1. Nuclear weapons

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

Progress in US and Soviet military programmes during 1984 presaged the significant qualitative and quantitative expansion and improvement of nuclear arsenals planned by the superpowers for the late 1980s and early 1990s. Nonetheless, during 1984 sustained increases occurred in the number of nuclear weapons, especially in the strategic nuclear stockpile. Approximately 800 strategic nuclear weapons were added to the US stockpile as a result of the commissioning of two Trident submarines and the activation of two more air-launched cruise missile (ALCM)-equipped B-52 bomber squadrons. The Soviet Union also appears to have virtually completed the MIRVing of its intercontinental ballistic missile (ICBM) force, resulting in at least a fourfold increase in strategic warheads since the late 1970s, while actively pursuing the deployment of a number of shorter-range nuclear systems. Both the United States and the Soviet Union also deployed their first modern long-range sea-launched cruise missiles (SLCMs) (see section V).

Whereas in 1983 the focus was on key decisions and milestones in the modernization of offensive nuclear forces (e.g., the Scowcroft Commission report on ICBM modernization, and the initial deployment of Pershing II and ground-launched cruise missiles (GLCMs) in Europe; see *SIPRI Yearbook 1984,* chapter 1), 1984 was dominated by discussions relating to President Reagan's Strategic Defense Initiative (SDI). Indeed, as the United States and the Soviet Union manoeuvred towards one another to try and find a way to resume arms negotiations, SDI replaced the Pershing II missile as the main Soviet focus and obstacle.

The SDI programme (and ideology) is extraordinarily radical. It is beginning to force open a debate about the fundamental structure and relationship of US and Soviet nuclear forces and doctrines. Depending on how much the plans will be translated into actual systems, it either redefines or overthrows the fact of mutual deterrence. President Reagan and other SDI supporters have claimed that strategic defences would provide an alternative to a Mutual Assured Destruction (MAD)

doctrine. The FY 1984 Annual Report to Congress of the Secretary of Defense reaffirmed the overall objectives of the 'countervailing strategy' of the Carter Administration, but emphasized that "deliberately designing weapons aimed at populations is neither necessary nor sufficient for deterrence. If we are forced to retaliate and can only respond by destroying population centers, we invite the destruction of our own population. Such a deterrent strategy is hardly likely to carry the conviction as a deterrent".[1]

The Administration characterization of MAD serves to justify not only new counterforce weapons but SDI as well. But as a number of strategic experts wrote in *Scientific American,* MAD "is not a policy or a doctrine but rather a fact of life. It simply descended like a medieval plague—a seemingly inevitable consequence of the enormous destructive power of nuclear weapons, of rockets that could hurl them across almost half of the globe in 30 minutes and of the importance of political institutions in the face of such momentous technological innovations".[2]

Although the SDI programme did not become a major issue in the US presidential campaign of 1984, arms control and defence analysts are lining up in support of or opposition to the proposed programme.[3] The attention focused on SDI by the Soviet Union has also coincided with Administration arguments that it was the fear of 'Star Wars' and the strategic offensive build-up that brought the Soviets back to the negotiating table. The reality is certainly more complex.[4]

While the superpowers were expanding their offensive arsenals and preparing for new defensive programmes, the smaller nuclear powers were also upgrading their nuclear forces (see section IV). France is planning to add its first MIRVed submarine-launched ballistic missile (SLBM) system in early 1985, while Britain is moving forward with Tornado deployments and Trident II preparations. China is also preparing for its first operational ballistic-missile submarine (SSBN) system.

II. US nuclear weapon programmes

Technical and quantitative developments during 1984 were secondary to the fundamental changes in Western public opinion concerning the superpower relationship. In 1980 the public perception was, rightly or wrongly, that the United States was lagging behind the Soviet Union militarily. By 1984 much of Western public opinion subscribed to the belief that US strength had been regained.[5] President Reagan asserted that "America is back—standing tall". A steady stream of statements

were made that created this new perception although they little corresponded to the numerical tables commonly consulted to determine the 'military balance'. To an interviewer's question in January 1984 about evidence of the President's claim that the world was a safer place as a result of his policies, Mr Reagan answered, "we have a deterrent capacity we didn't have three years ago".[6] In March 1984 he said, "I think that there is less tension today and less threat and danger with the rebuilding that we have done that makes us more secure than there was earlier when our defense was so lax that there was a window of vulnerability".[7] Assistant Secretary of State Richard Burt put this dimension of the arms race well when he said, "The strategic nuclear balance is what the world understands as to who's ahead. It is a psychological as much as a hardware dimension. And in terms of deterrence, it does not matter if the difference is psychological or not".[8]

The nuclear weapon budget

While deliberations on the FY 1985 budget were taking place (see chapter 7, section III), the vigorous programmes to modernize and increase the size and capability of the US nuclear arsenal continued. During 1984 sustained increases occurred, especially in the strategic stockpile. Approximately 800 strategic weapons were added as a result of two Trident submarines and two ALCM-equipped B-52 squadrons becoming operational. The budget for future nuclear weapons continued to rise at a faster rate than the total military budget. There is no convenient figure that specifies how much the United States annually spends on nuclear weapons. For the first time the Administration did present a figure of $50.3 billion,[9] which it said was approximately 15 per cent of the National Defense Budget. It is difficult to assess the validity of the figure because there was no explanation of how it was computed. Other estimates put the figure in the 21–22 per cent range.

Two measures that can be used to compute increases in spending for nuclear weapons are the Department of Energy's (DoE) budget for nuclear weapons and the strategic forces programme of the Department of Defense (DoD) budget. Reagan has increased the former budget by 105 per cent since FY 1981 and the latter by over 150 per cent.

ICBMs

The year saw little change in the land-based missile force (see table 1.1). Ten Titan II missiles were deactivated, reducing the number of these

Table 1.1. US strategic nuclear forces, 1985

Delivery system	Weapon system		Year deployed	Range (km)	Warheads × yield	Warhead type	Number in stockpile
	Type	No. deployed					
Land-based missiles	Minuteman II	450	1966	11 300	1 × 1.2 Mt	W-56	480
	Minuteman III	550	1970	13 000	3 × 170 kt/ 335 kt	W-62 W-78	825 1 000
	Titan II	30	1963	15 000	1 × 9 Mt	W-53	50
Submarine-based missiles	Poseidon	304	1971	4 600	10 × 40 kt	W-68	3 300
	Trident I	312	1979	7 400	8 × 100 kt	W-76	3 000
Bombers	B-52G/H	263	1955	16 000	8–24[a]	[a]	4 733
	FB-111	61	1969	4 700	6[a]	[a]	360
Aerial refuellers	KC-135	615	1957	—	—	—	—

[a] Bomber weapons include five different nuclear bomb designs with yields from 70 kt to 9 Mt, air-launched cruise missiles (ALCMs) with a yield of 200 kt, and short-range attack missiles (SRAMs) with a yield of 200 kt. FB-111s do not carry ALCMs or the 9-Mt bomb.

Sources: Cochran, T. B., Arkin, W. M. and Hoenig, M. H., *Nuclear Weapons Databook, Volume 1: US Forces and Capabilities* (Ballinger, Cambridge, Mass., 1984), updated in *Bulletin of the Atomic Scientists,* August/September 1984.

missiles to 30. There was no change in the 450 Minuteman IIs or the 550 Minuteman IIIs. The Pentagon continued to implement the three major recommendations proposed by the Scowcroft Commission.

The first was to deploy 100 MX/Peacekeeper missiles: 69 in existing Minuteman silos in eastern Wyoming and 31 in western Nebraska. The Administration requested $5 billion in its FY 1985 budget to buy 40 MX missiles and continue research, development and construction funding to meet an initial operating capability of 10 missiles on alert by December 1986. As had been the case in 1982 and 1983, the MX proved to be one of the most controversial issues with Congress. In two votes in the Senate, it narrowly won (55 to 41 and 48 to 48) with the latter tie broken by Vice-President Bush. In the House of Representatives, the votes were 218 for and 212 against, and 197 for and 199 against. In conference the two Houses compromised by producing a complex formula for the MX. In the end, $1.5 billion to procure 21 missiles was withheld until after 1 March 1985, pending satisfaction of three conditions: (*a*) that the President submit a report to Congress addressing several issues about the need for the MX; (*b*) that both Houses of Congress pass jointly a resolution to authorize $1.5 billion for the MX; and (*c*) that both Houses pass jointly a resolution to appropriate those same funds. By 29 March 1985 the Administration had won all four votes.

According to the latest Pentagon estimates, the total cost of the Peacekeeper missile will be $21.68 billion. This figure is somewhat misleading in that it excludes another $4.2 billion spent from 1973 to 1982, when it was officially known as the MX. The figure also excludes DoE warhead costs. Therefore, a more realistic estimate is $30 billion.

Three more research and development tests were conducted in 1984: on 30 March, using 10 Mk 12A re-entry vehicles (RVs); on 15 June, using 1 Mk 21 and 5 Mk 12A RVs; and on 1 October, using 6 Mk 21s. The Air Force stated that MX tests achieved "tremendous accuracy".[10] The CEP[11] goal for the MX is half that of the Minuteman III, probably of the order of 105–120 metres. The final 12 (of a total of 20) MX tests planned will be from modified Minuteman silos at Vandenberg Air Force Base in California.

Midgetman

The second Scowcroft Commission recommendation concerning ICBMs was to begin engineering design of a small, single-warhead missile (SICBM) to be on alert by 1992. The current concept is a missile of not more than 15 000 kg, 13 m long, with a range of 10 000 km,

deployed at up to 12 major military installations on mobile launchers hardened to 30 psi (pounds per square inch). The baseline warhead and re-entry vehicle would be the same as the MX (W-87 and Mk 21), giving it similar hard-target accuracy using the Northrop lightweight advanced inertial reference system (AIRS).

Congress appropriated $462 million for the small ICBM in FY 1985. In December 1983, February 1984 and May 1984 the Air Force awarded small ICBM contracts to competing corporations in the areas of missiles (Boeing, General Dynamics, McDonnell Douglas and Martin Marietta); propulsion systems (Aerojet General, Hercules, Morton Thiokol and United Technologies Chemical Systems Division); hard mobile launchers (Bell/Textron, Boeing, General Dynamics/Convair and Martin Marietta); and guidance and control systems (Rockwell, Autonetics, Litton, Honeywell and General Electric).

