



## The British nuclear stockpile, 1953–2013

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### Abstract

Recent research has revealed new facts about the British nuclear arsenal over a 25-year period starting in 1953. This accounting and the authors' own research support an estimate that the British produced about 1,250 nuclear warheads between 1953 and 2013. From a peak of about 500 warheads in the period between 1974 and 1981, the UK arsenal has now been reduced to some 225 weapons.

### Keywords

British nuclear arsenal, British nuclear history, John R. Walker, Project E

Research released over the last few years has disclosed new facts about the size, composition, and evolution of the British nuclear stockpile.<sup>1</sup> In his report “British Nuclear Weapon Stockpiles, 1953–1978,” arms control historian John R. Walker (2011) drew upon official declassified documents at the National Archives at Kew, UK, to provide an accounting of the British stockpile over a 25-year period early in the Cold War.

While Walker notes that key pieces of information, including numbers of warheads used for analysis and testing, may be missing, until more elaboration is forthcoming his research will stand as the best estimate available of the types and numbers of British nuclear warheads for the years he studied.<sup>2</sup>

In light of this new information, we now estimate that the British produced

approximately 1,200 warheads of nine types from 1953 to 2013 (see Tables 1 and 2), plus an additional 45 test devices or test weapons,<sup>3</sup> for a total of some 1,250. This represents an increase from our earlier estimate that approximately 850 warheads were built. This new figure is equivalent to about 2 percent of the 66,500 warheads that the United States has produced (Norris and Kristensen, 2009). During the peak years of 1974 to 1981, the British stockpile included approximately 500 warheads. The peak total yield was approximately 150 megatons in 1967.

From the mid-1950s, the British stockpile grew numerically and, with the introduction of the hydrogen bomb, in yield as well. Those peaks are long past as retirement of Royal Air Force (RAF) bombers and Royal Navy aircraft from nuclear missions leaves the Trident II

**Table 1.** British nuclear warheads, 1953–2013

YEAR	BLUE DANUBE	RED BEARD (RAF)	RED BEARD (RN)	YELLOW SUN MK1	YELLOW SUN MK2	BLUE STEEL	POLARIS	CHEVALINE	TRIDENT II	WE 177A/B/C (RAF)	WE 177A (RN)	TOTAL/YIELD KT OR MT
1953	1	–	–	–	–	–	–	–	–	–	–	1/16 KT
1954	5	–	–	–	–	–	–	–	–	–	–	5/80 KT
1955	10	–	–	–	–	–	–	–	–	–	–	10/160 KT
1956	50	–	–	–	–	–	–	–	–	–	–	50/800 KT
1957	58	–	–	–	–	–	–	–	–	–	–	58/928 KT
1958	58	–	–	2	–	–	–	–	–	–	–	60/1.7 MT
1959	58	–	–	20	–	–	–	–	–	–	–	78/9 MT
1960	58	10	–	37	–	–	–	–	–	–	–	105/16 MT
1961	58	10	–	37	50	–	–	–	–	–	–	155/66 MT
1962	10	70	5	20	86	20	–	–	–	–	–	211/115 MT
1963	0	110	20	0	86	40	–	–	–	–	–	256/128 MT
1964	–	110	35	–	86	40	–	–	–	–	–	271/126 MT
1965	–	110	35	–	86	40	–	–	–	–	–	271/126 MT
1966	–	110	35	–	86	40	–	–	–	10	–	281/133 MT
1967	–	110	35	–	86	40	54	–	–	30	–	355/153 MT
1968	–	94	35	–	0	40	108	–	–	40	–	317/82 MT
1969	–	10	35	–	–	40	156	–	–	60	5	306/96 MT
1970	–	0	35	–	–	0	250	–	–	80	10	375/79 MT
1971	–	–	30	–	–	–	250	–	–	92	40	412/81 MT
1972	–	–	20	–	–	–	250	–	–	110	43	423/85 MT
1973	–	–	0	–	–	–	250	–	–	207	43	500/144 MT
1974	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1975	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1976	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1977	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1978	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1979	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1980	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1981	–	–	–	–	–	–	250	–	–	207	43	500/144 MT
1982	–	–	–	–	–	–	100	35	–	207	43	385/121 MT
1983	–	–	–	–	–	–	50	80	–	207	43	380/120 MT
1984	–	–	–	–	–	–	0	100	–	207	43	350/114 MT
1985	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1986	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1987	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1988	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1989	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1990	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1991	–	–	–	–	–	–	–	100	–	207	43	350/114 MT
1992	–	–	–	–	–	–	–	100	–	150	0	250/88 MT
1993	–	–	–	–	–	–	–	100	–	150	–	250/88 MT
1994	–	–	–	–	–	–	–	100	–	150	–	250/88 MT
1995	–	–	–	–	–	–	–	70	64	40	–	234/38 MT
1996	–	–	–	–	–	–	–	35	128	40	–	203/38 MT
1997	–	–	–	–	–	–	–	35	128	40	–	203/38 MT
1998	–	–	–	–	–	–	–	0	200	40	–	240/38 MT
1999	–	–	–	–	–	–	–	–	240	0	–	240/24 MT
2000	–	–	–	–	–	–	–	–	280	–	–	280/28 MT
2001	–	–	–	–	–	–	–	–	280	–	–	280/28 MT
2002	–	–	–	–	–	–	–	–	280	–	–	280/28 MT
2003	–	–	–	–	–	–	–	–	280	–	–	280/28 MT
2004	–	–	–	–	–	–	–	–	280	–	–	280/28 MT
2005	–	–	–	–	–	–	–	–	280	–	–	280/28 MT
2006 <sup>1</sup>	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2007	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2008	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2009	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2010 <sup>2</sup>	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2011	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2012	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT
2013	–	–	–	–	–	–	–	–	225	–	–	225/22.5 MT

