Introducing the Strategic Nuclear Forces Dataset (Ver 1.0)

Data Note

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I. Introduction

This data note introduces a new dataset of strategic nuclear forces of all nuclear-armed states from 1945 to 2002. Specifically, it describes definitions of key concepts underlying the dataset, the sources used to construct the dataset, key assumptions that are posited to make estimates of important parts of the dataset, and information on key characteristics of states' strategic nuclear delivery platforms, such as their quantity, range, warhead yield, and accuracy. These pieces of information are also used to construct three indicators of the balance of strategic nuclear forces: the total deliverable strategic warhead count, the equivalent megatonnage (EMT), and the counter military potential (CMP) of each nuclear-armed state's nuclear strike.

The second section of this note explains definitions of key concepts used in the dataset and what sources are primarily used to construct the dataset. The third section offers a short explanation of the concepts of the deliverable strategic warhead count, EMT, and CMP of a state's nuclear strike and how each indicator is calculated. The fourth section describes the quantity of all deployed strategic nuclear delivery platforms of all nuclear-armed states from 1945 to 2002. The fifth section provides a list of all strategic nuclear delivery platforms and their operational range. The sixth section provides information about each strategic nuclear platform's accuracy. The seventh section provides information about the yield of nuclear warheads that each strategic nuclear platform can deliver. The last section provides information about the warhead delivery capability of multiple-warhead delivery platforms. Each section also describes the assumptions I made to provide estimates of key characteristics of strategic nuclear platforms, whenever they are made.

CITATION

I ask users of this dataset to employ the following citation:

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II. Definitions and Sources

Definitions

This dataset contains information about strategic nuclear delivery platforms that all nuclear states have deployed since they acquired the first operational nuclear device. The date of each state's nuclear proliferation is based on Gartzke and Kroenig's list of nuclear weapons proliferation.[1]

What is a strategic nuclear delivery platform? A strategic nuclear delivery platform is defined here as a delivery platform that can carry at least one nuclear warhead and be used for strategic nuclear missions. Strategic nuclear missions include counter-value nuclear attacks, which aim at civilian targets such as population centers and major industrial complexes, and counter-force attacks, which aim at military targets such as an adversary's nuclear delivery platforms and command-and-control centers.

While some nuclear platforms can be solely used for strategic nuclear missions due to their inherent technological features (e.g., low accuracy, high yield), other platforms can be employed for both strategic and battlefield nuclear missions. Some states consider all nuclear platforms they have deployed as strategic. I consider all nuclear platforms deployed by Israel, South Africa, India, and Pakistan as strategic.[2] Although Pakistan has recently deployed some battlefield nuclear platforms, including its Nasr short-range tactical nuclear weapons, its early nuclear platforms have been considered strategic by most analysts and policymakers. I also assume that the nuclear platforms that can be used for both strategic and battlefield nuclear missions as strategic, because states are likely to think that such dual-use platforms would be used in an all-out nuclear war should a mutual nuclear exchange occur. Lastly, I only focus on deployed strategic nuclear platforms. Platforms that were tested but never deployed are not considered in this dataset.

Sources Used

I refer to a wide array of primary and secondary sources to gather information on each nuclear-armed state's strategic nuclear delivery platforms and the specification of each nuclear platform. The Natural Resources Defense Council (NRDC) and Federation of American Scientists' (FAS) *Nuclear Notebook* reports provide the most valuable information. Their information has been considered the most reliable by nuclear experts. The Stockholm International Peace Research Institute (SIPRI)'s *SIPRI Yearbook* editions contain invaluable information about states' nuclear arsenals, which is written by the experts involved in gathering information provided by NRDC and FAS *Nuclear Notebook*. I frequently consult these three sources. In some cases where these sources do not provide enough information, I refer to the International Institute for

[1] Erik Gartzke and Matthew Kroenig, "A Strategic Approach to Nuclear Proliferation," *Journal of Conflict Resolution* 53, no. 2 (April 2009): 151-60.

[2] For instance, see Erik Gartzke, Jeffrey Kaplow, and Rupal N. Mehta, "The Determinants of Nuclear Force Structure," *Journal of Conflict Resolution* 58, no. 3 (2014): 481-508.

Strategic Studies (IISS)' *Military Balance*, along with other country-specific sources.

Data on nuclear weapons often remain classified, and publicly available sources commonly rely upon experts' estimations. It is natural, therefore, that in many cases different sources provide different information. I attempt to use the source which provides a wide array of information with reasonable reliability to minimize the need for making arbitrary assumptions. I also try to rely upon the latest sources as much as possible because analysts frequently use newly declassified information and update their estimation. In some cases where there are reasons to believe that country-specific sources provide more reliable information than general sources (e.g., country-specific sources use declassified internal sources), I use country-specific sources.

III. Calculating the Deliverable Strategic Warhead Count, EMT, and CMP

This section of the dataset describes how to calculate three dyad-specific indicators of a nuclear-armed state's strategic nuclear force: the deliverable strategic warhead count, the EMT, and the CMP of a state's nuclear strike. These are best understood as estimates of the total firepower a state's nuclear arsenal can generate in a hypothetical nuclear war scenario.

Assumptions

I make several assumptions to calculate these indicators. First, I only consider the strategic nuclear platform whose range is greater than the inter-capital distance between a state and its adversary. As nuclear delivery platforms typically have a limited range of operation and a state's potential adversaries might be geographically distant, it is important to consider the dyad-specific geographical distance and delivery platforms' range. Ideally, the best approximation of the maximum reach of a state's nuclear force requires information on the location of both the military bases in which a state's nuclear delivery vehicles are deployed and potential targets that these delivery platforms aim at and assess whether nuclear warheads of the state can be delivered by those platforms to important targets. However, detailed information on states' nuclear weapons deployment and their list of targets remains strictly classified, which hinders the construction of such an ideal measure.

I argue that the inter-capital distance between two states can be a reasonable proxy of the physical distance a state's nuclear warhead has to travel to hit a target in its dyadic counterpart. Here the assumption is that a state's capital is a reasonable proxy for military bases where nuclear weapons are deployed. To be clear, this does not mean that nuclear weapons are typically deployed precisely in a state's capital. It only suggests that nuclear weapons are often located in places distant from a state's border, like a state's capital city, for a good reason. Deploying nuclear delivery vehicles and warheads on a base close to one's border increases their vulnerability to a potential counterforce strike. Even small states such as Israel have buffer zones between their nuclear weapon bases and their borders to reduce the vulnerability and their nuclear forces' exposure to a potential military strike. Likewise, states rarely choose cities located close to land borders as their capital cities because geographical proximity to a potential opponent's border may make an effective defense difficult. Due to the absence of systematic and reliable information on all states' nuclear weapons bases, the location of a state's capital could be a proxy of where nuclear delivery platforms are deployed because both nuclear weapons bases and states' capitals are often physically distant from their borders.

A potential adversary's capital can also be a good proxy for strategic targets that a state threatens to destroy with nuclear weapons. In fact, a state's capital city is often regarded as one of the most important targets for a nuclear strike, given that most government and military apparatus are in the capital. Other attractive targets, such as major industry complexes, are also distant from a state's border and often located close to its capital, for economic and military reasons. If a major industrial complex is close to one's border, even a minor military incursion of an adversary may significantly impair a state's overall economic capacity. Since capitals are often the source of mass consumption of goods and resources, population centers and industrial complexes are located close to capitals. Therefore, using the inter-capital distance is a conservative and still reliable proxy for the geographic distance that a state's nuclear warhead needs to travel to hit a given opponent.

Submarine-launched ballistic missiles (SLBMs), especially launched from nuclear-powered ballistic missile submarines, are thought to have an infinite range, given that the powerful nuclear reactor gives a nuclear submarine virtually unlimited range. For strategic bombers, I gather the information about each bomber's combat range, the maximum range that an aircraft can fly with (nuclear) payloads.

Below I provide a dyad-specific list of strategic nuclear delivery platforms that are considered in calculations of EMT and CMP indices.

