
- The US and UK are working on a Common Missile Compartment (CMC) for the Vanguard and Ohio-class replacements, to carry the successor to the current Trident II (D5) missile.
- The delay to the UK Trident replacement program announced in the 2010 SDSR brings the UK program closer in line with the US program.

Funding nuclear weapons

Estimated⁵ cost per submarine and total program cost (2013 prices) – United Kingdom

- Estimated cost of four submarines: £12.8bn – £16.25bn.
- Estimated Total Program Cost: £17.4bn – £23.2bn.
 - Four new submarines: £12.8bn – £16.25bn.
 - Future refurbishment/replacement of warhead: £2.3bn – £3.5bn.
 - Infrastructure: £2.3bn – £3.5bn.
 - Participation in the US Trident II missile life extension program: £290 million.
- The total program cost of Trident is estimated at £17.4bn – £23.2bn but overall capital costs could exceed £30bn. The annual running costs are about £1.5bn.

Estimated cost per submarine and total program cost – United States⁶

- Estimated cost of each new submarine from \$4.9bn to \$5.6bn.
- Estimated Total Program Cost: \$93,062.4bn.
- The US has a capital spend planned at least \$179 billion over 2010-2018 on the entirety of its nuclear triad, including ICBMs and bombers.
- The estimated cost of producing, maintaining and operating the nuclear triad is expected to exceed \$500 billion over the next two decades.
- The difficulty with attaining exact figures is that at present there is no congressional requirement to have a stand alone nuclear budget.⁷
- The current level of funding greatly exceeds the average annual expenditure on nuclear deterrent during the Cold War (\$5.1 billion in inflation-adjusted dollars).

Trident Renewal Timeline⁴

Year	US Renewal	UK Renewal	
2007	Preliminary studies for next generation submarine – SSBN(X)	Strategic Defence and Security Review (SDSR) resets timetable	
2010			
2011 2013			
2014	US Pres. Election Finalise new submarine design Construction begins	BASIC Trident Commission Final Report released	
2015		UK General Election	
2015		New government releases Strategic Defence and Security Review (SDSR)	
2016		Main Gate Decision: construction begins	
2016			
2018			
2021			
2026		HMS Vanguard retires and new sub begins sea trials	
2028		1st new sub deployed	1st new sub deployed

4 Ritchie, Nick, *Replacing Trident: Background Briefing for Parliamentarians*, Bradford Disarmament Research Centre, Department of Peace Studies: University of Bradford, January 2011, page 4: <http://www.york.ac.uk/media/politics/documents/research/MPs.pdf>

5 Adjusted for inflation: estimated costs based on 2006-2007 financial year, adjusted for 2013 – 2014 financial year

6 O'Rourke, Ronald., *Navy Ohio Replacement (SSBN(X)) Ballistic Missile Submarine Program: Background and Issues for Congress*, Congressional Research Service, October 22nd 2013: <http://www.fas.org/sgp/crs/weapons/R41129.pdf>

7 Nuclear Threat Initiative, *US Nuclear Weapons Budget: An Overview*, September 27th 2013, <http://www.nti.org/analysis/articles/us-nuclear-weapons-budget-overview/>