1. "We have now decided to make a further reduction in the number of operationally available warheads. This will be reduced from the present position of fewer than 200 to fewer than 160. Also we will make a corresponding 20 percent reduction in the size of our overall warhead stockpile which includes a small margin to sustain the operationally available warheads" (Secretary of State for Defence and Secretary of State for Foreign and Commonwealth Affairs, 2006: 12).

2. "So I am pleased to announce today that, for the first time, the Government will make public the maximum number of nuclear warheads that the United Kingdom will hold in its stockpile—in future, our overall stockpile will not exceed 225 nuclear warheads. This is a significant step forward on previous policy, which was to publish only the number of warheads classed as 'operationally available'; the maximum number of which will remain at 160" (Hague, 2010: Column 181).

The numbers and types of warheads over a 60-year period, starting in 1953, with an estimate of the stockpile yield for each year. Our research extends Walker's data from 1978 to 2013. Sources: Walker (2011) and authors' own estimates.

**Table 2.** The British nuclear arsenal, 1953–2013

WARHEADS/WEAPONS	YEARS TESTED	STOCKPILE ENTRY–EXIT	NUMBER	DELIVERY SYSTEMS AND COMMENTS
<b>WARHEADS OF BRITISH DESIGN AND MANUFACTURE</b>				
Blue Danube bomb	1952–1953	1953–1962	58	Valiant B.1, Vulcan B.1/1A, Victor B.1/1A bombers. Nagasaki-type fission weapon. First tested in Australia, October 3, 1952, Operation Hurricane. Yield 16 KT.
Red Beard bomb (RAF)	1956–1957	1960–1972	110	Canberra B.15/16, Valiant B.1, Lightweight (2,000 lb) fission bomb, yield 15 KT; also could be used as primary for H-bomb.
Red Beard bomb (RN)	1956–1957	1962–1972	35	Scimitar F.1, Buccaneer S.1/S.2.
Yellow Sun, Mk 1 bomb	1958	1959–1963	37	Vulcan B.1/1A, Victor B.1/1A. Yield 400 KT, 7,000 lbs.
<b>WARHEADS OF US DESIGN, BRITISH MANUFACTURE</b>				
Yellow Sun, Mk 2 bomb	1956 (US)	1961–1967	86	Vulcan B.1/B.2, Victor B.1/B.2 bombers. "Red Snow" warhead, copy of US B28; gradual replacement by WE 177 beginning in 1966. Yield 1 Megaton.
Blue Steel ASM	1956 (US)	1962–1969	40	Vulcan B.2A, Victor B.2R. Copy of W28 (warhead for US Hound Dog missile).
WE 177A bomb (RAF)	1963–1968 (US)	1969–1998	54	Vulcan B.2, Buccaneer S.2A/B, Jaguar GR.1, Tornado GR.1. Probable copy of US B61 bomb. <sup>1</sup> Yield 10 KT by only using fission first stage, no fusion secondary. Weight 600 lbs, 112 inches long.
WE 177B bomb (RAF)	1963–1968 (US)	1966–1995	53	Weight 950 lbs, 133 inches long x 16 inch diameter. Yield options to 450 KT. UK designation ZA297.