Table 1. A Dyad-Specific List of Strategic Nuclear Platforms that Can Reach the Adversary

State A	Strategic nuclear platforms reachable to State B	Distance (km)	State B	Strategic nuclear platforms reachable to State A
US	All ICBM All SLBM All bombers	5,903	**UK**	All platforms
US	All ICBM All SLBM All bombers	6,166	**France**	All SLBM
US	All ICBM All SLBM B-36, B-52, B-58, FB-111A, B-1B, B-2	7,826	**USSR/Russia**	All ICBM (except for SS-3, 4, 5, 20) All SLBM All Tu-95, 3M since 1958, Tu-160
US	Titan II, Minuteman III All SLBM B-52, FB-111A, B-1B	12,723	**South Africa**	-
US	All ICBM All SLBM B-52, B-58, FB-111A, B-1B, B-2	9,503	**Israel**	-
US	Atlas E/F, Titan II, all Minuteman All SLBM B-52, FB-111A, B-1B, B-2	11,152	**China**	DF-5 All SLBM
US	Atlas E/F, Titan II, Minuteman II/III All SLBM B-52, FB-111A, B-1B, B-2	12,057	**India**	-
US	Atlas E/F, Titan II, Minuteman series All SLBM	11,386	**Pakistan**	-

	B-52, FB-111A, B-1B, B-2			
UK	All platforms	341	**France**	All platforms
UK	All platforms	2,503	**USSR/Russia**	All platforms (except for SS-3, 4)
UK	All SLBM	9,679	**South Africa**	-
UK	All platforms	3,611	**Israel**	-
UK	Vulcan All SLBM	8,145	**China**	DF-5 All SLBM
UK	All SLBM	6,717	**India**	-
UK	All SLBM	6,046	**Pakistan**	-
France	All platforms	2,490	**USSR/Russia**	All platforms (except for SS-3, 4)
France	All SLBM	9,352	**South Africa**	-
France	Mirage IVA/P SSBS S3 All SLBM	3,336	**Israel**	-
France	All SLBM	8,222	**China**	DF-5 All SLBM
France	All SLBM	6,595	**India**	-
France	All SLBM	5,932	**Pakistan**	-
USSR/Russia	All ICBM (except for SS-3, 4, 5, 13, 17 M3, 19 series, 20, 24 M1, SS-27) All SLBM All Tu-95, 3M, Tu-160	10,145	**South Africa**	-
USSR/Russia	All platforms (except for SS-3, 4)	2,675	**Israel**	-
USSR/Russia	All platforms (except for SS-3, 4, 5, 20)	5,795	**China**	DF-5 All SLBM H-6
USSR/Russia	All platforms (except for SS-3, 4)	4,347	**India**	-
USSR/Russia	All platforms (except for SS-3, 4)	3,663	**Pakistan**	-
South Africa	-	7,522	**Israel**	-
South Africa	-	12,968	**China**	DF-5 All SLBM
South Africa	-	9,312	**India**	-
South Africa	-	9,450	**Pakistan**	-
Israel	-	7,125	**China**	DF-5 All SLBM
Israel	-	4,030	**India**	-
Israel	-	3,539	**Pakistan**	-
China	DF-4, DF-5 All SLBM Tu-4, H-6	3,784	**India**	-
China	DF-4, DF-5 All SLBM Tu-4, H-6	3,874	**Pakistan**	-
India	All platforms	686	**Pakistan**	All platforms

Second, if my estimation of the maximum number of nuclear warheads carried by all strategic platforms exceeds the estimated number of all nuclear warheads possessed by a given nuclear-armed state, then I use the latter as the final estimation of nuclear warheads carried by the state's nuclear delivery platforms, as the actual number of nuclear warheads used in a strike cannot exceed the number of nuclear weapons possessed by the state.[3] Additionally, if different models of a specific platform carry different warheads but there is no available information on the number of each model of the platform, I take the average value of the maximum number of warheads delivered by each model of the platform.

FORMULAS

First, the deliverable strategic warhead is an indicator counting the total number of nuclear warheads that can be delivered by a state's strategic nuclear delivery platforms. Rather than assuming that all nuclear warheads a country possesses can be used by all delivery platforms at once, this measure directly takes into account the number of strategic nuclear delivery platforms deployed by each nuclear-armed state, the range of these platforms, the number of nuclear warheads each type of platform can carry. Thus, it can more accurately capture how many targets the state's nuclear strike can cover than merely counting the number of all deployed nuclear warheads.

The procedure for calculating the deliverable strategic nuclear warhead count is as follows.

$$\textit{Deliverable Strategic Warhead Count}_{\text{total}} = \sum_{i=1}^{M} \mathrm{N}_i \quad (1)$$

where M represents the total number of distinct types of delivery platforms, and N_i is the total number of nuclear weapons that the ith type delivery platform carries.

Second, the EMT index reflects the fact that not all nuclear warheads have equal destructive power. Some nuclear payloads have more than ten megatons, while others may create a yield of a few kilotons. As high-yield weapons can impose greater damage on both civilian and military targets, the total EMT of a state's nuclear arsenal is a more direct measure of the total destructive power of a state's first nuclear strike.

The procedure for calculating the total EMT of a state's nuclear attack is as follows. First, I identify a state's strategic nuclear platforms whose reach is greater than the inter-capital distance between the state and its dyad-specific adversary. Next, I gather information on the yield of the nuclear ordnance delivered by each distinct nuclear platform and the number of warheads that the platform can deliver. Finally, I use the following formulas to calculate the total EMT of a state's nuclear strike.

[3] The data on nuclear warheads come from Matthew Kroenig, "Nuclear Superiority and the Balance of Resolve: Explaining Nuclear Crisis Outcomes," *International Organization* 67, no. 1 (January 2013): 141-71.

$$EMT_{\text{total}}=\sum_{i=1}^{M} \mathrm{N}_i \mathrm{Y}_i^{\frac{2}{3}} \text{ if } \mathrm{Y}_i \leq 1\mathrm{MT} \ (2)$$

and

$$EMT_{\text{total}}=\sum_{i=1}^{M} \mathrm{N}_i \mathrm{Y}_i^{\frac{2}{3}} \text{ if } \mathrm{Y}_i \leq 1\mathrm{MT} \ (3)$$

where M represents the total number of distinct types of delivery platforms, N_i is the total number of nuclear weapons that the *i*th type delivery platform carries, Y_i is the destructive power (measured by megatonnage) of the weapon.[4]

Next, the total CMP of a state's nuclear strike represents the effectiveness of a nuclear strike against hard targets, mostly the adversary's nuclear forces.[5] Since the key to a successful counterforce nuclear strike is to possess accurate delivery platforms, this measure considers not only the destructiveness of nuclear payloads but also the accuracy of the platforms carrying out an attack. As counterforce capabilities of states' arsenals play a key role in the nuclear competition school's arguments, the relative advantage of states' nuclear forces could be well captured by assessing the total CMP of a state's military nuclear capability.

The total CMP of a state's nuclear strike is calculated in a similar way in which the total EMP of a state's nuclear salvo is measured, except that information on each strategic nuclear platform's accuracy is additionally taken into consideration. The following formulas are used.

$$CMP_{\text{total}}=\sum_{i=1}^{M} \mathrm{N}_i \frac{\mathrm{Y}_i^{\frac{2}{3}}}{\mathrm{CEP}_{\mathrm{Y}_i}} \text{ if } \mathrm{Y}_i \geq 0.2\mathrm{MT} \ (4)$$

and

$$CMP_{\text{total}}=\sum_{i=1}^{M} \mathrm{N}_i \frac{\mathrm{Y}_i^{\frac{4}{5}}}{\mathrm{CEP}_{\mathrm{Y}_i}} \text{ if } \mathrm{Y}_i < 0.2\mathrm{MT} \ (5)$$

where M represents the total number of distinct types of delivery platforms, N_i is the total number of nuclear weapons that the *i*th type delivery platform carries, Y_i is the destructive power (measured by megatonnage) of the weapon, $\mathrm{CEP}_{\mathrm{Y}_i}$ is the accuracy, measured by

[4] For discussion of the formula, see Jeffrey T. Richelson, "Evaluating the Strategic Balance," *American Journal of Political Science* 24, no. 4 (November):783-84; Michael Salman, Kevin J Sullivan, Stephen Van Evera, "Analysis or Propaganda? Measuring American Strategic Nuclear Capability, 1969-88," in Lynn Eden and Steven E. Miller, eds., *Nuclear Arguments: Understanding the Strategic Nuclear Arms and Arms Control Debates* (Ithaca, NY: Cornell University Press, 1989), 209; John S. Przemieniecki, *Mathematical Methods in Defense Analyses*, 3rd ed (Reston, VA: American Institute of Aeronautics and Astronautics, 2000), 177.