A test to measure how blast-resistant the mobile launchers might be was conducted in October 1983 at White Sands Missile Range. Called Direct Course, in the test 600 tons of high explosives were detonated simulating the blast from a 1-kt nuclear explosion and its effects on small scaled-down versions of Midgetman launchers. Other experiments to determine the survivability of launchers were conducted at Sandia Laboratories in New Mexico. One test included detonation of up to half a ton of high explosives inside a new 155-m long, 6-m diameter tube generating winds of up to 1 760 kilometres per hour.[12]

The number of small ICBM missiles has still not been decided upon. Now that the Administration has won the MX vote, the Air Force may propose deployment of only 400–500 of these small ICBMs, rather than 1 000 or more had the MX been defeated.

The third Scowcroft Commission recommendation was to conduct technology programmes in the areas of silo hardening and deep basing. The Pentagon requested almost $260 million for these programmes in FY 1985. Some US scientists have concurrently revised their thinking on how hard missile silos can be made. Using steel liners with concrete and reinforced steel, Air Force and Defense Nuclear Agency officials believe silos can be hardened to 20–25 times the 2 000-psi levels now used in Minuteman silos. New experiments have also concluded that craters produced by nuclear detonations may be smaller than was once thought. Data from the Pacific tests conducted in wet soil showed that nuclear explosions produced large saucer-type craters. Tests and experiments conducted in loose, dry soil, more similar to where US silos are based, produced smaller-diameter, soupbowl-like craters.

The Pentagon is pursuing a deep-basing programme with other possible applications in addition to protection of missiles. Deep basing is pursued to meet the requirements of Presidential Directive PD-59

and National Security Decision Directive NSDD-13, which demand long-term endurance of US strategic forces and a 'strategic reserve'.

Supplementing the strategic efforts is a seven-year (fiscal years 1983–89) $1.3 billion set of research programmes known as the Advanced Strategic Missile Systems (ASMS). In FY 1985 the Pentagon will spend almost $100 million researching new penetration aids, defence suppression and advanced re-entry systems.[13] Research into guidance improvements to further increase the accuracy of the Minuteman III and Minuteman II missiles is also being pursued.

Strategic submarine programmes

During 1984 two more Trident submarines began their first patrols. By the end of the year the force included 5 Trident and 31 Poseidon submarines capable of firing 592 SLBMs and carrying 5 536 warheads. From March 1983 to March 1984, ballistic-missile submarines conducted 81 patrols. From the first patrol in November 1960 to 13 March 1984 the total number of patrols was 2 219.[14]

The FY 1985 budget provided funds for the twelfth Ohio Class SSBN and advanced funding for the thirteenth and fourteenth. During the year, the *Ohio* (SSBN 726) and *Michigan* (SSBN 727) continued patrols (from 1982 to 13 March 1984 they had completed seven between them); the *Florida* (SSBN 728) and *Georgia* (SSBN 729) began patrols; and the *Henry M. Jackson* (SSBN 732, ex-*Rhode Island*) was commissioned (6 October). The Navy has not yet specified exactly how many Trident submarines it wants, although a figure of 20–25 is often mentioned.

Unless arms control agreements require otherwise, the Navy plans to retire 31 Lafayette/Franklin Class SSBNs between 1993 and 1999. The most immediate issue must be decided before the seventh Trident submarine, the *Alaska* (SSBN 734), goes on sea trials sometime in September 1985.[15] By then the USA will have 14 more than the unratified SALT II limit of 1 200 MIRVed-missile launchers. This would bring up two crucial decisions for the Reagan Administration. The first and most important would be whether to continue to "refrain from actions which undercut" the SALT treaties "so long as the Soviet Union shows equal restraint", a statement made by President Reagan on 31 May 1982 (see *SIPRI Yearbook 1984,* page 661). In a press conference on 9 January 1985, the President indicated in the strongest language so far that the policy would continue. If it is decided to keep under the limit, then the Pentagon could dismantle either a Lafayette Class Poseidon submarine (16 launch tubes) or 14 Minuteman III silos or implement some other solution. The problem will persist with sea trials of the eighth submarine, the *Nevada* (SSBN 735), in May 1986

and the sea trials of each subsequent submarine. A Congressional resolution in 1984 was introduced to continue the 'no undercut' policy and reports were required of the Pentagon to clarify its policy.[16]

Because the Navy accelerated the introduction of the Trident II missiles to be put on the ninth submarine instead of the eleventh, it terminated purchase of Trident I (C-4) SLBMs in 1984. The current plan is to buy 570 Trident Is (plus 25 for research and development) for 12 retrofitted Poseidon submarines and the first eight Trident hulls. As of 13 March 1984 398 missiles had been delivered.[17]

The Navy requested over $2.2 billion in the FY 1985 budget for research for the Trident II SLBM, with which it plans eventually to arm all Trident submarines. Unlike the MX, which has garnered headlines and controversy, a notable feature of the Trident II is the apparent lack of concern about a weapon system that is more strategically significant and more expensive than the MX. If and when it is fully deployed, the MX would include 100 missiles carrying 1 000 warheads. An eventual force of 25 Trident submarines will carry 600 Trident II missiles with some 4 800 warheads. Though slightly less accurate than that of the MX, Trident II's planned higher yield warhead (475 kt *vs* 300 kt) will give it a hard-target kill capability nearly equal to that of the MX. The Trident programme also promises to be the most expensive US nuclear weapon system. Counting all parts of the programme, a force of 20 will cost over $100 billion; a force of 25, some $120 billion.

Strategic bomber programmes

The number of strategic bombers remained approximately the same in 1984, although the number of deliverable weapons increased with the addition of two ALCM-equipped B-52G squadrons. On 1 January 1985 there were 167 B-52Gs, 96 B-52Hs and 61 FB-111s. Several B-1B milestones occurred in 1984, and more concrete plans were known. On 1 February 1984, future B-1B bases were announced. Between September 1986 and June 1988, five squadrons of B-1Bs will be activated at Dyess AFB, Texas; Ellsworth AFB, South Dakota; Grand Forks AFB, North Dakota; and McConnell AFB, Kansas. Dyess AFB will get the first of 26 aircraft in June 1985 and will become the training base. Ellsworth AFB will receive two squadrons (32 aircraft) between January and September 1987. Grand Forks AFB will receive one squadron (16 aircraft) between September 1987 and January 1988, and McConnell AFB will receive 16 aircraft between February 1988 and June 1988.

In 1984 Congress appropriated $7 billion for 34 more B-1B aircraft, bringing the total number of aircraft purchased to date to 52. The final

48 aircraft will be requested in the FY 1986 budget. Concern has been expressed over the economic impact of stopping the enormous production complex that makes the B-1B. With over 5 000 subcontractors in 48 states and no more purchases planned beyond FY 1986, there is speculation that the Air Force might ask for more than 100 B-1Bs.

The rollout of the first B-1B occurred at the Rockwell factory in Palmdale, California, on 4 September 1984, five months ahead of schedule. The first B-1B bomber successfully completed a 3 h 10 min maiden flight on 18 October.

Bomber weapons—including the short-range attack missile (SRAM), the ALCM and bombs—are also undergoing modernization. In 1984 the fifth operational ALCM-equipped B-52 squadron was deployed. Production of the ALCM, however, is nearing termination at 1 739 missiles as interest shifts to the Advanced Cruise Missile (ACM) with its longer range, higher speed and lower radar signature. The ACM will eventually arm the B-1B bomber force. An intercontinental cruise missile with a 9 600–12 800-km range is also under development.[18] A replacement for the SRAM, called the Advanced Air-to-Surface Missile (AASM), is also under development. A new nuclear bomb, the B-83, entered the bomber force in 1984 and will eventually replace the older high-yield B-28, B-43 and B-53 bombs.

Theatre nuclear forces

After the extraordinary attention surrounding the ground-launched cruise missile and Pershing II in 1983, 1984 was relatively calm. Both the GLCM and the Pershing II were introduced in Europe at a rate of about one missile per week. No official announcements were made so as not to arouse additional public furore or debate. By year's end, 48 GLCMs were operational at Greenham Common in the UK[19] and 32 at Comiso, Italy. In the Federal Republic of Germany, the number of Pershing IIs had risen to 54 by then. The first battalion of 36 missiles with four batteries was completed at Schwäbisch Gmünd. Eighteen more missiles at Heilbronn and Neu Ulm were activated.[20] The remainder are scheduled for deployment by December 1985.

Sixteen cruise missiles have been deployed at Florennes, Belgium. Although the exact timetable for cruise missile deployment has not been made public and may be subject to political alterations, the following schedules are planned:

Greenham Common, UK	96 between December 1983 and December 1985
Comiso, Italy	112 between March 1984 and early 1987

Table 1.2. US theatre nuclear forces, 1985

Delivery system	Weapon system: Type	No. deployed	Year deployed	Range (km)	Warheads × yield	Warhead type	Number in stockpile
Aircraft	[a]	2 000	—	1 060–2 400	1-3 × bombs	[a]	2 800
Land-based missiles	Pershing II	54	1983	1 790	1 × 0.3–80 kt	W-85	54
	GLCM	80	1983	2 500	1 × 0.2–150 kt	W-84	100
	Pershing 1a	144	1962	740	1 × 60–400 kt	W-50	280
	Lance	100	1972	125	1 × 1–100 kt	W-70	1 282
	Honest John	24	1954	38	1 × 1–20 kt	W-31	200
	Nike Hercules	200	1958	160	1 × 1–20 kt	W-31	500
Artillery[b]	[b]	4 300	1956	30	1 × 0.1–12 kt	[b]	2 422
Atomic demolition mines	Medium/special	610	1964	—	1 × 0.01–15 kt	W-45/54	610
Naval systems							
Carrier aircraft	[c]	900	..	550–1 800	1–2 × bombs	[c]	1 000
Land-attack SLCMs	Tomahawk	50	1984	2 500	1 × 5–150 kt	W-80	50
ASW systems	ASROC	n.a.	1961	10	1 × 5–10 kt	W-44	574
	SUBROC	n.a.	1965	60	1 × 5–10 kt	W-55	285
	P-3/S-3/SH-3	630	1964	2 500	1 × <20 kt	B-57	897
Ship-to-air missiles	Terrier	n.a.	1956	35	1 × 1 kt	W-45	100

[a] Aircraft include Air Force F-4, F-16 and F-111, and NATO F-16, F-100, F-104 and Tornado. Bombs include four types with yields from sub-kt to 1.45 Mt.
[b] There are two types of nuclear artillery (155-mm and 203-mm) with three different warheads: a 0.1-kt W-48, 155-mm shell; a 1–12-kt W-33, 203-mm shell; and a 1-kt W-79, enhanced-radiation, 203-mm shell.
[c] Aircraft include Navy A-6, A-7, F/A-18 and Marine Corps A-4, A-6 and AV-8B. Bombs include three types with yields from 20 kt to 1 Mt.