WE 177C bomb (RAF)	1963–1968 (US)	1972–1995	125	Similar size and weight to WE177B for UK aircraft in Germany. Yield 200 KT.
WE 177A bomb (RN)	1963–1968 (US)	1969–1991	43	Depth bomb for ASW, Buccaneer S.2, Sea Harrier FRS.1, Sea King, Lynx, Wessex, Wasp. Yield 0.5 KT by only using first fission stage, no fusion secondary. Known as PT176.
<b>WARHEADS OF BRITISH DESIGN AND MANUFACTURE FOR US DELIVERY SYSTEMS</b>				
Polaris A3T SLBM	1962 (US)	1967–1983	250	Four Resolution-class SSBNs. Variant of the Livermore designed W58 (warhead for US Polaris A3 SLBM/200 KT). UK designation ET317. UK test at NTS on September 10, 1965, shot Charcoal. Repeat of shot Courser (September 25, 1964), which failed; zero yield. Nominal loading, three RVs per missile.
Polaris A3TK SLBM	1974–1981	1982–1996	100	Chevaline. Four Resolution-class SSBNs. Design tested at NTS 1974–80. Variant of Livermore designed W58/200 KT. Nominal loading two RVs per missile with hardening, penetration aids and decoys.
Trident II SLBM	1982–1992	1995–to date	225	Vanguard-class SSBNs. Warhead similar to Los Alamos W76/100 KT.

(continued)

**Table 2.** Continued

WEAPON	YEARS TESTED IN US	DEPLOYED WITH UK FORCES	NUMBER	COMMENTS
<b>US WARHEADS FOR BRITISH DELIVERY SYSTEMS</b>				
Mark 5 bomb	1951–1955	1958–1966	48	Project E. For Canberra B.(I) 6/8 squadrons in Germany (replaced by B28 and B43). Lightweight/small diameter (approximately 3,000 lbs/3.75 feet).
Mark 7 bomb	1960–1968			Project E. For Canberra B.(I) 6/8 squadrons in Germany (replaced by B28 and B43). 1,650 lbs.
B28/43 bomb	1956/1958/1961	1960–1976	96	48 Project E warheads for NATO Valiants in the UK (1960–1965), then 48 Project E warheads for NATO Canberra B.(I)6/8 (1965–1972) and Phantom FGR.2 (1972–1976) in Germany.
Mark 34 Lulu	1957–1958	1965–1971	60	ASW depth bombs for Shackleton MR.3.
B57 depth bomb	1956–1958	1970–1992	65	ASW depth bombs for Nimrod MR.1/2, replaced Mk 34/Shackleton in 1972, final withdrawal of B57 in 1992.
W7 Corporal	1951–1953	1958–1965, 1966	100	Two regiments in Germany/BAOR, replaced by Honest John with UK forces.
W31 Honest John	1953–1955	1960–1978	120	Six batteries in three regiments in Germany/BAOR, replaced by Lance.
W70 Lance	1961–1964	1976–1992	85	In Germany, withdrawn unilaterally.
W33 8-inch	1953–1955	1960–1987	36	Six batteries in three regiments in Germany/BAOR, mission eliminated by 1988.
W48 155mm	1955–1957	1968–1991	36	Artillery in Germany, withdrawn unilaterally.
B54/W45 ADMs	1957–1958	1966–1982	50	In Germany, Medium Atomic Demolition Munitions withdrawn around 1982.