[5] Richelson, "Evaluating the Strategic Balance," 785-86.

circular error probable (CEP), of the *i*th type delivery platform.[6]

Note that I exclude strategic bombers carrying nuclear gravity bombs from the list of delivery platforms when calculating the total CMP of a state's nuclear arsenal because information on the accuracy of gravity bombs is extremely difficult to obtain. This exclusion would not be a significant issue, however, because gravity bombs are rarely used for counterforce nuclear strikes. Bombers armed with gravity bombs are included in the calculation of the total EMT of a state's nuclear strike.

Excel files and Stata do-files that are used to calculate the EMT and CMP of each nuclear-armed state's nuclear strike toward another nuclear-armed state are available upon request. Contact (ksuh01@syr.edu).

[6] For discussion on the formula, see Richelson, "Evaluating the Strategic Balance," 785-87; Przemieniecki, *Mathematical Methods in Defense Analyses*, 179.

IV. Deployed Strategic Nuclear Platforms, 1945-2002

This section provides annual information on the quantity of each distinct strategic nuclear delivery platform of nuclear-armed states from 1945 to 2002. It also describes the assumptions I made to estimate the quantity of each nuclear-armed state's strategic nuclear delivery platforms and provides a country-specific list of sources to code the estimated number of deployed strategic nuclear platforms.

ASSUMPTIONS ABOUT QUANTITY

In several cases (especially the United States during the early Cold War, Israel, India, and Pakistan), data on the number of nuclear platforms are especially either sparse or secretive and, therefore, obtaining necessary information is not always feasible. Whenever necessary, I make some assumptions to provide my own estimates.

U.S. Bomber Capability in the Early Cold War

Not all bombers during the early Cold War (e.g., B-29, B-36, B-50) were modified for carrying out nuclear missions. Though there is available information on the precise number of nuclear-certified bombers between 1945-1950,[7] there is no publicly available information on the number of nuclear-certified bombers between 1951 and 1957, the final year of the deployment of B-36 bombers. Following NRDC, which assumes that all Primary Authorized Aircrafts (PAA) can carry nuclear bombs during that period, I assume that all B-29, 36, and 50 bombers were nuclear-certified since 1951.

Israel, India, and Pakistan's Nuclear-Certified Aircraft

Similarly, not all aircraft of Israel, Pakistan, and India assume nuclear missions (for example, although Israel's F-16 aircraft has been known as an air-based leg of Israel's nuclear arsenal, it is clear that not all F-16 aircraft are nuclear-certified). Since how many F-16s are nuclear-certified remains unknown, here I need to rely on some assumptions. For Israel, Hans Kristensen and Robert S. Norris argue in the 2014 *Nuclear Notebook* that potentially one or two F-16 squadrons are nuclear-certified; in the 2014 edition, IISS' *Military Balance* reports that Israel has a total of 10 F-16 squadrons. I, therefore, assume that **15%** of Israel's F-16s are nuclear-certified.[8]

As for India, most *Nuclear Notebook* reports argue that some portion of Jaguar IS/IB and Mirage 2000H are capable of launching nuclear strikes.[9] Based on the *SIPRI Yearbook* series

[7] David Alan Rosenberg, "U.S. Nuclear Stockpile, 1945 to 1950," *Bulletin of the Atomic Scientists* 38, no. 5 (May 1982): 25-30.

[8] Assuming a nuclear-certified F-16 carries one nuclear gravity bomb, this assumption is consistent with SIPRI Yearbook's estimation. For instance, since 2008 SIPRI Yearbook estimated that Israel has both 205 F-16 aircrafts and 30 air-deliverable bombs, which corresponds to approximately 15% of the total number of F-16.

[9] Other country-specific sources seem to agree. See for instance, Ashley J. Tellis, *India's Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal* (Santa Monica, CA: RAND, 2001), 533.

and *Nuclear Notebook*, I assume that all Mirage 2000H bombers are nuclear-certified,[10] and **50%** of Jaguar attack aircraft are given a nuclear role.

Lastly, *Nuclear Notebook* reports consistently view F-16 as Pakistan's sole air delivery platform. Nuclear Notebook and SIPRI Yearbook have consistently estimated that among 40 F-16s that Pakistan initially obtained, the remaining 32 F-16s are nuclear-certified. Until 2002, therefore, I assume that all Pakistan's F-16 aircraft are given a nuclear role.

These estimations are based on an assumption that the exact portion of nuclear-certified aircraft does not change substantially over time, which I believe is not a particularly strong assumption since these three countries have not faced an especially threatening security environment that requires them to increase the number of nuclear-certified aircraft dramatically.

Israel's Land-Based Missile Force

Unfortunately, information about Israel's Jericho-family missile forces is largely unavailable. While technological specifications of Jericho missiles are available, I was able to obtain information on the number of deployed Jericho missiles only in some years. It does not cover all years since 1967, the date of Israel's acquisition of nuclear weapons. Therefore, I make some assumptions to provide estimates of the number of deployed Jericho missiles, based on publicly available information. Still, such estimates are only available in some years, but not in others.

For instance, some sources argue that two Jericho-I missiles had been delivered to Israel until 1968, and Israel possessed twelve Jericho missiles in 1969. They expected that Israel by the end of 1970 would have 24 to 30 missiles.[11] There is another source indicating that Israel originally planned to buy 30 missiles from France, which was stopped due to a French embargo on new military equipment after the 1967 war.[12] Thus, I assume that Israel possessed 30 Jericho missiles in 1970. From 1971 and 1978, Israel was reported to produce additional 50 Jericho-I missiles.[13] I assume that the missiles were produced at the same pace (6.25 per year) during this period, and round the value of each year. Between 1979 and 2000, however, I cannot

[10] SIPRI Yearbook consistently state that Mirage 2000H aircrafts have been nuclear-certified, without specifying the precise portion, while it specifies the estimated ratio (50%) of nuclear-certified Jaguar aircrafts. *Nuclear Notebook* backs and forth, but recent reports also say a half or all of two squadrons of Mirage aircrafts are nuclear-certified. See for instance, Hans M. Kristensen and Robert S. Norris, "Indian Nuclear Forces, 2017," *Bulletin of the Atomic Scientists* 73, no. 4 (2017): 206.

[11] Joint Chiefs of Staff, "Memorandum for the Secretary of Defense—Subject: Nuclear Missile Capability in Israel," in *Israel Crosses the Threshold II: The Nixon Administration Debates the Emergence of the Israeli Nuclear Program (National Security Archive Electronic Briefing Book No. 485)*, ed. William Burr and Avner Cohen (Washington, DC: National Security Archive, 2014), accessed November 27, 2018, https://nsarchive2.gwu.edu//nukevault/ebb485/docs/Doc%204A%205-5-69%20stash%20re%20Feb%201969.pdf; White House, "Memorandum for President," in *Israel Crosses the Threshold II: The Nixon Administration Debates the Emergence of the Israeli Nuclear Program (National Security Archive Electronic Briefing Book No. 485)*, ed. William Burr and Avner Cohen (Washington, DC: National Security Archive, 2014), accessed November 27, 2018, https://nsarchive2.gwu.edu/nukevault/ebb485/docs/Doc%2010%207-19-69%20circa.pdf.

[12] Robert S. Norris, William M. Arkin, Hans M. Kristensen, and Joshua Handler, "Israeli Nuclear Forces, 2002," *Bulletin of the Atomic Scientists* 58, no. 5 (September/October 2002): 74.

[13] James C O'Halloran, *IHS Jane's Weapons Strategic: 2016-2017* (United Kingdom: HIS, 2016), 54.

find any publicly available source containing the information about Jericho missiles deployment, except for 1990 when I can obtain the source indicating the number of deployed Jericho missiles. Thus, Israel's land-based strategic delivery platforms category has some missing data points.

Israel's Sea-Based Missile Force

While there are many rumors and ambiguous conjectures, it seems that Israel has deployed its sea-based deterrent force, consisting of the Dolphin-class diesel-powered submarines and Popeye Turbo cruise missiles. There is no available source, however, which contains information about how many nuclear-capable missiles each Israeli submarine carries. Each Dolphin-class submarine is believed to carry six missiles and four torpedoes.[14] I thus assume that each submarine carries six nuclear-capable missiles. Given that British and French SSBNs have carried nuclear-tipped SLBMs as many as possible, this assumption appears not to be particularly strong.