Sources: Cochran, T. B., Arkin, W. M. and Hoenig, M. H., *Nuclear Weapons Databook, Volume 1: US Forces and Capabilities* (Ballinger, Cambridge, Mass., 1984), updated in *Bulletin of the Atomic Scientists,* August/September 1984.

Florennes, Belgium	48 between March 1985 and December 1987
Hasselbach, FR Germany	96 between June 1986 and June 1988
Woensdrecht, Netherlands	48 between December 1986 and June 1988
Molesworth, UK	64 between September 1987 and December 1988

In the Netherlands the final government decision on deployment was again delayed until November 1985. The nuclear-armed Tomahawk sea-launched cruise missile was first deployed in June 1984 (see section V).

A number of other important developments concerning lesser known weapons occurred during 1984 (see table 1.2). The October 1983 NATO Ministers' meeting in Montebello, Canada, called for the withdrawal of

Table 1.3. US European nuclear modernization, 1985–92

Weapon system (warhead)	As of 1985	Withdrawals[a]	As of 1992
Stored in Europe			
Pershing II	54	0	108
Pershing 1a	231	131	100
Ground-launched CM	100	0	464
Bombs	1730	0	1730
Lance	690	0	690
Honest John	190	190	0
Nike Hercules	680	680	0
8-inch (W-33)	930	500	430
8-inch (W-79)	0	0	200[b]
155-mm (W-48)	730	350	380
155-mm (W-82)	0	0	100
Atomic demolition mines	370	370	0
Depth bombs	190	0	190
Total in Europe	*5895*	*2221*	*4392*
Committed to Europe[c]			
Poseidon	400	0	400
Carrier bombs	360	0	500
Bombs	600	0	800
Depth bombs	140	0	140
Lance	380	0	380
8-inch (W-79)	200	0	200
Total committed	*2080*	0	*2420*
Total	**7975**	**2221**	**6812**

[a] Withdrawals in accordance with the modernization decision of 1979 (equal withdrawals for deployments); the Montebello decision of 1983 (1400 additional withdrawals); and (other) anticipated changes in artillery stockpiles.
[b] Deployment of non-enhanced radiation warheads in Europe.
[c] Warheads committed by Europe or planned for storage in Europe (does not include tactical naval nuclear weapons).

Source: Authors' estimates.

Table 1.4. Major US nuclear weapon system programmes

Weapon system	Total no. to be produced	First year operational	Spent by FY 1986 ($ bn)	Requested funding FY 1986 ($ bn)	Number requested	Proposed funding FY 1987 ($ bn)	Unit cost FY 1986 ($ mn)	Estimated total cost[a] ($ bn)	Comments
MX missile	223	1986	13.1[b]	4.0	48	3.2	116	25.9	100 deployed by 1989
Trident submarine	20–25	1982	16.8	2.0	1	1.8[c]	1 600	31–39	Cost for first 16 subs: $25.1 bn
Trident I	595	1979	8.1	0.066	0	0.047	19	11.2	For 12 Poseidon and 8 Trident, 211 tests and spares
Trident II	764	1989	4.4	2.7	0	3.6	49	37.4	For 16 subs; for 20–25, cost would be $42–48 bn
B-1B	100	1986	26.4	6.0	48	0.136	400	40	90 operational aircraft
Stealth	132	1990s	[d]	0.80	0	2.272	?	40–50?	One estimate $6.3 bn for FY 84–88
B-52 modifications	263	Ongoing	3.3	0.480	—	0.805	20 each	5.8	Radar, engines, avionics
ALCM	1 739	1982	4.1	0.049	0	0.037	2.5	4.5	Production stopped
GLCM	565	1983	2.8	0.620	95	0.243[c]	6.5	3.7	
SLCM	4 068	1984	3.3	0.849	249	1	3.2	13.0	758 nuclear versions
Advanced cruise missile	2 600	1988	?	?	0	?	5–7	7.0	Figures are estimates
Pershing II	325	1983	2.2	0.335	70	0.007	7.0	2.9	
Midgetman	1 000	1992	.807	0.625	0	?	38–70	38–70	20-year cost could be $107 bn

[a] Does not include DoE costs for nuclear warheads and bombs which normally are an additional 10–20 per cent of the weapon system cost.
[b] Does not include $1.5 billion for 21 missiles in FY 1985 budget pending Congressional vote.
[c] Does not include military construction funds.
[d] Partial figures first available in FY 1986 budget request are not comprehensive.

Source: FY 1986 Defense budget requests to Congress.

1 400 nuclear warheads from Europe as part of the compensation for long-range modernization, but also approved the modernization of short-range nuclear forces (see table 1.3). The most controversial programme of this modernization is nuclear artillery, which is going to move forward under complicated Congressional guidelines: (*a*) no more than 925 new artillery projectiles can be produced; (*b*) the military must determine the mix of 155-mm and 203-mm shells within this ceiling; (*c*) no new enhanced radiation warheads can be built; and (*d*) the cost of the overall programme cannot exceed $1.2 billion.[21]

Other theatre weapons include the B-61 nuclear bomb, which continues in production, arming new US and NATO F-16 and Tornado aircraft in Europe. According to the Army, investigations have also begun on the possibility of "a modernized mid-range replacement or modification to Lance, and perhaps a standoff air-delivered weapon".[22] A standoff replacement for the B-57 nuclear depth bomb is also under development, as is a nuclear warhead for a naval air-to-air missile.

Congressional control of nuclear programmes

The second session of the 98th Congress continued a pattern of active participation in exercising oversight responsibilities in military programmes in general and nuclear weapons and arms control issues in particular. It did this through its regular and special hearings and resolutions and by requesting detailed reports and actions from the Pentagon.

An increasingly frequent device to help Congress fulfil its oversight responsibilities is to request reports from the executive branch of the government. Language in the FY 1985 bills demanded various reports and actions that will be due during the year. Among the more significant in the area of nuclear weapons and arms control are the following:

1. A report from the President on the need for the MX missile, due on 1 March 1985.
2. The survivability of the US strategic nuclear ballistic missile submarine force, due on 1 April 1985.
3. A spring 1985 presidential report on anti-satellite (ASAT) weapons certifying that the USA is seeking to negotiate a mutual, verifiable agreement with the USSR on ASAT weapons, that renewed ASAT tests are necessary and will not impair negotiations, and that such tests are consistent with the Anti-Ballistic Missile (ABM) Treaty.

4. The arms control methods which might make it possible to verify the difference between conventionally armed sea-launched cruise missiles and those armed with nuclear warheads (due on 15 March 1985).

5. Strategic Defense Initiative programmes, due each fiscal year from FY 1986 to FY 1990, with budget presentation materials. Major parts of the report shall include details of the programmes, definition of objectives, the status of consultations with allies, and statement of anticipated impact on the ABM Treaty.

6. Theatre nuclear weapons and force structure, due on 19 January 1985. The report will address specific issues on how to reduce pressures for early-first-use of NATO tactical nuclear weapons and how to make the arsenal more stable and credible.

7. Withdrawal of tactical nuclear warheads from Europe, due 90 days after the final decision is made regarding implementation of the NATO Montebello decision of 17 October 1983. The report shall specify the types, numbers and rationale for the particular warheads chosen for withdrawal.

8. US counterforce capability, due on 15 April 1985. The report shall discuss the required strategic counterforce capability consistent with existing US policy.

9. Transmittal to Congress of the General Advisory Committee Report on Soviet Compliance with Arms Control Agreements, occurred in October 1984.

10. Nuclear Winter findings and policy implications, due on 1 March 1985. The report shall include: (*a*) a detailed review and assessment of the current scientific studies and findings on the atmospheric, climatic, environmental and biological consequences of nuclear explosions and nuclear exchanges; (*b*) a thorough evaluation of the implications that such studies and findings have on strategy, targeting, planning, command, control, procurement, deployment, arms control and civil defence policy; and (*c*) an analysis of the extent to which current scientific findings on the consequences of nuclear explosions are being studied, disseminated and used in the Soviet Union.

11. Findings regarding Soviet adherence to the 'no undercut' policy, due on 15 February 1985.

12. The implications of the *USS Alaska*'s sea trials for the US 'no undercut' policy, due on 1 June 1985.

13. Report of a Blue Ribbon Task Group to the President and Congress on how to make the research, development, testing, production, surveillance and retirement of nuclear weapons more cost-effective, due in mid-June 1985.[23]

The Strategic Defense Initiative

President Reagan's Strategic Defense Initiative (SDI) or 'Star Wars' proposal was debated widely in 1984 and by year's end became entwined with a range of issues from the fundamentals of US strategic doctrine to arms control. On 6 January President Reagan signed National Security Decision Directive 119, which set into motion an accelerated research programme for strategic defences. The FY 1985 military budget which soon followed provided details. Envisioned in the near term was a $26 billion effort for the fiscal years 1985–89. Existing anti-ballistic missile (ABM) and new SDI research was reorganized into five major technical areas. The FY 1985 budget request was almost $2 billion: $1.78 billion for the DoD and $210 million for the DoE. Congress cut the DoD funding by almost $380 million.