Sources: Walker (2011) and authors' own estimates.

1. The United States conducted a series of underground tests at the Nevada Test Site to certify the B61 bomb's yield and to confirm its military characteristics. It is estimated that six tests were conducted in 1966: Sienna, Lime, Ochre, Chartreuse, Halfbeak (on June 30, at full yield: 365 kilotons), and Daiquiri. As the data were shared, it was probably not necessary for the British to test the WE177 independently to confirm the design.

submarine-launched ballistic missile for Vanguard nuclear submarines as the sole nuclear weapon remaining in the British stockpile. We estimate that there are approximately 225 warheads in the current stockpile (Kristensen and Norris, 2011).

The British nuclear stockpile was supplemented by a US stockpile, held in

custody for British forces operating the delivery systems (see Tables 2 and 3) during the Cold War. These US weapons included gravity bombs, missile warheads, artillery shells, and atomic demolition munitions. Some of the US weapons were deployed in the United Kingdom, but most were with RAF and British

**Table 3.** US warheads for British forces, 1958–1992

YEAR	MK 5/7	B28/43	MK 34 LULU	B57 ASW	CORPORAL W7	HONEST JOHN W31	LANCE W70	8-INCH W33	155-MM W48	ADMS B54/W45	TOTAL
1958	48	–	–	–	100	–	–	–	–	–	148
1959	48	–	–	–	100	–	–	–	–	–	148
1960	36	16	–	–	100	120	–	36	–	–	308
1961	24	48	–	–	100	120	–	36	–	–	328
1962	24	48	–	–	100	120	–	36	–	–	328
1963	24	48	–	–	100	120	–	36	–	–	328
1964	24	48	–	–	100	120	–	36	–	–	328
1965	12	36	60	–	100	120	–	36	–	–	364
1966	0	48	60	–	100	120	–	36	–	25	389
1967	–	48	60	–	0	120	–	36	–	50	314
1968	–	48	60	–	–	120	–	36	36	50	350
1969	–	36	60	–	–	120	–	36	36	50	338
1970	–	24	30	30	–	120	–	36	36	50	326
1971	–	24	15	45	–	120	–	36	36	50	326
1972	–	36	0	60	–	120	–	36	36	50	338
1973	–	36	–	60	–	120	–	36	36	50	338
1974	–	36	–	65	–	120	–	36	36	50	343
1975	–	36	–	65	–	120	–	36	36	50	343
1976	–	0	–	65	–	120	85	36	36	50	392
1977	–	–	–	60	–	120	85	36	36	50	387
1978	–	–	–	60	–	120	85	36	36	50	387
1979	–	–	–	60	–	0	85	36	36	50	267
1980	–	–	–	60	–	–	85	36	36	50	267
1981	–	–	–	60	–	–	85	36	36	50	267
1982	–	–	–	60	–	–	85	36	36	25	242
1983	–	–	–	60	–	–	85	36	36	0	217
1984	–	–	–	60	–	–	85	36	36	0	217
1985	–	–	–	60	–	–	85	36	36	0	217
1986	–	–	–	60	–	–	85	36	36	0	217
1987	–	–	–	60	–	–	85	36	36	–	217
1988	–	–	–	40	–	–	85	0	36	–	161
1989	–	–	–	40	–	–	85	–	36	–	161
1990	–	–	–	40	–	–	85	–	36	–	161
1991	–	–	–	40	–	–	85	–	36	–	161
1992	–	–	–	0	–	–	0	–	0	–	0

US nuclear weapons systems were provided to the United Kingdom under "Project E," which supplied the Royal Air Force with nuclear weapons at a time when the British had built just a handful, and for NATO missions, primarily in Germany. Although kept in US custody, the weapons would have been released to British forces upon proper authorization. Sources: Walker (2011) and Norris et al. (1994).