SOURCES

Below is a country-specific list of sources used to code each nuclear-armed state's number of strategic nuclear platforms.

United States

Land-Based: 1959-2002 (NRDC's Nuclear Data, US ICBM Forces)[15]

Sea-Based: 1960-2002 (NRDC's Nuclear Data, US Ballistic Missile Submarine Forces)[16]

Air-Based: 1945-1950 (Rosenberg 1982), 1951-2002 (NRDC's Nuclear Data, US Strategic Bomber Forces)[17]

United Kingdom

Sea-Based: 1968-2002 (IISS Military Balance, SIPRI Yearbook, Norris, Burrows, and Fieldhouse 1994)[18]

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[14] See, for instance, International Institute for Strategic Studies, *The Military Balance 2018* (London: IISS, 2018), 341.

[15] Natural Resources Defense Council, "US ICBM Forces," Archive of Nuclear Data from NRDC's Nuclear Program, November 25, 2002, accessed March 19, 2022, https://web.archive.org/web/20041027183556/https:/www.nrdc.org/nuclear/nudb/datab3.asp.

[16] Natural Resources Defense Council, "US Ballistic Missile Submarine Forces," Archive of Nuclear Data from NRDC's Nuclear Program, November 25, 2002, accessed March 19, 2022. https://web.archive.org/web/20041027183238/https://www.nrdc.org/nuclear/nudb/datab5.asp.

[17] David Alan Rosenberg, "U.S. Nuclear Stockpile, 1945 to 1950," *Bulletin of the Atomic Scientists* 38, no. 5 (1982): 25-30; Natural Resources Defense Council, "US Strategic Bomber Forces." Archive of Nuclear Data from NRDC's Nuclear Program, November 25, 2002, accessed March 19, 2022, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp.

[18] Robert S. Norris, Andrew S. Burrows, and Richard W. Fieldhouse, *Nuclear Weapons Databook*, vol. 5, *British,*

Air-Based: 1955-1982 (Laming 1997; Wynn 1994)[19]

France

Land-Based: 1971-1994 (Norris, Burrows, and Fieldhouse 1994); 1995-2002 (SIPRI Yearbook)

Sea-Based: 1972-1994 (Norris, Burrows, and Fieldhouse 1994); 1995-2002 (SIPRI Yearbook)

Air-Based: 1964-1994 (Norris, Burrows, and Fieldhouse 1994); 1995-2002 (SIPRI Yearbook)

Soviet Union/Russia

Land-Based: 1960-2002 (NRDC's Nuclear Data, USSR/Russian ICBM Forces)[20]

Sea-Based: 1956-1957 (Podvig 2001); 1958-1971 (Podvig 2001; NRDC's Nuclear Data, USSR/Russian Ballistic Missile Submarine Forces); 1972-2002 (NRDC's Nuclear Data, USSR/Russian Ballistic Missile Submarine Forces)[21]

Air-Based: 1956-2002 (NRDC's Nuclear Data, USSR/Russian Strategic Bomber Forces)[22]

South Africa

Air-Based: 1982-1990 (Albright 1994)[23]

Israel

Land-Based: see the "Israel's Land-based Missile Force" section in the data note

Sea-Based: 2000-2002 (Norris, Arkin, Kristensen, and Handler 2002)[24]

Air-Based: 1981-2002 (IISS Military Balance)

China

French, and Chinese Nuclear Weapons (Boulder, CO: Westview Press, 1994).

[19] Tim Laming, *V-Bombers: Vulcan, Victor and Valiant: Britain's Airborne Nuclear Deterrent* (Sparkford: Patrick Stephens Limited, 1997); Humphrey Wynn, *The RAF Strategic Nuclear Deterrent Forces: Their Origins, Roles and Deployment, 1946-1969: A Documentary history* (London: Her Majesty's Stationery Office, 1994).

[20] Natural Resources Defense Council, "USSR/Russian ICBM Forces," Archive of Nuclear Data from NRDC's Nuclear Program, November 25, 2002, accessed March 19, 2022, https://web.archive.org/web/20041027183514/https://www.nrdc.org/nuclear/nudb/datab4.asp.

[21] Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA: MIT Press, 2001); Natural Resources Defense Council, "USSR/Russian Ballistic Missile Submarine Forces," Archive of Nuclear Data from NRDC's Nuclear Program, November 25, 2002, accessed March 19, 2022, https://web.archive.org/web/20041027183456/https://www.nrdc.org/nuclear/nudb/datab6.asp.

[22] Natural Resources Defense Council, "USSR/Russian Strategic Bomber Forces," Archive of Nuclear Data from NRDC's Nuclear Program, November 25, 2002, accessed March 19, 2022, https://web.archive.org/web/20041027183159/https://www.nrdc.org/nuclear/nudb/datab8.asp.

[23] David Albright, "South Africa and the Affordable Bomb," *Bulletin of the Atomic Scientists* 50, no. 4 (July/August 1994): 37-47.

[24] Robert S. Norris, William M. Arkin, Hans M. Kristensen, and Joshua Handler, "Israeli Nuclear Forces, 2002," *Bulletin of the Atomic Scientists* 58, no. 5 (September/October 2002): 73-75.

Land-Based: 1966-1993 (Norris, Burrows, and Fieldhouse 1994); 1994-2002 (SIPRI Yearbook)

Sea-Based: 1985-1993 (Norris, Burrows, and Fieldhouse 1994); 1994-2002 (SIPRI Yearbook)

Air-Based: 1964-1993 (Norris, Burrows, and Fieldhouse 1994); 1994-2002 (SIPRI Yearbook)

India

Air-Based: 1988-2002 (IISS Military Balance)

Pakistan

Air-Based: 1990-2002 (IISS Military Balance)

Table 2 provides annual data on the number of deployed strategic nuclear platforms of all nuclear-armed states. It differentiates land-based, sea-based, and air-based strategic nuclear platforms. It also includes the name of each deployed platform.

Table 2. The Number of Deployed Strategic Nuclear Platforms, 1945-2002

Year	Country	Land-based	Sea-based	Air-based
1945	US	-	-	**15** (B-29)
1946	US	-	-	**29** (B-29)
1947	US	-	-	**23** (B-29)
1948	US	-	-	**57** [**35** (B-29)/**4** (B-36)/**18** (B-50)]
1949	US	-	-	**121** [**66** (B-29)/**17** (B-36)/**38** (B-50)]
1950	US	-	-	**225** [**95** (B-29)/**34** (B-36)/**96** (B-50)]
1951	US	-	-	**569** [**290** (B-29)/**60** (B-36)/**219** (B-50)]
1952	US	-	-	**660** [**360** (B-29)/**100** (B-36)/**200** (B-50)]
1953	US	-	-	**720** [**90** (B-29)/**180** (B-36)/**135** (B-50)/**315** (B-47)]
1954	US	-	-	**1,035** [**180** (B-36)/**90** (B-50)/**765** (B-47)]
1955	US	-	-	**1,260** [**270** (B-36)/**990** (B-47)]
1956	US	-	-	**1,470** [**210** (B-36)/**1,215** (B-47)/**45** (B-52)]
1957	US	-	-	**1,605** [**120** (B-36)/**1,260** (B-47)/**225** (B-52)]
1958	US	-	-	**1,620** [**1,260** (B-47)/**360** (B-52)]
1959	US	**6** (Atlas D)	-	**1,545** [**1,200** (B-47)/**345** (B-52)]
1960	US	**12** (Atlas D)	**32** (Polaris A-1)	**1,515** [**1,065** (B-47)/**450** (B-52)]
1961	US	**57** [**30** (Atlas D)/**27** (Atlas E)]	**80** (Polaris A-1)	**1,395** [**855** (B-47)/**40** (B-58)/**450** (B-52)]
1962	US	**203** [**30** (Atlas D)/**27** (Atlas E)/**72** (Atlas F)/**54** (Titan I)/**20** (Minuteman I)]	**144** [**80** (Polaris A-1)/**64** (Polaris A-2)]	**1,306** [**675** (B-47)/**76** (B-58)/**555** (B-52)]