Throughout the spring and summer Congress held an extensive set of hearings on SDI.[24] Pentagon, Congressional and private research organizations also focused on the feasibility of an SDI programme. The Scowcroft Commission report in March 1984 concluded that "strategic implications of ballistic missile defense and the criticality of the ABM Treaty to further arms control agreements dictate extreme caution in proceeding to engineering development in this sensitive area".[25] The Office of Technology Assessment released a background paper on 24 April which concluded: "The prospect that emerging 'Star Wars' technologies, when further developed, will provide a perfect or near-perfect defense system, literally removing from the hands of the Soviet Union the ability to do socially mortal damage to the United States with nuclear weapons, is so remote that it should not serve as the basis of pubic expectation or national policy about ballistic missile defense".[26] The Congressional Budget Office released a report on 23 May 1984 entitled *Analysis of the Costs of the Administration's Strategic Defense Initiative, 1985–1989,* which concluded that SDI cost estimates were dependent on how comprehensively or narrowly defence is defined. Details of the 1983 Fletcher Commission and Hoffman Commission reports were also released in 1984.[27]

The SDI debate intensified as more and more former government officials, scientists, defence intellectuals and arms control proponents contributed their views. Former Secretary of Defense James Schlesinger attacked the Star Wars plans, estimating that the cost would be at least $1 trillion and saying, "There is no serious likelihood of removing the nuclear threat from our cities in our lifetime or in the lifetime of our children".[28] McGeorge Bundy, George F. Kennan, Robert S. McNamara and Gerard Smith struck again with another *Foreign Affairs* article entitled "The President's choice: Star Wars or arms

control" (Winter 1984–85). Former Secretary of Defense Harold Brown said that "technology does not offer even a reasonable prospect of a successful population defense", even at a cost of $1 trillion. He called on President Reagan to give up the ambitious project and "publicly acknowledge that there is no realistic prospect for a successful population defense certainly for many decades and probably never".[29]

More unclear at the end of the year than at the beginning were the official goals for the scope of strategic defences. Although it was originally intended to be a comprehensive population/city defence, some talked as if it might only defend missile fields and facilities. Whether for technological, financial or strategic reasons, evidence emerged in 1984 suggesting that civilian and military officials were quietly scaling back the goals of the programme.[30] Congressional scepticism also grew, and the prospects of crushing deficits looming over the budget may ensure that the high price tag of $4 billion in FY 1986 will be reduced. The sensitive point of protection of allies caused critical reactions and some suspicion from French, British and West German leaders during the year.[31]

III. Soviet nuclear weapon programmes

Virtually every official and private analysis of the nuclear 'balance' between the United States and the Soviet Union made since the late 1960s has pointed out that, while the USSR has more nuclear delivery vehicles than the USA, the United States has more warheads than the Soviet Union. In spring 1984, US officials, including the President, indicated that the Soviet Union had surpassed the USA in the size of its nuclear arsenal and indeed had a numerical warhead advantage of some 25 per cent.[32] According to charts presented by US officials in testimony before Congress for the FY 1985 budget, the Soviet nuclear arsenal is considerably higher than the US peak of about 31 000 warheads in 1967. The charts portrayed the total Soviet arsenal surpassing that of the USA sometime in the mid-1970s.[33]

This new analysis of the military balance could have a significant impact on the politics of weapon procurement, the formulation of arms control stances and the battle for public opinion. These estimates, it should nevertheless be noted, are equivocal and may be the product of inflationary assumptions and generous arms control counting rules.[34] Given the lack of public knowledge about the accuracy of US intelligence estimates in this obscure area, it is difficult to determine at this time the exact size of the Soviet nuclear arsenal and thus to judge the veracity of US government figures on the overall number of warheads. If a 'warhead gap' exists, it has little military significance, given that

both the USA and the USSR have a full range of accurate and reliable strategic and theatre nuclear weapon systems in great numbers. Nonetheless it appears that the intention of the US government's analysis of the Soviet stockpile size is to stimulate Congressional and public support for US nuclear programmes.

Soviet strategic nuclear forces

The Soviet Union's land-based ICBM force remained at 1 398 missiles during 1984 and was armed with more than 6 000 warheads (see table 1.5). The warheads continued to account for about 70 per cent of the strategic nuclear arsenal.[35] It is now presumed by the US Defense Department that all 150 SS-17s, 308 SS-18s and 360 SS-19s carry multiple independently targetable re-entry vehicles (MIRVs), although some single-warhead SS-17 and SS-19 missiles may still be deployed. One additional modification each for the SS-18 and SS-19 missiles is expected, though tests have not yet taken place. At least one and possibly two new types of solid-fuelled ICBMs—the medium-sized SS-X-24 with 10 MIRV warheads (a modification/replacement of the SS-17) and the small-sized single-warhead SS-X-25 (a modification/replacement of the SS-13)—were first tested in 1982 and 1983, respectively. Deployment and flight-testing of both missiles continued in 1984.[36] It has been suggested that site preparation for and possible deployment of the SS-X-25 have taken place in both mobile and silo modes at former SS-7 and SS-8 missile sites and the existing SS-13 silos.[37] The motors for two other ICBMs—the solid-fuelled, MIRVed SS-X-26 reported to be an improvement over the SS-X-24, and a large, liquid-fuelled follow-on to the SS-18 called the SS-X-27—were also reported to be undergoing testing, with flight tests possibly to take place in 1985 or 1986.[38]

The future size and type breakdown of the land-based missile force depends greatly upon whether the USSR intends to continue to comply with the SALT II Treaty. Continued verified adherence would permit virtually no increase in force levels and only modest increases in capabilities, while circumvention of the constraints of arms control could bring exponential improvements in both quality and quanitity of Soviet land-based ICBM forces.

The present force of strategic ballistic-missile submarines includes 64 boats, 62 of which are 'modern' nuclear-powered types (SSBNs) and carry 936 SLBMs armed with approximately 2 100 warheads, or about 30 per cent of the overall strategic arsenal.[39] An additional 14 older submarines with 42 SLBMs are assigned theatre missions. The first two Typhoon Class submarines with the SS-N-20 SLBM are now in service

Table 1.5. Soviet strategic nuclear forces, 1985

Delivery system	Weapon system: Type	No. deployed	Year deployed	Range (km)	Warheads × yield	Number in stockpile[a]
Land-based missiles	SS-11 Mod 1[b]	520	1966	11 000	1 × 1 Mt	640–1 280
	Mod 2/3		1973		3 × 250–350 kt (MRV)	
	SS-13 Mod 2	60	1972	9 400	1 × 600–750 kt	60–120
	SS-17 Mod 3[c]	150	1979	10 000	4 × 750 kt	600–1 200
	SS-18 Mod 4	308	1979	11 000	10 × 550 kt	3 080–6 160
	SS-19 Mod 3[d]	360	1979	10 000	6 × 550 kt	2 160–4 320
Submarine-based missiles	SS-N-5	42	1963	1 400	1 × 1 Mt	42–60
	SS-N-6 Mod 1/2	336	1967	2 400	1 × 1 Mt	336–672
	Mod 3		1973	3 000	2 × 200–350 kt (MRV)	
	SS-N-8	292	1973	7 800	1 × 800 kt–1 Mt	292–584
	SS–N–17	12	1977	3 900	1 × 1 Mt	12–24
	SS-N-18 Mod 1/3	224	1978	6 500	3–7 × 200–500 kt	672–2 510
	Mod 2		1978	8 000	1 × 450 kt-1 Mt	
	SS-N-20	60	1983	8 300	6–9 × 350–500 kt	360–432
Bombers	Mya-4 Bison	45	1956	8 000	2 × bombs	90–180
	Tu-95 Bear	120	1956	8 300	2 × bombs and ASMs	366–812
	Tu-22M Backfire	130	1974	5 500	2 × bombs and ASMs	390–780
Aerial refuellers	[e]	125	—	—	—	—
ABMs	Galosh	32	1964	750	1 × 3–5 Mt	32–64

[a] Warheads represent low and high estimates of possible force loadings (including reloads).
[b] Approximately 100 Mod 1 with one warhead, 360 Mod 2, and 60 Mod 3 are deployed.
[c] Some SS-17 Mod 2 missiles with one warhead may also be deployed.
[d] Some SS-19 Mod 2 missiles with one warhead may also be deployed.
[e] Includes Badger and Bison A bomber converted for aerial refuelling.

Sources: Authors' estimates derived from: Arkin, W. M. and Sands, J. I., 'The Soviet Nuclear Stockpile,' *Arms Control Today* June 1984, pp. 1–7; Department of Defense, *Soviet Military Power,* 1st, 2nd, 3rd eds; NATO, '*NATO–Warsaw Pact Force Comparisons,* 1st, 2nd eds.; Berman, R. P. and Baker, J. C., *Soviet Strategic Forces: Requirements and Responses* (Brookings Institution, Washington, D.C., 1982); Defense Intelligence Agency, *Unclassified Communist Naval Orders of Battle,* DDB-1200-124-84, May 1984.

with the Northern Fleet, with another on sea trials and at least two more probably under construction and two more planned.[40] Additionally, the SS-NX-23, a new liquid-propelled SLBM with improved accuracy, better reliability and increased MIRV capabilities, continued flight-testing in 1984. It will be initially deployed in the near term on a new class of strategic-missile submarine, the Delta IV, and is expected to replace the SS-N-18 on Delta III submarines.[41] A second new SLBM is also believed to be in the research and development phase; together with the SS-NX-23, it could result in true counterforce capabilities in the sea-based missile force.[42] These programmes indicate a clear intention to increase the portion of future intercontinental strike forces at sea. Modernization of sea-based systems within SALT restrictions can take place with continued dismantling of older Yankee Class submarines. Without SALT restrictions, a significant expansion of sea-based forces would be possible, including deployments of additional MIRVed sea-based missiles as follow-ons to the SS-N-20 and SS-N-23 (otherwise restricted by SALT).

Soviet long-range bomber assets include some 165 Bear and Bison bombers capable of delivering gravity bombs and air-to-surface missiles (ASMs). A new variant of the Bear bomber entered production in late 1983, designated Bear H by US intelligence, with some 20 now in service.[43] This bomber carries the new long-range ALCM, the AS-15, which is now operational in small numbers and provides much greater range and improved accuracy over older ASMs. The deployment of the Bear H, with the AS-15 missile, is advancing more rapidly than the US intelligence community expected.[44] Several older Bear B/C bombers have been modified to carry the AS-4 instead of the AS-3 ASM and are now designated Bear G. All 69 of these aircraft will probably be reconfigured in the future to carry the AS-4 or the long-range AS-15. The new Blackjack A bomber is also likely to carry the AS-15 as well as bombs and will replace the Bison and the Bear A gravity bombers. During 1984, Blackjack continued in testing and will probably be operationally deployed in 1985 or 1986.