Army of the Rhine units in Germany. Among the former weapons were Thor ballistic missiles,<sup>4</sup> gravity bombs for US fighter bombers at several RAF bases,<sup>5</sup> and antisubmarine warfare depth charges for US, Dutch, and British aircraft.<sup>6</sup>

The number of US weapons stockpiled for British forces during the 1960s and 1970s was in the range of 300 to 400, dropping to between 150 and 250 in the 1980s; they were totally withdrawn by 1992. There were also US warheads for US military forces based in the United Kingdom,

but these, too, have been removed and are not included in the tables.<sup>7</sup>

The United States no longer supplies any warheads to British forces. In September 1991, President George H. W. Bush announced that all remaining artillery shells, Lance missile warheads, and tactical naval weapons would be returned to the United States and dismantled. On July 2, 1992, the Pentagon announced that all had been returned to US territory.

Meanwhile, Britain's unilateral initiatives caused its stockpile to decrease by

one-third, from approximately 350 to around 225.

The British nuclear stockpile went through stages similar to those that most nuclear powers have traveled: initially achieving fission bombs, then boosting them, and then creating hydrogen bombs, throughout the process miniaturizing and adapting all types of warheads to fit a variety of missiles and aircraft. What is unique in the British case is the close collaboration with the United States in research, development, and testing of warhead designs. The British government is to be commended for being transparent about a topic once shrouded in secrecy. With the disclosure of details about the UK nuclear stockpile based on declassified official documents, scholars can fill in some of the gaps in the historical record.

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### Notes

1. See Walker (2011) and the program on British nuclear history at the Mountbatten Centre for International Studies and the working papers the program has published: Wynn (1994), Arnold (2001), and Simpson (2011).
2. At any given time, a certain number of warheads are taken apart for analysis and surveillance. Some are reassembled and returned to the stockpile, while others are disposed of because the components were destroyed in taking them apart. A few warheads may be converted into Joint Test Assemblies, from which the nuclear material is removed and replaced with an instrumentation package that transmits data when the full delivery system is tested (e.g., during test launches of ballistic missiles fired from British submarines). One uncertainty concerns a table published by the government in the 1998 White Paper that shows reductions in the stockpile since the peak in the 1970s, and—when compared with government statements in 2006 and 2010—appears to show a somewhat larger stockpile in the 1970s, 1980s, and 1990s (Secretary of State for Defence, 1998). Another uncertainty in counting nuclear weapons involves determining when a warhead is no longer considered part of the stockpile. Is it after it has been retired, or only later, when it is dismantled? We do not have the figures for the aforementioned activities.
3. This includes 21 UK atmospheric tests in Australia and the Pacific between October 3, 1952 and September 23, 1958 and 24 joint US–UK underground tests at the Nevada Test Site from March 1, 1962 to November 26, 1991.
4. The formal agreement to deploy Thors in Great Britain was signed on February 22, 1958. The Thor had a range of 1,740 miles and carried one W49Y2 warhead with a yield of 1.4 megatons. On June 22, 1959, the Strategic Air Command (SAC) transferred the first Thor squadron to the 77th RAF Strategic Missile Squadron. In addition, SAC assigned a detachment to each Thor squadron to retain custody and control and provide maintenance for re-entry vehicles and warheads; receive and initiate US warhead release orders; operate US Air Force communication facilities; and provide training to the RAF. Four squadrons became operational between June 1959 and April 22, 1960, when the final Thor squadron was transferred to the RAF. On June 3, 1960, the first Thor missile was mated to its warhead. From June 1960 until late November 1962 there were 60 Thors deployed in Great Britain.
5. The 48th Tactical Fighter Wing at RAF Lakenheath and the 20th Tactical Fighter Wing at RAF Upper Heyford were the main bases. See Arkin and Fieldhouse (1985).
6. Naval Aviation Weapons Facilities at Machrihanish and St. Mawgan.
7. See Kristensen (2008).

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