1963	US	**597** [**30** (Atlas D)/**27** (Atlas E)/**72** (Atlas F)/**54** (Titan I)/**54** (Titan II)/**360** (Minuteman I)]	**160** [**80** (Polaris A-1)/**80** (Polaris A-2)]	**1,055** [**450** (B-47)/**80** (B-58)/**525** (B-52)]
1964	US	**907** [**27** (Atlas E)/**72** (Atlas F)/**54** (Titan I)/**54** (Titan II)/**700** (Minuteman I)]	**320** [**80** (Polaris A-1)/**208** (Polaris A-2)/**32** (Polaris A-3)]	**785** [**180** (B-47)/**80** (B-58)/**525** (B-52)]
1965	US	**854** [**54** (Titan II)/**800** (Minuteman I)]	**384** [**208** (Polaris A-2)/**176** (Polaris A-3)]	**650** [**45** (B-47)/**80** (B-58)/**525** (B-52)]
1966	US	**1,004** [**54** (Titan II)/**800** (Minuteman I)/**150** (Minuteman II)]	**560** [**208** (Polaris A-2)/**352** (Polaris A-3)]	**575** [**80** (B-58)/**495** (B-52)]
1967	US	**1,054** [**54** (Titan II)/**800** (Minuteman I)/**200** (Minuteman II)]	**656** [**208** (Polaris A-2)/**448** (Polaris A-3)]	**558** [**78** (B-58)/**480** (B-52)]
1968	US	**1,054** [**54** (Titan II)/**800** (Minuteman I)/**200** (Minuteman II)]	**656** [**208** (Polaris A-2)/**448** (Polaris A-3)]	**481** [**76** (B-58)/**405** (B-52)]
1969	US	**1,054** [**54** (Titan II)/**500** (Minuteman I)/**500** (Minuteman II)]	**656** [**208** (Polaris A-2)/**448** (Polaris A-3)]	**399** [**39** (B-58)/**360** (B-52)]
1970	US	**1,054** [**54** (Titan II)/**400** (Minuteman I)/**500** (Minuteman II)/**100** (Minuteman III)]	**656** [**208** (Polaris A-2)/**448** (Polaris A-3)]	**390** [**360** (B-52)/**30** (FB-111A)]
1971	US	**1,054** [**54** (Titan II)/**300** (Minuteman I)/**500** (Minuteman II)/**200** (Minuteman III)]	**656** [**144** (Polaris A-2)/**400** (Polaris A-3)/**112** (Poseidon C3)]	**377** [**347** (B-52)/**30** (FB-111A)]
1972	US	**1,054** [**54** (Titan II)/**200** (Minuteman I)/**500** (Minuteman II)/**300** (Minuteman III)]	**656** [**96** (Polaris A-2)/**368** (Polaris A-3)/**192** (Poseidon C3)]	**457** [**397** (B-52)/**60** (FB-111A)]
1973	US	**1,054** [**54** (Titan II)/**100** (Minuteman I)/**500** (Minuteman II)/**400** (Minuteman III)]	**656** [**48** (Polaris A-2)/**288** (Polaris A-3)/**320** (Poseidon C3)]	**423** [**357** (B-52)/**66** (FB-111A)]
1974	US	**1,054** [**54** (Titan II)/**50** (Minuteman I)/**500** (Minuteman II)/**450** (Minuteman III)]	**656** [**304** (Polaris A-3)/**352** (Poseidon C3)]	**396** [**330** (B-52)/**66** (FB-111A)]
1975	US	**1,054** [**54** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**656** [**288** (Polaris A-3)/**368** (Poseidon C3)]	**396** [**330** (B-52)/**66** (FB-111A)]
1976	US	**1,054** [**54** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**656** [**208** (Polaris A-3)/**448** (Poseidon C3)]	**382** [**316** (B-52)/**66** (FB-111A)]
1977	US	**1,054** [**54** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**656** [**192** (Polaris A-3)/**464** (Poseidon C3)]	**382** [**316** (B-52)/**66** (FB-111A)]
1978	US	**1,054** [**54** (Titan II)/**450** (Minuteman	**656** [**160** (Polaris A-3)/**496** (Poseidon	**376** [**316** (B-52)/**60** (FB-111A)]

		II)/**550** (Minuteman III)]	C3)]	
1979	US	**1,054** [**54** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**656** [**160** (Polaris A-3)/**464** (Poseidon C3)/**32** (Trident I)]	**376** [**316** (B-52)/**60** (FB-111A)]
1980	US	**1,054** [**54** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**592** [**96** (Polaris A-3)/**400** (Poseidon C3)/**96** (Trident I)]	**376** [**316** (B-52)/**60** (FB-111A)]
1981	US	**1,054** [**54** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**512** [**16** (Polaris A-3)/**368** (Poseidon C3)/**128** (Trident I)]	**376** [**316** (B-52)/**60** (FB-111A)]
1982	US	**1,049** [**49** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**520** [**304** (Poseidon C3)/**216** (Trident I)]	**328** [**272** (B-52)/**56** (FB-111A)]
1983	US	**1,040** [**40** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**544** [**304** (Poseidon C3)/**240** (Trident I)]	**297** [**241** (B-52)/**56** (FB-111A)]
1984	US	**1,030** [**30** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**592** [**304** (Poseidon C3)/**288** (Trident I)]	**297** [**241** (B-52)/**56** (FB-111A)]
1985	US	**1,020** [**20** (Titan II)/**450** (Minuteman II)/**550** (Minuteman III)]	**600** [**288** (Poseidon C3)/**312** (Trident I)]	**297** [**241** (B-52)/**56** (FB-111A)]
1986	US	**1,005** [**5** (Titan II)/**450** (Minuteman II)/**540** (Minuteman III)/**10** (Peacekeeper)]	**616** [**256** (Poseidon C3)/**360** (Trident I)]	**312** [**241** (B-52)/**56** (FB-111A)/**15** (B-1B)]
1987	US	**1,000** [**450** (Minuteman II)/**520** (Minuteman III)/**30** (Peacekeeper)]	**640** [**256** (Poseidon C3)/**384** (Trident I)]	**361** [**241** (B-52)/**56** (FB-111A)/**64** (B-1B)]
1988	US	**1,000** [**450** (Minuteman II)/**500** (Minuteman III)/**50** (Peacekeeper)]	**608** [**224** (Poseidon C3)/**384** (Trident I)]	**318** [**180** (B-52)/**48** (FB-111A)/**90** (B-1B)]
1989	US	**1,000** [**450** (Minuteman II)/**500** (Minuteman III)/**50** (Peacekeeper)]	**592** [**208** (Poseidon C3)/**384** (Trident I)]	**311** [**173** (B-52)/**48** (FB-111A)/**90** (B-1B)]
1990	US	**1,000** [**450** (Minuteman II)/**500** (Minuteman III)/**50** (Peacekeeper)]	**608** [**176** (Poseidon C3)/**384** (Trident I)/**48** (Trident II)]	**267** [**154** (B-52)/**24** (FB-111A)/**89** (B-1B)]
1991	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**480** [**384** (Trident I)/**96** (Trident II)]	**209** [**125** (B-52)/**84** (B-1B)]
1992	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**488** [**368** (Trident I)/**120** (Trident II)]	**158** [**74** (B-52)/**84** (B-1B)]
1993	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**336** [**192** (Trident I)/**144** (Trident II)]	**159** [**74** (B-52)/**84** (B-1B)/**1** (B-2)]
1994	US	**580** [**530** (Minuteman III)/**50**	**360** [**192** (Trident I)/**168** (Trident II)]	**157** [**74** (B-52)/**80** (B-1B)/**3** (B-2)]