Improvements in strategic nuclear defence also occurred in 1984, with continued development of a replacement system for the ABM-1B Galosh ABM system. It is also believed that the SA-5, the SA-10 (which is deployed at fixed sites and is beginning deployment in a mobile mode) and the new SA-X-12 may have strategic defence applications. It is not known whether these systems can carry nuclear warheads.

Theatre nuclear weapon systems

The across-the-board build-up of Soviet theatre nuclear forces also continued during 1984 (see table 1.6). Seven land-based missiles and

Table 1.6. Soviet theatre nuclear forces, 1985

Delivery systems	Weapon system Type	No. deployed	Year deployed	Range (km)	Warheads × yield	Number in stockpile[a]
Aircraft	Tu-16 Badger	316	1955	4 800	2 × bombs and ASMs	632
	Tu-22 Blinder	139	1962	2 200	1 × bombs or ASMs	139
	Tactical aircraft[b]	2 545	—	700–1 000	1–2 × bombs	2 545
Land-based missiles	SS-20	396[c]	1977	5 000	3 × 150 kt	2 376
	SS-4	224	1959	2 000	1 × 1 Mt	224
	SS-12	120	1969	800	1 × 200 kt–1 Mt	120
	SS-22	100	1979	900	1 × 1 Mt	100
	Scud B	570	1965	280	1 × 100–500 kt	1 140
	SS-23	48	1982	350	1 × 100 kt	48
	Frog	620	1965	70	1 × 10–200 kt	2 480
	SS-21	120	1978	120	1 × 20–100 kt	480
	SS-C-1B[d]	100	1962	450	1 × 50–200 kt	100
	[e]	n.a.	1956	40–300	1 × low kt	n.a.
Artillery	[f]	1 080	1974	10–30	1 × low kt	1 080
Atomic demolition mines	n.a.	n.a.	n.a.	—	n.a.	n.a.
Naval systems						
Aircraft	Tu-22M Backfire	105	1974	5 500	2 × bombs or ASMs	210
	Tu-16 Badger	240	1961	4 800	1–2 × bombs or ASMs	480
	Tu-22 Blinder	35	1962	2 200	1 × bombs	35
	ASW aircraft[g]	200			1 × depth bombs	200

Anti-ship cruise missiles	SS-N-3	336	1962	450	1 × 350 kt	336
	SS-N-7	96	1968	56	1 × 200 kt	96
	SS-N-9	200	1968	280	1 × 200 kt	200
	SS-N-12	136	1976	500	1 × 350 kt	136
	SS-N-19	88	1980	460	1 × 500 kt	88
	SS-N-22	36	1981	110	1 × ? kt	36
ASW missiles and torpedoes	SS-N-14	310	1968	50	1 × low kt	310
	SS-N-15	76	1972	40	1 × 10 kt	76
	SUW-N-1	10	1967	30	1 × 5 kt	10
	Torpedoes	n.a.	1957	16	1 × low kt	n.a.
Ship-to-air missiles	SA-N-6	264	1977	55	1 × low kt	264

[a] Estimates of total warheads are based on minimal loadings of delivery systems.
[b] Nuclear-capable tactical aircraft models include Su-24 Fencer, Su-17 Fitter, MiG-27 Flogger, MiG-21 Fishbed, Yak-28 Brewer, MiG-25 Foxbat and Su-25 Frogfoot.
[c] The Soviet Union denies that the figure is as high as this.
[d] Land-based anti-ship missile.
[e] Land-based surface-to-air missiles. Nuclear-capable SAMs probably include SA-1, SA-2, SA-5 and SA-10.
[f] Artillery includes 152-mm towed and self-propelled guns and 180-mm, 203-mm and 240-mm calibres.
[g] Includes Bear, Mail and May aircraft.

Sources: Arkin, W. M. and Sands, J. I., 'The Soviet nuclear stockpile', *Arms Control Today,* June 1984, pp. 1–7; Polmar, N., *Guide to the Soviet Navy,* 3rd ed. (US Naval Institute, Annapolis, Md., 1983); Department of Defense, *Soviet Military Power,* 1st, 2nd, 3rd eds; NATO, *NATO–Warsaw Pact Force Comparisons,* 1st, 2nd eds; Defense Intelligence Agency, 'A guide to foreign tactical nuclear weapon systems under the control of ground force commanders', DST-1040S-541-83 (secret, partially declassified), 9 September 1983; Statement of Rear Admiral John L. Butts, USN, Director of Naval Intelligence, before the Seapower and Force Projection Subcommittee, Senate Armed Services Committee, 26 February 1985.

artillery systems are currently being fielded, including additional deployments of SS-20 missiles.

By the end of 1984, another two SS-20 bases were reported by NATO to have reached operational status, bringing deployments of SS-20s to a total of 396, a claim denied by the Soviet Union.[45] Nine additional bases with nine launchers each are believed to be under construction. These deployments, if true, will have an impact on the decision in the Netherlands to move ahead with deployments of 48 GLCMs, a decision planned for implementation by 1 November 1985.

Perhaps more significant than renewed SS-20 deployments are deployments of Soviet operational-tactical and tactical nuclear weapon systems in eastern Europe. The 900-km range SS-12 Scaleboard and its replacement, the SS-22, are being forward-deployed in the German Democratic Republic and Czechoslavakia, the first such deployment for these long-range weapons, and the SS-22 is replacing SS-12 missiles in the Soviet Army (but the SS-12 was never deployed outside the USSR). Additionally, the SS-21 is replacing the Frog-7 at a rate of four per month with Soviet forces, with conversion in the German Democratic Republic and Czechoslovakia almost completed. The SS-23 is also replacing Scud B missiles with Soviet forces, although deployments are at a slightly slower rate. Replacement systems for SS-21, SS-22 and SS-23 missiles may also emerge from the Soviet research, development, testing and evaluation (RDT&E) process over the next two years. Finally, deployments of new 152-mm towed and self-propelled guns and self-propelled howitzers, 203-mm self-propelled howitzers, and 240-mm towed and self-propelled heavy mortars have continued, and the older 152-mm howitzers are now considered to be nuclear-capable.[47] A new version of the 152-mm howitzer is also believed to be in development.[48]

The Soviet Union has also continued development of its own ground-launched cruise missiles. The SSC-X-4, which has been undergoing tests since late 1981, may be ready for operational deployment in 1986. With a range of about 3 000 km, the missile will most likely be used for theatre missions. A larger, longer-range GLCM, not yet designated, may be ready for deployment by the late 1980s. This missile may have strategic applications and a capability against hardened targets. Both missiles may eventually be fitted with either nuclear or conventional warheads.[49]

The status of Soviet nuclear-capable aviation has remained roughly stable, with some increases in the number of Tu-22M Backfire B bombers and MiG-27 Flogger D/J and Su-24 Fencer A theatre nuclear-capable aircraft. The annual production rate for the Backfire is now assessed by US intelligence to be in excess of 30 per year, the produc-

Table 1.7. Soviet nuclear weapon systems introduced or under development, 1981–85

Strategic	Theatre/tactical
SS-18 Mod 5	SS-X-28 (replacement for SS-20)
SS-18 Mod 4	SS-21
SS-X-24	SS-22
SS-X-25	SS-23
SS-X-26	Replacement for SS-21
SS-X-27	Replacement for SS-22
SS-NX-23/Delta IV	Replacement for SS-23
New undesignated SLBM	SS-CX-4
Bear G	MiG-27 Flogger J
Bear H/with AS-15 ALCM	Su-25 Frogfoot
Blackjack A	152-mm howitzer M-1987
Backfire C	SS-N-21
ABM-X-3	SS-N-22
	Next-generation SLCM/GLCM

Sources: DoD, *Soviet Military Power,* 1984; Joint Economic Committee, *Allocation of Resources in the Soviet Union and China,* 1983, Hearings, Part 9, pp. 202–205.

tion rate pledged by the USSR during SALT II.[50] The Su-25 Frogfoot is now also believed to have the capability to deliver free-fall nuclear bombs.[51]

The Soviet Navy also showed significant developments during 1984. In April, a Soviet naval exercise in the northern Atlantic simulated a NATO attack and Soviet response, with one large battle group led by the Kirov Class from the Northern Fleet meeting two other battle groups from the Baltic Fleet. The exercise included a surge of 20 submarines (including Delta Class strategic missile submarines) from Northern Fleet bases, as well as participation by the first Oscar Class cruise-missile submarine.[52] An explosion the following month at the Severomorsk naval base destroyed a sizeable portion of replenishment stocks for the fleet's surface-to-air and cruise missiles. (Another explosion at Bobruysk airfield at the same time destroyed several Badger aircraft.) 1984 also saw the deployment of a second Kirov Class cruiser (this one deployed with additional surface-to-air weaponry in place of the SS-N-14 ASW missile), the conversion of the first Yankee Class SSBN to carry cruise missiles, and deployments of the first Tomahawk-like SS-N-21 cruise missile aboard submarines (see section V).

Additional units of Kirov and Slava Class cruisers and Sovremennyy and Udaloy Class destroyers are under construction, and US photographic evidence of a large nuclear-powered aircraft carrier capable of launching fixed-wing aircraft was published in the Western press, providing the greatest detail of the scope of this programme.[53] Soviet submarines had problems in 1984, with a Victor I colliding with the *USS Kitty Hawk* in March, another Victor I colliding with a Soviet tanker ship in the Straits of Gibraltar in September, and the crippling

of a Golf II submarine in the Sea of Japan the same month. The year ended with an errant test of a submarine-launched cruise missile (a hybrid of old vintages) which overflew Norwegian airspace before crashing in Finland. The missile was unarmed, and the Soviet Union officially apologized for the accident.