		(Peacekeeper)]		
1995	US	**575** [**525** (Minuteman III)/**50** (Peacekeeper)]	**384** [**192** (Trident I)/**192** (Trident II)]	**122** [**56** (B-52)/**60** (B-1B)/**6** (B-2)]
1996	US	**575** [**525** (Minuteman III)/**50** (Peacekeeper)]	**408** [**192** (Trident I)/**216** (Trident II)]	**113** [**56** (B-52)/**48** (B-1B)/**9** (B-2)]
1997	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**432** [**192** (Trident I)/**240** (Trident II)]	**65** [**56** (B-52)/**9** (B-2)]
1998	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**432** [**192** (Trident I)/**240** (Trident II)]	**65** [**56** (B-52)/**9** (B-2)]
1999	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**432** [**192** (Trident I)/**240** (Trident II)]	**72** [**56** (B-52)/**16** (B-2)]
2000	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**432** [**192** (Trident I)/**240** (Trident II)]	**72** [**56** (B-52)/**16** (B-2)]
2001	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**432** [**168** (Trident I)/**264** (Trident II)]	**72** [**56** (B-52)/**16** (B-2)]
2002	US	**550** [**500** (Minuteman III)/**50** (Peacekeeper)]	**432** [**168** (Trident I)/**264** (Trident II)]	**72** [**56** (B-52)/**16** (B-2)]
1952	UK	-	-	-
1953	UK	-	-	-
1954	UK	-	-	-
1955	UK	-	-	**8** (Valiant)
1956	UK	-	-	**48** (Valiant)
1957	UK	-	-	**72** [(**56** Valiant/**16** Vulcan)]
1958	UK	-	-	**96** [(**56** Valiant/**16** Victor/**24** Vulcan)]
1959	UK	-	-	**104** [(**56** Valiant/**24** Victor/**24** Vulcan)]
1960	UK	-	-	**112** (**48** Valiant/**32** Victor/**32** Vulcan)[25]

[25] Three Valiant squadrons were given a tactical nuclear role when assigned the Supreme Allied Commander Europe (SACEUR) between 1960 and 1961. Thus, they are removed from the list. Robert S. Norris, Andrew S. Burrows, and Richard W. Fieldhouse, *Nuclear Weapons Databook*, vol.5, *British, French, and Chinese Nuclear Weapons* (Boulder, CO: Westview Press, 1994), 87

1961	UK	-	-	**112** (**32** Valiant/**32** Victor/**48** Vulcan)
1962	UK	-	-	**128** [(**16** Valiant/**48** Victor/**64** Vulcan)]
1963	UK	-	-	**120** [(**48** Victor/**72** Vulcan)]
1964	UK	-	-	**120** [(**48** Victor/**72** Vulcan)]
1965	UK	-	-	**104** [(**32** Victor/**72** Vulcan)]
1966	UK	-	-	**88** [(**16** Victor/**72** Vulcan)]
1967	UK	-	-	**88** [(**16** Victor/**72** Vulcan)]
1968	UK	-	**16** (Polaris A3)	**80** [(**16** Victor/**64** Vulcan)]
1969	UK	-	**48** (Polaris A3)	**64** (Vulcan)[26]
1970	UK	-	**64** (Polaris A3)	**56** (Vulcan)
1971	UK	-	**64** (Polaris A3)	**56** (Vulcan)
1972	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1973	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1974	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1975	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1976	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1977	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1978	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1979	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1980	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1981	UK	-	**64** (Polaris A3)	**48** (Vulcan)
1982	UK	-	**64** [**48** (Polaris A3)/**16** (Chevaline)[27]]	**40** (Vulcan)
1983	UK	-	**64** [**48** (Polaris A3)/**16** (Chevaline)]	-[28]
1984	UK	-	**64** [**32** (Polaris A3)/**32** (Chevaline)]	-

[26] Last Victor nuclear bomber squadron was disbanded in December 1968. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 147.

[27] The first Chevaline-equipped submarine, *HMS Renown*, went on patrol. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 101.

[28] Vulcan bombers were officially withdrawn from nuclear bomber role. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 145. While Vulcan bombers took a tactical nuclear role since 1969, British government maintained that its Vulcan forces still assume a strategic nuclear role, which was substantiated by Vulcan bombers' participation in strategic nuclear mission exercises. Thus, I consider Vulcan bombers as a strategic platform, in contrast to the late Valiant bombers, which also assumed a tactical nuclear role but were never given a similar treatment from British government. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 123-24.

1985	UK	-	**64** [**16** (Polaris A3)/**48** (Chevaline)]	-
1986	UK	-	**64** [**16** (Polaris A3)/**48** (Chevaline)]	-
1987	UK	-	**64** (Chevaline)	-
1988	UK	-	**64** (Chevaline)	-
1989	UK	-	**64** (Chevaline)	-
1990	UK	-	**64** (Chevaline)	-
1991	UK	-	**64** (Chevaline)	-
1992	UK	-	**64** (Chevaline)	-
1993	UK	-	**48** (Chevaline)	-
1994	UK	-	**48** (Chevaline)	-
1995	UK	-	**64** [**48** (Chevaline)/**16** (Trident)]	-
1996	UK	-	**32** (Trident)	-
1997	UK	-	**32** (Trident)	-
1998	UK	-	**48** (Trident)	-
1999	UK	-	**48** (Trident)	-
2000	UK	-	**48** (Trident)	-
2001	UK	-	**48** (Trident)	-
2002	UK	-	**48** (Trident)	-
1960	France	-	-	-
1961	France	-	-	-
1962	France	-	-	-
1963	France	-	-	-
1964	France	-	-	**4** (Mirage IVA/P)
1965	France	-	-	**32** (Mirage IVA/P)
1966	France	-	-	**36** (Mirage IVA/P)
1967	France	-	-	**36** (Mirage IVA/P)
1968	France	-	-	**36** (Mirage IVA/P)
1969	France	-	-	**36** (Mirage IVA/P)
1970	France	-	-	**36** (Mirage IVA/P)
1971	France	**9** (SSBS S2)	-	**36** (Mirage IVA/P)
1972	France	**18** (SSBS S2)	**16** (MSBS M1)	**36** (Mirage IVA/P)
1973	France	**18** (SSBS S2)	**32** (MSBS M1)	**36** (Mirage IVA/P)

1974	France	**18** (SSBS S2)	**32** (MSBS M1)	**36** (Mirage IVA/P)
1975	France	**18** (SSBS S2)	**32** (**16** (MSBS M1)/**16** (M2))	**36** (Mirage IVA/P)
1976	France	**18** (SSBS S2)	**32** (MSBS M2)	**32** (Mirage IVA/P)
1977	France	**18** (SSBS S2)	**48** [**32** (MSBS M2)/**16** (M20)]	**32** (Mirage IVA/P)
1978	France	**9** (SSBS S2)	**64** [**32** (MSBS M2)/**32** (M20)]	**32** (Mirage IVA/P)
1979	France	**9** (SSBS S2)	**64** [**32** (MSBS M2)/**32** (M20)]	**32** (Mirage IVA/P)
1980	France	**9** (SSBS S3)	**64** (MSBS M20)	**32** (Mirage IVA/P)
1981	France	**9** (SSBS S3)	**64** (MSBS M20)	**32** (Mirage IVA/P)
1982	France	**9** (SSBS S3)	**64** (MSBS M20)	**32** (Mirage IVA/P)
1983	France	**18** (SSBS S3)	**64** (MSBS M20)	**28** (Mirage IVA/P)
1984	France	**18** (SSBS S3)	**64** (MSBS M20)	**28** (Mirage IVA/P)
1985	France	**18** (SSBS S3)	**64** [**48** (MSBS M20)/**16** (M4)]	**28** (Mirage IVA/P)
1986	France	**18** (SSBS S3)	**64** [**48** (MSBS M20)/**16** (M4)]	**24** (Mirage IVA/P)
1987	France	**18** (SSBS S3)	**64** [**32** (MSBS M20)/**32** (M4)]	**24** (Mirage IVA/P)
1988	France	**18** (SSBS S3)	**64** [**32** (MSBS M20)/**32** (M4)]	**18** (Mirage IVA/P)
1989	France	**18** (SSBS S3)	**64** [**32** (MSBS M20)/**32** (M4)]	**18** (Mirage IVA/P)
1990	France	**18** (SSBS S3)	**64** [**16** (MSBS M20)/**48** (M4)]	**18** (Mirage IVA/P)
1991	France	**18** (SSBS S3)	**64** (MSBS M4)	**18** (Mirage IVA/P)
1992	France	**18** (SSBS S3)	**64** (MSBS M4)	**18** (Mirage IVA/P)
1993	France	**18** (SSBS S3)	**64** (MSBS M4)	**18** (Mirage IVA/P)
1994	France	**18** (SSBS S3)	**64** (MSBS M4)	**18** (Mirage IVA/P)
1995	France	**18** (SSBS S3)	**64** (MSBS M4)	**18** (Mirage IVA/P)
1996	France	**18** (SSBS S3)	**64** [**48** (MSBS M4)/**16** (M45)]	**18** (Mirage IVA/P)[29]
1997	France	-	**64** [**48** (MSBS M4)/**16** (M45)]	**45** (Mirage 2000N)[30]
1998	France	-	**64** [**48** (MSBS M4)/**16** (M45)]	**45** (Mirage 2000N)
1999	France	-	**64** [**48** (MSBS M4)/**16** (M45)]	**45** (Mirage 2000N)
2000	France	-	**64** [**32** (MSBS M4)/**32** (M45)]	**45** (Mirage 2000N)

[29] Mirage IVPs were converted from its nuclear role in July 1996. Stockholm International Peace Research Institute (SIPRI), *SIPRI Yearbook 2001: Armaments, Disarmament and International Security* (New York: Oxford University Press, 2001), 472.

[30] Mirage 2000Ns have assumed strategic nuclear role. SIPRI, *SIPRI Yearbook 1997: Armaments, Disarmament and International Security* (New York: Oxford University Press, 1997), 400.

2001	France	-	**48** [**16** (MSBS M4)/**32** (M45)]	**60** (Mirage 2000N)
2002	France	-	**48** [**16** (MSBS M4)/**32** (M45)]	**60** (Mirage 2000N)
1949	Russia[31]	-	-	-
1950	Russia	-	-	-
1951	Russia	-	-	-
1952	Russia	-	-	-
1953	Russia	-	-	-
1954	Russia	-	-	-
1955	Russia	-	-	-
1956	Russia	**48** [48 (SS-3)]	**2** [**2** (R-11FM)]	**40** [**20** (Tu-95A)/**20** (MYA-4)]
1957	Russia	**48** [48 (SS-3)]	**10** [**10** (R-11FM)]	**53** [**30** (Tu-95A)/**23** (MYA-4)]
1958	Russia	**48** [48 (SS-3)]	**18** [**12** (R-11FM)/**6** (SS-N-4)]	**85** [**45** (Tu-95A)/**40** (MYA-4)]
1959	Russia	**48** [48 (SS-3)]	**45** [**12** (R-11FM)/**33** (SS-N-4)]	**105** [**55** (Tu-95A)/**50** (MYA-4)]
1960	Russia	**206** [**32** (SS-3) /**172** (SS-4)/**2** (SS-6)]	**42** [**12** (R-11FM)/**30** (SS-N-4)]	**121** [**65** (Tu-95A)/**56** (MYA-4)]
1961	Russia	**436** [**36** (SS-3)/**373** (SS-4)/**17** (SS-5)/**4** (SS-6)/**6** (SS-7)]	**69** [**12** (R-11FM)/**57** (SS-N-4)]	**133** [**75** (Tu-95A)/**58** (MYA-4)]
1962	Russia	**558** [**36** (SS-3)/**458** (SS-4)/**28** (SS-5)/**4** (SS-6)/**32** (SS-7)]	**84** [**12** (R-11FM)/**66** (SS-N-4)/**6** (SS-N-5)]	**138** [**80** (Tu-95A)/**58** (MYA-4)]
1963	Russia	**753** [**36** (SS-3)/**564** (SS-4)/**54** (SS-5)/**4** (SS-6)/**90** (SS-7)/**5** (SS-8)]	**84** [**12** (R-11FM)/**66** (SS-N-4)/**6** (SS-N-5)]	**150** [**80** (Tu-95A)/**12** (Tu-95B/C]/**58** (MYA-4)]
1964	Russia	**877** [**36** (SS-3)/**568** (SS-4)/**82** (SS-5)/**4** (SS-6)/**170** (SS-7)/**17** (SS-8)]	**84** [**12** (R-11FM)/**66** (SS-N-4)/**6** (SS-N-5)]	**173** [**85** (Tu-95A)/**30** (Tu-95B/C]/**58** (MYA-4)]
1965	Russia	**990** [**36** (SS-3)/**572** (SS-4)/**101** (SS-5)/**4** (SS-6)/**197** (SS-7)/**23** (SS-8)/**57** (SS-11M1)]	**87** [**12** (R-11FM)/**66** (SS-N-4)/**9** (SS-N-5)]	**163** [**60** (Tu-95A)/**45** (Tu-95B/C]/**58** (MYA-4)]
1966	Russia	**1,093** [**4** (SS-3)/**572** (SS-4)/**101** (SS-5)/**4** (SS-6)/**197** (SS-7)/**23** (SS-8)/**10** (SS-9M2)/**182** (SS-11M1)]	**90** [**12** (R-11FM)/**66** (SS-N-4)/**12** (SS-N-5)]	**159** [**45** (Tu-95A)/**60** (Tu-95B/C]/**54** (MYA-4)]
1967	Russia	**1,491** [**572** (SS-4)/**101** (SS-5)/**4** (SS-6)/**197** (SS-7)/**23** (SS-8)/**10** (SS-9M1)/**70** (SS-	**99** [**12** (R-11FM)/**54** (SS-N-4)/**33** (SS-N-5)]	**159** [**30** (Tu-95A)/**75** (Tu-95B/C]/**54** (MYA-4)]

[31] Tu-4, Tu-16, Tu-22, Tu-26 were also deployed platforms, but I was not able to find any publicly available, annual information about the number of those platforms.

		9M2)/**514** (SS-11M1)]		
1968	Russia	**1,673** [**556** (SS-4)/**100** (SS-5)/**197** (SS-7)/**23** (SS-8)/**20** (SS-9M1)/**115** (SS-9M2)/**3** (SS-9M3)/**659** (SS-11M1)]	**148** [**10** (R-11FM)/**48** (SS-N-4)/**42** (SS-N-5)/**48** (SS-N-6M1)]]	**159** [**30** (Tu-95A)/**75** (Tu-95B/C]/**54** (MYA-4)]
1969	Russia	**1,902** [**532** (SS-4)/**96** (SS-5)/**197** (SS-7)/**23** (SS-8)/**40** (SS-9M1)/**130** (SS-9M2)/**5** (SS-9M3)/**859** (SS-11M1)/**20** (SS-13)]	**227** [**6** (R-11FM)/**45** (SS-N-4)/**42** (SS-N-5)/**128** (SS-N-6M1)/**6** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1970	Russia	**2,065** [**504** (SS-4)/**89** (SS-5)/**197** (SS-7)/**23** (SS-8)/**50** (SS-9M1)/**170** (SS-9M2)/**10** (SS-9M3)/**982** (SS-11M1)/**40** (SS-13)]	**323** [**6** (R-11FM)/**42** (SS-N-4)/**45** (SS-N-5)/**224** (SS-N-6M1)/**6** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1971	Russia	**2,086** [**480** (SS-4)/**87** (SS-5)/**190** (SS-7)/**19** (SS-8)/**50** (SS-9M1)/**200** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**990** (SS-11M1)/**40** (SS-13)]	**409** [**2** (R-11FM)/**21** (SS-N-4)/**60** (SS-N-5)/**320** (SS-N-6M1)/**6** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1972	Russia	**2,071** [**480** (SS-4)/**87** (SS-5)/**190** (SS-7)/**19** (SS-8)/**50** (SS-9M1)/**200** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**955** (SS-11M1)/**60** (SS-13)]	**503** [**21** (SS-N-4)/**60** (SS-N-5)/**416** (SS-N-6M1)/**6** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1973	Russia	**2,029** [**480** (SS-4)/**87** (SS-5)/**190** (SS-7)/**19** (SS-8)/**50** (SS-9M1)/**208** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**830** (SS-11M1)/**75** (SS-11M2/M3)/**60** (SS-13)]	**595** [**21** (SS-N-4)/**60** (SS-N-5)/**480** (SS-N-6M1)/**34** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1974	Russia	**1,934** [**480** (SS-4)/**87** (SS-5)/**190** (SS-7)/**19** (SS-8)/**50** (SS-9M1)/**208** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**610** (SS-11M1)/**200** (SS-11M2/M3)/**60** (SS-13)]	**679** [**21** (SS-N-4)/**60** (SS-N-5)/**464** (SS-N-6M1)/**48** (SS-N-6M3)/**86** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1975	Russia	**2,036** [**480** (SS-4)/**87** (SS-5)/**190** (SS-7)/**19** (SS-8)/**50** (SS-9M1)/**200** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**490** (SS-11M1)/**350** (SS-11M2/M3)/**60** (SS-13)/**10** (SS-17M1)/**10** (SS-18M1/M3)/**60** (SS-19M1)]	**771** [**21** (SS-N-4)/**60** (SS-N-5)/**432** (SS-N-6M1)/**96** (SS-N-6M3)/**162** (SS-N-8)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1976	Russia	**2,044** [**456** (SS-4)/**87** (SS-5)/**138** (SS-7)/**19**	**849** [**15** (SS-N-4)/**60** (SS-N-5)/**404**	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52**