IV. Nuclear weapon programmes of other powers

The UK

Polaris A3-TK/Chevaline missiles continued to be deployed on Resolution Class strategic-missile submarines (see table 1.8). During 1984 the second submarine was brought back into commission from overhaul with the improved Chevaline 'front end' and warheads. All four of Britain's SSBNs are scheduled to be refitted with the Chevaline by mid-1987. The Chevaline is thought to contain 2 MRV warheads, of greater targeting flexibility and survivability than the Polaris, and is thereby increasing both the range and the accuracy of the Polaris missile.

As outlined in the British Defence White Paper, the government remains committed to the Trident modernization programme.[54] Major orders were placed in 1984 for equipment for the Trident submarines. Plans are well advanced for the new Trident shore facilities on the Clyde Estuary, Scotland, and a comprehensive Environmental Impact Assessment, a first for British defence-related projects, has been submitted.

The Tornado dual-capable strike aircraft continues to be deployed both in the UK and in FR Germany. Seven squadrons are at present operational, with a total of 11 squadrons of 220 aircraft planned by mid-1987. In early 1984 the first Tornado squadron became fully active at RAF Laarbruch in FR Germany, the first permanent deployment outside the UK. Eight squadrons are earmarked to be stationed in FR Germany, four at Laarbruch and four at RAF Brüggen, replacing the Buccaneer and Jaguar aircraft, respectively.

The Tornado programme will result in a vast increase in the capability of the British front-line nuclear strike attack force. The number of Tornado aircraft planned almost doubles the combined number of nuclear-capable Jaguar and Buccaneer aircraft deployed in FR Germany. This would indicate that Britain will require a larger stockpile of gravity bombs to arm these aircraft. The stockpile will increase even further, however, since the aircraft withdrawn from FR Germany may retain nuclear strike roles in the United Kingdom. After return to the UK, some Buccaneers will be given maritime strike roles,

Table 1.8. British nuclear forces, 1985

Delivery system	Weapon system: Type	No. deployed	Year deployed	Range (km)[c]	Warheads × yield	No. in stockpile
Aircraft	Buccaneer 52[a]	30	1962	1 700	2 × bombs	60
	Jaguar A[a]	36	1973	1 400	1 × bombs	36
	Tornado GR-1[b]	140	1982	1 300	2 × bombs	280
Submarine-based missiles	Polaris A3	32	1968	4 600	3 × 200 kt	96
	Polaris A3-TK	32	1982	4 700	2 × 40 kt	64
Carrier aircraft	Sea Harrier	30	1980	450	1 × bombs	30
ASW helicopters	Sea King	69	1976	—	1 × depth bombs	69
	Wasp	16	1963	—	1 × depth bombs	16
	Lynx	35	1976	—	1 × depth bombs	35

[a] Some Buccaneer and Jaguar aircraft withdrawn from bases in FR Germany may be assigned nuclear roles in the UK.
[b] 220 Tornado attack aircraft (GR1) are on order for the Royal Air Force and continue to replace Jaguar aircraft.
[c] Range for aircraft indicates combat radius.

Note: 34 Nimrod ASW aircraft, 12 Lance launchers and artillery guns are also certified to use US nuclear weapons.

Sources: Moore, J., ed., *Jane's Fighting Ships 1982–83, 1983–84* (Jane's, London, annual); Taylor, J. W. R., *Jane's All the World's Aircraft, 1982–83, 1983–84* (Jane's, London, annual); Beaver, P., *The Encyclopaedia of the Modern Royal Navy* (London, 1982); UK Ministry of Defence, *Statement on the Defence Estimates, 1980, 1981, 1982, 1983* and *1984* (HMSO, London, annual); Rogers, P., *Guide to Nuclear Weapons 1984–85* (University of Bradford, Bradford, 1984); UK, House of Commons, *Defence Committee Report, Session 79/80,* 23 July 1980.

possibly with nuclear weapons (as are the Lossiemouth-based Buccaneers). Some nuclear-capable Jaguars withdrawn from FR Germany will also join the UK-based squadrons in a back-up role, but their nuclear capability is unknown.

France

The MIRVed M-4 SLBM is due to enter service with the French strategic submarine force in 1985 (see table 1.9). The M-4 will be first deployed on the new SSBN, *L'Inflexible,* and will then be backfitted on all but the first SSBN, *Le Redoutable,* as part of an extensive retrofit programme. The introduction of the six-warhead M-4 missile into the French nuclear force will result in a large net increase in the number of warheads: from 80 warheads in 1984 to 496 by 1993.

The M-4 missile is now in its qualification and acceptance phase, after completing the last development test firing in February 1984. Delivery of the TN-70 nuclear warhead for the M-4 began in July 1983 and development continues on the TN-71 warhead, to be fitted on M-4 missiles after 1987. The TN-71 will reportedly bring the warheads up to the standard of warheads used by the USA, but it is unclear whether this refers to increased yield-to-weight ratio or advanced fusing.[55]

July 1984 saw the first deployment of the Mirage-2000 aircraft in the French Air Force. The Mirage-2000N variant is configured for nuclear attack and will eventually replace the Mirage IIIE and Jaguar A aircraft of the FATAC (tactical air command). Flight testing of the Mirage-2000N began in February 1983. Its initial operational date is expected to be 1988, and a total of 85 Mirage-2000N versions are planned.

Development work continues on France's first nuclear-armed air-to-surface missile, the ASMP. In the strategic role, the ASMP will be deployed on 18 Mirage-IVPs starting in 1986–87. In the tactical role, the ASMP will be deployed on 85 Mirage-2000N aircraft from 1988. The aircraft carriers *Foch* and *Clemenceau* have already been modified to accommodate the ASMP, probably for delivery by the Super Etendard.[56]

China

The 1 October 1984 military parade in Beijing was the first public display of Chinese nuclear missiles and included ICBMs, IRBMs and SLBMs (see table 1.10). The parade included CSS-1, -2, -3, and -4 missiles, as well as two CSS-N-3 SLBMs towed on trucks driven by naval personnel.[57] The appearance of nuclear weapons in the public parade was indicative of increased Chinese emphasis on nuclear

Table 1.9. French nuclear forces, 1985

Delivery system	Weapon system		Year deployed	Range (km)[c]	Warheads × yield	Warhead type	Number in stockpile
	Type	No. deployed					
Aircraft[a]	Mirage-IVA[a]	34	1964	1 500	2 × 70 kt	AN-22	75
	Jaguar A	45	1973	1 400	1 × 6–8/30 kt	[b]	50
	Mirage-IIIE	30	1964	1 200	1 × 6–8/30 kt	[b]	35
Air refuellers	C-135F	11	1965	—	—	—	—
Land-based missiles	S3	18	1980	3 500	1 × 1 Mt	TN-61	18
	Pluton	42	1974	120	1 × 15–25 kt	ANT-51	120
Submarine-based missiles	M-20	80	1977	3 000	1 × 1 Mt	TN-61	80
	M-4	16	1985	4 000	6 × 150 kt	TN-70	96
Carrier aircraft	Super Etendard	36	1978	650	1 × 6–8/30 kt	[b]	40

[a] The AN-51 warhead is also possibly a secondary bomb for tactical aircraft, and the AN-52 is also possibly a secondary bomb for the Mirage IVA.
[b] Warheads include ANT-51, ANT-52 and possibly a third type.
[c] Range for aircraft indicates combat radius.

Sources: Laird, R. F., 'French nuclear forces in the 1980s and the 1990s', *Comparative Strategy*, Vol. 4, No. 4, 1984, pp. 387–412; Langereux, P., 'Missiles tactiques et engins: cibles français en service, en developpement ou en étude', *Air et Cosmos*, 28 May 1983, p. 180; Defense Intelligence Agency, 'A guide to foreign tactical nuclear weapon systems under the control of ground force commanders, DST-1040S-541-83-CHG 1 (secret, partially de-classified), 17 August 1984; International Institute for Strategic Studies, *The Military Balance 1983–84* (IISS, London, annual).

Table 1.10. Chinese nuclear forces, 1985

Delivery	Weapon system		Year deployed	Range (km)	Warheads × yield	No. in stockpile
	Type	No. deployed				
Aircraft[a]	B-4 (Bull)	30	1966	6 100	1–4 × bombs	30
	B-5 (Beagle)	10	1974	1 850	1 × 1 Mt	10
	B-6 (Badger)	100	1966	5 900	1–3 × 1 Mt	30
Land-based missiles	CSS-1 (DF-2)	40–60	1966	1 100	1 × 20 kt	40–60
	CSS-2 (DF-3)	85–125	1972	2 600	1 × 2–3 Mt	85–125
	CSS-3 (DF-4)	~5	1978	7 000	1 × 1 Mt	10
	CSS-4 (DF-5)	~5	1980	12 000	1 × 5–10 Mt	10
	DF-1[b]	10–30	1966	650	1 × 2–10 kt	10–30
Submarine-based missiles	CSS-N-3	26	1983	3 300	1 × 200 kt–1 Mt	26

[a] All figures for these bomber aircraft refer to nuclear-capable versions only. Hundreds of these aircraft are also deployed in non-nuclear versions.
[b] A number of SRBMs (DF-1s) have been deployed in 'theatre support' roles, although they may no longer be active. Some of the MRBM and IRBM missiles are assigned to 'regional nuclear roles'. China has tested a number of warheads with yields from 2 to 20 kt.

Sources: Joint Chiefs of Staff, *Military Posture (annual report) FY 1978, 1982, 1983;* Department of Defense, *Annual Report for 1982;* Defense Intelligence Agency, *Handbook on the Chinese Armed Forces,* April 1976; Defense Intelligence Agency, 'A guide to foreign tactical nuclear weapon systems under the control of ground force commanders', DST-1040S-541-83-CHG 1 (Secret, partially declassified), 17 August 1984; Godwin, P. H., *The Chinese Tactical Airforces and Strategic Weapons Program: Development, Doctrine, and Strategy* (Air University, Maxwell AFB, Ala., 1978); Washburn, T. D., *The People's Republic of China and Nuclear Weapons: Effects of China's Evolving Arsenal* ADA 067350 (NTIS, 1979); US Congress, Joint Economic Committee, *Allocation of Resources in the Soviet Union and China 1976,* Part 2, pp. 94–96; Anderson, J., 'China shows confidence in its missiles', *Washington Post,* 19 December 1984, p. F11; International Institute for Strategic Studies, *The Military Balance 1983–84* (IISS, London, annual).

weapons in the overall defence programme. While the military has received the lowest priority of the four modernizations, nuclear programmes have received high priority.

In June 1984 the Chinese government also announced the establishment of a new Strategic Missile Force, taking over the previous nuclear responsibilities of the 2nd Artillery of the PLA.[58] In weapon development, trials of Xia Class SSBNs with CSS-N-3 SLBMs continued, preparing for possible deployment in 1985. About three submarines are reported to be under construction. According to the US Defense Intelligence Agency, production of CSS-3 and -4 ICBMs and CSS-2 IRBMs continues at a rate of 10 and 20 missiles per year, respectively.

V. Nuclear sea-launched cruise missiles

The deployment in June 1984 of the long-range nuclear-armed Tomahawk sea-launched cruise missile by the US Navy and in October of the long-range nuclear-armed SS-N-21 SLCM by the Soviet Navy are perhaps the most significant nuclear weapon developments in 1984. According to Admiral Stephen Hostettler, Director of the Joint Cruise Missile Program Office, Tomahawk provides "a new dimension in naval warfare".[60] These new long-range SLCMs now join long-range air-launched cruise missiles and ground-launched cruise missiles already deployed or about to be deployed by the superpowers. The Soviet Union, in addition, already has some 500 shorter-range SLCMs on 70 submarines.

The nuclear SLCM in the US Navy will serve three key military roles: strategic, theatre and tactical. This versatility means that it will probably be assimilated into a wide variety of nuclear war plans and strategies. The US Navy has enumerated a number of the specific tactical roles SLCMs could serve in support of military operations:

1. To "strike selected naval targets ashore to enhance sea control operations".
2. To "strike selected fixed targets in support of the land war".
3. To "strike quasi-fixed targets to disrupt enemy second and third echelon movement".
4. To "strike or hold at risk selected targets after a major theater nuclear exchange".
5. To "strike selected targets in contingencies such as Third World crises involving Soviet intervention or introduction of nuclear weapons".[61]

Deployment of the nuclear Tomahawk will expand the Navy's

long-range offensive strike platforms from 14 aircraft carriers to over 200 ships and submarines (in addition to SSBNs). By the early 1990s there will be over 2 500 ship and submarine launchers able to carry the nuclear Tomahawk. Of the 3 994 Tomahawk SLCMs planned for production, 2 739 will be for surface ships and 1 255 will be on submarines. According to their missions, 593 are for anti-ship, 2 643 for conventional land attack and 758 for nuclear land attack. By FY 1995, 4 battleships, 29 cruisers, 51 destroyers and 106 attack submarines will be converted to carry the nuclear Tomahawk.[62] Ships and submarines will be able to launch the Tomahawk from standard 21-inch torpedo tubes, deck-mounted 'armoured box launchers', or new vertical launchers. New Los Angeles Class attack submarines, the first of which will be deployed in 1985, will have 12 vertical launch tubes (the vertical launching system) in their forward sections, which will allow them to carry Tomahawks without reducing their load of torpedoes.

SLCM deployment, according to the Navy, enhances "the capability to execute a variety of options within both sea control and power projection functions". Targets not assigned to carrier-based aircraft—including "targets deep inside enemy territory, currently outside the combat radius of tactical aircraft, point targets of extreme hardness, previously unable to be attacked with a high kill probability, and targets close to the FEBA [forward edge of the battle area] that are so heavily defended as to cause excessively high levels of aircraft attrition"—will be suitable for SLCM attack.[63] The Tomahawk on "independent covert forward-deployed submarines", Admiral Hostettler told the US Congress in 1984, "presents the Soviets a formidable threat from 360 degree axis".[64]

The introduction of the 2 160-km range land-attack SLCM will be particularly significant in the Pacific and Indian Oceans where the Navy says it will be "able to hold at risk large land areas not currently covered by naval forces or other theater forces [and]...significantly increase the Pacific Fleet's theater nuclear arsenal and provide the capability to strike land targets from survivable sea-based platforms".[65] According to the Navy, Tomahawk's presence around the periphery of the Soviet Union will "convey to the Soviet Union that its territory is not a sanctuary".[66]

Tomahawk will also be called upon for 'strategic' and 'strategic reserve' roles. Admiral Frank B. Kelso, Director of the Strategic Submarine Division of the Navy, explained to Congress in 1981 that SLCMs "will not be automatically launched in a general war scenario" but remain available so that "the United States would, in any post-nuclear exchange environment, retain a measure of coercive power".[67] Admiral William Williams, Director of the Navy's Strategic and

Theater Nuclear Warfare Division, said in 1981 that Tomahawk "will provide additional survivable nuclear forces for the Strategic Reserve Force. The latter role could be pivotal in the postwar balance and struggle for recovery".[68]

The new Soviet long-range SLCM—the SS-N-21—is also thought to be dual-capable like the Tomahawk. The 3 000-km range missile is small enough to be fired from the standard 533-mm torpedo tubes found on virtually all Soviet submarines and will primarily arm Yankee and Victor III Class submarines. Flight-testing of the SS-N-21 appears to have been completed and the missile may already be operationally deployed on submarines near US coasts.[69] The SS-N-21 will be primarily allocated to theatre strike roles, but tactical 'strategic reserve' and strategic strike missions against US command, control and communications facilities and naval bases must also logically be accepted.[70]

Arms control implications

The 1984 Arms Control Impact Statement prepared by the Arms Control and Disarmament Agency on the Tomahawk SLCM stated that the "relatively slow flight of current generation cruise missiles does not represent a first-strike threat to the Soviet Union. Rather, cruise missile deployments symbolize a second-strike capability which should have a stabilizing effect". This assessment appears to miss the point that they are destabilizing and cause arms control problems.

The vertical launching system (VLS), able to deliver not only Tomahawk but also surface-to-air and anti-submarine weapons, is another arms control problem. While increasing the Navy's survivability and flexibility, VLS significantly complicates future arms control possibilities for surface ships.[71] Indeed, one of the acknowledged goals of the Tomahawk programme is to confuse the USSR. As Admiral Williams stated in 1981, "We...clearly recognize that their very presence out there and their survivable presence will provide to the Soviets a very difficult calculation process in assessing the United States' capabilities".[72]

Given the potential strategic missions of the new SLCMs, their operational flexibility, and planned deployment in large numbers, they should clearly be included in the current arms control negotiations. By virtue of their range, SLCMs fall into the same category as air-launched cruise missiles that were controlled under SALT II. The development of SLCMs has moved forward, sidestepping arms control categories and the larger European missile debate, but now they have been deployed and both operational and numerical controls are required.

Notes and references

1. Department of Defense, *FY 1984 Annual Report*, p. 55.
2. Bethe, H. A. *et al.*, 'Space-based ballistic missile defense', *Scientific American*, October 1984, p. 39.
3. Key Administration advocates include the President's Science Advisor, George Keyworth, and Defense Secretary Caspar Weinberger. Several prominent figures such as Zbigniew Brzezinski, Henry Kissinger and Richard Nixon have begun to give it serious consideration. See *Wall Street Journal*, 10 July 1984; *New York Times Magazine*, 27 January 1984, pp. 28 ff; *Washington Post*, 23 September 1984, p. C8; and *Washington Post*, 1 July 1984, p. A6.
4. See Hough, J., 'Could "Star Wars" foment a new Russian revolution', *Washington Post*, 6 January 1985, p. C1.
5. This is confirmed in polls. See Smith, H., 'Poll shows skepticism on arms pact', *New York Times*, 8 January 1985, p. A8.
6. *Washington Post*, 22 January 1984, p. A9.
7. *New York Times*, 29 March 1984, p. B-11.
8. Quoted in *Time*, 7 January 1985, p. 66.
9. House Appropriations Committee, *FY 1985 Energy and Water Development Appropriations*, Part 6, p. 102.
10. Senate Armed Services Committee, *FY 1982 DoD*, Part 7, p. 3237.
11. 'Circular error probable' is a measure of accuracy: the radius of a circle, centred on the target, within which 50 per cent of the weapons aimed at the target are expected to fall.
12. Spice, B., 'Sandia labs testing launchers', *Albuquerque Journal*, 31 October 1984, p. A12.
13. *Aviation Week & Space Technology*, 3 September 1984, pp. 44–45.
14. Senate Armed Services Committee, *FY 1984 DoD*, Part 5, p. 2524; Senate Armed Services Committee, *FY 1985 DoD*, Part 7, p. 3376.
15. Senate Armed Services Committee, *Arms Control Overview*, 13 June 1984, Senate Hearing 98-939, p. 68.
16. *Congressional Record*, 12 April 1984, pp. 4638–41; Department of Defense Authorization Act 1985, *Conference Report*, 98-1080, 26 September 1984, pp. 99–101.
17. SASC, *FY 1985 DoD* (note 14), p. 3419.
18. Defense Advanced Research Projects Agency, *FY 1984 Research and Development Program, A Summary Description*, April 1983, pp. 3–4.
19. Getler, M., 'British-based US planes keep watch', *Washington Post*, 31 December 1984, p. A10.
20. Markham, J. M., '3 GIs die at German base when missile catches fire', *New York Times*, 12 January 1985, p. 3; Drozdiak, W., 'US missile unit likes Pershing II', *Washington Post*, 11 November 1984, p. A1; Pincus, W., 'Pershing IIs deployed faster than expected', *Washington Post*, 3 October 1984, p. A31. For a description of Pershing II operations, see Sankner, R. and Norris, P. H., 'One up on 1a', *Field Artillery Journal*, July–August 1984, pp. 16–19.
21. DoD Authorization Act 1985 (note 16), pp. 165–66.
22. SASC, *FY 1985 DoD* (note 14), p. 3634.
23. In addition, reports are required on Soviet compliance with arms control agreements; the requirements and costs of measures to verify compliance with the 1972 Biological and Toxin Weapons Convention (due on 15 March 1985); the adequacy of current US chemical stockpiles; and the need for production of new binary weapons (1 April 1985). See DoD Authorization Act 1985 (note 16), pp. 19–20, 94–102, 141–42, 315–16.
24. House Armed Services Committee, *FY 1985 DoD*, Part 4, pp. 1097–164; SASC, *FY 1985 DoD* (note 14), Part 6; House Appropriations Committee, *FY 1985 DoD*, Part 5, pp. 665–955; Senate Appropriations Committee, *FY 1985 DoD*, Part 3, pp. 289–373; Senate Foreign Relations Committee, *Strategic Defense and Anti-Satellite Weapons*, Senate hearing 98-750; House Foreign Affairs Committee, *Arms Control in Outer Space.*
25. *President's Commission on Strategic Forces*, 21 March 1984, p. 8.
26. Carter, A. B., *Directed Energy Missile Defense in Space*, Background Paper, Office of Technology Assessment, 1984.
27. Extensive coverage of the reports was first given in *Aviation Week & Space Technology*, 17 October 1983, pp. 16–18; 24 October, 1983, pp. 50–57; and 31 October 1983, pp. 74–78. For portions of the reports and summaries, see SFRC (note 24), pp. 94–175.
28. *Science*, 4 November 1984, p. 673.
29. Oberdorfer, D., 'Ex Defense Chief calls "Star Wars" unrealistic', *Washington Post*, 15 December 1984, p. A14. Articles supporting and criticizing the scientific feasibility of develop-

ing a space-based ballistic missile defence system multiplied during 1984. See, for instance, Bethe, H. A., Garwin, R. L., Gottfried, K. and Kendall, H. W., 'Space-based ballistic missile defense', *Scientific American*, October 1984, pp. 39–49; Drell, S. D. and Panofsky, W. K. H., 'The case against strategic defense: technical and strategic realities', *Issues in Science and Technology*, Fall 1984, pp. 45–65; Drell, S., Farley, P. J. and Holloway, D., 'Preserving the ABM initiative', *International Security*, Fall 1984, pp. 51–91; Fletcher, J. C., 'The technologies for ballistic missile defense', *Issues in Science and Technology*, Fall 1984, pp. 15–29; Jastrow, R., 'Reagan vs. the scientists: why the president is right about missile defense', *Commentary*, January 1984, pp. 23–32; *Orbis*, summer 1984, whole issue; Payne, K. B. and Gray, C. S., 'Nuclear policy and the defensive transition', *Foreign Affairs*, spring 1984, pp. 820–42. An extensive treatment of Star Wars impact on the ABM Treaty is given in: Longstreth, T. K. and Pike, J. E., *A Report on the Impact of United States and Soviet Ballistic Missile Defense Programs on the ABM Treaty*, June 1984. A good introduction to the subject is Carter, A. B. and Schwartz, D. N. (eds), *Ballistic Missile Defense* (Brookings Institution, Washington, D. C., 1984).

30. Broad, W. J., 'Reduced goal set on Reagan's plan for space defense', *New York Times*, 23 December 1984, p. 1.
31. Yost, D.S, 'European anxieties about ballistic missile defense', *Washington Quarterly*, Fall 1984.
32. Indications of a Soviet numerical advantage were first mentioned in 1983 Congressional testimony by Dr Richard Wagner (Senate Armed Services Committee, *FY 1984, Department of Energy*, p. 19), but were contradicted by testimony of Mr Perle the same year (House Foreign Affairs Committee, *Call for a Mutual and Verifiable Freeze on and Reductions in Nuclear Weapons*, 1983, p. 45). A clear portrayal of a Soviet advantage of roughly 25 per cent appeared in figures accompanying 1984 testimony by Dr Wagner and Mr Weinberger (see note 9, p. 118; and SASC, *FY 1985 DoD*, Part 1, p. 123, respectively). Mr Reagan confirmed this advantage on 10 June in London (Kaplan, F., *Boston Globe*, 18 June 1984, p. 1), as did Mr Weinberger soon thereafter (CBS Morning News, 18 June 1984, manuscript p. 7).
33. Two charts presented by Dr Wagner and Mr Weinberger conflict, with Dr Wagner's indicating 1978 and Mr Weinberger's 1975 as the cross-over point (see note 32). For estimates of the historical US arsenal, see Cochran, T. B., Arkin, W. M. and Hoenig, M. H., *The Nuclear Weapons Databook: Volume 1, US Nuclear Weapons and Capabilities* (Ballinger, Cambridge, Mass., 1984), pp. 14–15.
34. See Arkin, W. M. and Sands, J. I., 'The Soviet nuclear stockpile', *Arms Control Today*, Vol. 14, No. 5, June 1984.
35. Department of Defense, *Defense/84*, May 1984, p. 5.
36. *The President's Report on Continuing the Acquisition of the Peacekeeper (MX) Missile*, March 1985, p. 2. The USSR reported in 1982 that the SS-X-24 would be the single new type of ICBM allowed under the SALT II agreement, and in response to US charges that the SS-X-25 is a new missile, the USSR indicated that it is a modification of the SS-13. Available evidence does not permit an unambiguous determination of whether the SS-X-25 is a new missile as defined by SALT II, although it is expected to feature significantly improved capabilities over the SS-13.
37. See, for example, Agres, T., 'Soviets testing new ICBMs, CIA reports', *Washington Times*, 18 September 1984, p. 1.
38. See note 37; and Corddry, C. W., 'Soviets believed developing giant intercontinental missile', *Baltimore Sun*, 13 May 1984, p. 1
39. See note 35. When the third Typhoon Class submarine enters operational service, two Yankee Class submarines will be removed from service as strategic missile submarines, thus reducing the number of strategic missile submarines to 61 and the number of SLBMs to 924. However, the number of warheads on deployed submarines will increase. According to the Joint Chiefs of Staff, *FY 1986*, p. 19, this change may have already taken place.
40. Department of Defense, *Soviet Military Power* (1984), pp. 25–26; Defense Intelligence Agency, *Unclassified Communist Naval Orders of Battle*, May 1984, p. 1.
41. *The President's Report* (note 36), p. 2; DoD, 1984 (note 40), p. 25; House Armed Services Committee, *FY 1985 DoD*, Part 1, p. 770; *Defense/84* (note 35, p. 9). Delta Class submarines moved into the North Atlantic in January 1984 as part of the response to US INF (intermediate-range nuclear forces) deployments (House Armed Services Committee, *FY 1985 DoD*, Part 3, p. 3).
42. Joint Economic Committee, *Allocation of Resources in the Soviet Union and China*, 1983, Part 9, p. 203.

43. Fifteen Bear Hs were reported to be in service in mid-1984 by Lt General James A. Williams, Director of the Defense Intelligence Agency, in 'The Soviet strategic threat' (note 35), p. 10. The Joint Chiefs of Staff FY 1986 statement notes 120 Bears and 45 Bisons as deployed (p. 19), thus indicating that 20 Bear Hs have been deployed.
44. *The President's Report* (note 36), pp. 2–3. The Soviet Ministry of Defence announced on 13 October 1984 that new long-range cruise missiles on "strategic bombers and submarines" had begun to be deployed (Doder, D., 'Soviets say new cruise deployed', *Washington Post*, 14 October 1984, p. 1). US intelligence believes these missiles to be the AS-15 on the Bear H bomber, and the SS-N-21 aboard attack submarines.
45. Press statement by the Chairman of the Standing Consultative Group, *NATO Press Release*, Brussels, 9 January 1985. The Soviet denial of additional deployments in 1984 was made in October in response to statements by Mr Weinberger that "substantial numbers" of additional SS-20 missiles are operational. See *New York Times*, 12 October 1984, p. A3; and 13 October 1984, p. A3.
46. Note 42.
47. NATO, *NATO and the Warsaw Pact Force Comparisons*, 1984, pp. 36–40; Joint Chiefs of Staff, *FY 1986*, pp. 40–41, 46.
48. Note 42, p. 197.
49. DoD, 1984 (note 40), pp. 30–31; Williams (note 43), p. 11.
50. House Armed Services Committee, *FY 1984 RDT&E*, Part 5, pp. 232, 247; *Aviation Week & Space Technology*, 23 July 1984, p. 16; Pincus, W., 'US eyes Soviet rate of making bombers', *Washington Post*, 22 December 1984, p. A18.
51. DoD, 1984 (note 40), p. 55.
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54. *Statement on the Defence Estimates 1984*, Vol. 1 (HMSO, London, 1984), p. 24.
55. 'French propose defense budget of $15.8 billion for next year', *Aviation Week & Space Technology*, 22 October 1984, pp. 29–30.
56. 'French government defines nuclear aircraft carrier', *Aviation Week & Space Technology*, 26 November 1984, p. 61
57. *New York Times*, 2 October 1984; *Jane's Defence Weekly*, 13 October 1984.
58. *Jane's Defence Weekly*, 10 August 1984, p. 223; *New York Post* (Reuters), 13 June 1984.
59. Note 42, p. 104.
60. House Armed Services Committee, *FY 1985 DoD*, Part 2, p. 371.
61. House Armed Services Committee, *FY 1985 DoD*, Part 3, pp. 754–55.
62. Note 60, p. 361.
63. House Armed Services Committee, *FY 1980 DoD*, Part 3, p. 755.
64. Note 60, p. 373.
65. Senate Armed Services Committee, *FY 1983 DoD*, Part 5, p. 3083.
66. Arms Control and Disarmament Agency, *FY 1984 ACIS*, p. 142.
67. Senate Armed Services Committee, *Strategic Forces Modernization Programs*, Hearings, 1981, p. 203.
68. Note 67, p. 170.
69. *The President's Report* (note 36), p. 2; see also note 44.
70. Statement of Rear Admiral John L. Butts, USN, Director of Naval Intelligence, before the Seapower and Force Projection Subcommittee, Senate Armed Services Committee, 26 February 1985, p. 10.
71. See Arkin, W. M., 'Flying in the face of arms control', *Bulletin of the Atomic Scientists*, February 1984.
72. As Admiral Hostettler said in 1984, "By placing this versatile family of weapons on a wide variety of surface ships and submarines, we multiply our offensive force capability...It complicates Soviet planning by requiring them to consider every battlegroup ship a potential threat." House Armed Services Committee, *FY 1985 DoD*, Part 2, p. 372.