		(SS-8)/**40** (SS-9M1)/**190** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**430** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**20** (SS-17M1)/**36** (SS-18M1/M3)/**100** (SS-19M1)/**18** (SS-20)]	(SS-N-6M1)/**144** (SS-N-6M3)/**226** (SS-N-8)]	(MYA-4)]
1977	Russia	**1,911** [**448** (SS-4)/**79** (SS-5)/**78** (SS-7)/**9** (SS-8)/**20** (SS-9M1)/**140** (SS-9M2)/**20** (SS-9M3)/**10** (SS-9M4)/**330** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**50** (SS-17M1)/**36** (SS-18M1/M3)/**40** (SS-18M2)/**100** (SS-19M1)/**20** (SS-19M2)/**51** (SS-20)]	**972** [**12** (SS-N-4)/**60** (SS-N-5)/**340** (SS-N-6M1)/**192** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**64** (SS-N-18)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1978	Russia	**1,827** [**404** (SS-4)/**73** (SS-5)/**65** (SS-9M2)/**20** (SS-9M3)/**230** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**80** (SS-17M1)/**20** (SS-17M2)/**36** (SS-18M1/M3)/**140** (SS-18M2)/**120** (SS-19M1)/**60** (SS-19M2)/**99** (SS-20)]	**1,002** [**9** (SS-N-4)/**60** (SS-N-5)/**260** (SS-N-6M1)/**240** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**128** (SS-N-18)/**1** (SS-N-20)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1979	Russia	**1,968** [**372** (SS-4)/**45** (SS-5)/**55** (SS-9M2)/**20** (SS-9M3)/**220** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**120** (SS-17M1)/**20** (SS-17M2)/**36** (SS-18M1/M3)/**154** (SS-18M2)/**50** (SS-18M4)/**180** (SS-19M1)/**60** (SS-19M2)/**156** (SS-20)]	**993** [**3** (SS-N-4)/**57** (SS-N-5)/**196** (SS-N-6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**144** (SS-N-18)/**1** (SS-N-20)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1980	Russia	**1,905** [**316** (SS-4)/**35** (SS-5)/**160** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**130** (SS-17M1)/**20** (SS-17M2)/**26** (SS-18M1/M3)/**162** (SS-18M2)/**120** (SS-18M4)/**180** (SS-19M1)/**40** (SS-19M2)/**20** (SS-19M3)/**216** (SS-20)]	**990** [**57** (SS-N-5)/**180** (SS-N-6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**160** (SS-N-18)/**1** (SS-N-20)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1981	Russia	**1,954** [**264** (SS-4)/**25** (SS-5)/**130** (SS-	**1,038** [**57** (SS-N-5)/**160** (SS-N-	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52**

		11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**130** (SS-17M1)/**20** (SS-17M2)/**26** (SS-18M1/M3)/**162** (SS-18M2)/**120** (SS-18M4)/**180** (SS-19M1)/**40** (SS-19M2)/**80** (SS-19M3)/**297** (SS-20)]	6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**208** (SS-N-18)/**21** (SS-N-20)]	(MYA-4)]
1982	Russia	**1,989** [**224** (SS-4)/**16** (SS-5)/**130** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**30** (SS-17M1)/**10** (SS-17M2)/**110** (SS-17M3)/**16** (SS-18M1/M3)/**92** (SS-18M2)/**200** (SS-18M4)/**80** (SS-19M1)/**10** (SS-19M2)/**240** (SS-19M3)/**351** (SS-20)]	**990** [**57** (SS-N-5)/**96** (SS-N-6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**21** (SS-N-20)]	**157** [**30** (Tu-95A)/**75** (Tu-95B/C]/**52** (MYA-4)]
1983	Russia	**1,858** [**112** (SS-4)/**100** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**150** (SS-17M3)/**308** (SS-18M4)/**330** (SS-19M3)/**378** (SS-20)]	**978** [**45** (SS-N-5)/**96** (SS-N-6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**21** (SS-N-20)]	**167** [**30** (Tu-95A)/**75** (Tu-95B/C]/**10** (Tu-95H16)/**52** (MYA-4)]
1984	Russia	**1,861** [**112** (SS-4)/**55** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**150** (SS-17M3)/**308** (SS-18M4)/**360** (SS-19M3)/**396** (SS-20)]	**982** [**45** (SS-N-5)/**80** (SS-N-6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**41** (SS-N-20)]	**160** [**30** (Tu-95A)/**65** (Tu-95B/C]/**10** (Tu-95G)/**10** (Tu-95H16)/**45** (MYA-4)]
1985	Russia	**1,888** [**112** (SS-4)/**28** (SS-11M1)/**420** (SS-11M2/M3)/**60** (SS-13)/**150** (SS-17M3)/**308** (SS-18M4)/**360** (SS-19M3)/**405** (SS-20)/**45** (SS-25)]	**980** [**39** (SS-N-5)/**48** (SS-N-6M1)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**61** (SS-N-20)/**16** (SS-N-23)]	**160** [**30** (Tu-95A)/**55** (Tu-95B/C]/**20** (Tu-95G)/**25** (Tu-95H16)/**30** (MYA-4)]
1986	Russia	**1,887** [**112** (SS-4)/**420** (SS-11M2/M3)/**60** (SS-13)/**150** (SS-17M3)/**308** (SS-18M4/M5)/**360** (SS-19M3)/**405** (SS-20)/**72** (SS-25)]	**948** [**39** (SS-N-5)/**288** (SS-N-6M3)/**292** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**61** (SS-N-20)/**32** (SS-N-23)]	**160** [**30** (Tu-95A)/**45** (Tu-95B/C]/**30** (Tu-95G)/**40** (Tu-95H16)/**15** (MYA-4)]
1987	Russia	**1,871** [**48** (SS-4)/**420** (SS-11M2/M3)/**60** (SS-13)/**139** (SS-17M3)/**308** (SS-18M4/M5)/**360** (SS-19M3)/**405** (SS-20)/**5** (SS-24M1)/**126** (SS-25)]	**962** [**39** (SS-N-5)/**272** (SS-N-6M3)/**286** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**81** (SS-N-20)/**48** (SS-N-23)]	**155** [**30** (Tu-95A)/**30** (Tu-95B/C]/**40** (Tu-95G)/**5** (Tu-95H6)/**50** (Tu-95H16)]
1988	Russia	**1,729** [**18** (SS-4)/**370** (SS-11M2/M3)/**60**	**963** [**36** (SS-N-5)/**240** (SS-N-	**170** [**20** (Tu-95A)/**30** (Tu-95B/C]/**45**

		(SS-13)/**120** (SS-17M3)/**308** (SS-18M4/M5)/**350** (SS-19M3)/**318** (SS-20)/**12** (SS-24M1)/**20** (SS-24M2)/**153** (SS-25)]	6M3)/**286** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**101** (SS-N-20)/**64** (SS-N-23)]	(Tu-95G)/**15** (Tu-95H6)/**50** (Tu-95H16)/**10** (Tu-160)]
1989	Russia	**1,580** [**6** (SS-4)/**360** (SS-11M2/M3)/**60** (SS-13)/**100** (SS-17M3)/**308** (SS-18M4/M5)/**300** (SS-19M3)/**195** (SS-20)/**24** (SS-24M1)/**56** (SS-24M2)/**171** (SS-25)]	**949** [**18** (SS-N-5)/**192** (SS-N-6M3)/**286** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**121** (SS-N-20)/**96** (SS-N-23)]	**160** [**20** (Tu-95B/C]/**45** (Tu-95G)/**25** (Tu-95H6)/**55** (Tu-95H16)/**15** (Tu-160)]
1990	Russia	**1,297** [**310** (SS-11M2/M3)/**30** (SS-13)/**50** (SS-17M3)/**308** (SS-18M4/M5)/**300** (SS-19M3)/**36** (SS-24M1)/**56** (SS-24M2)/**207** (SS-25)]	**908** [**176** (SS-N-6M3)/**280** (SS-N-8)/**12** (SS-N-17)/**224** (SS-N-18)/**120** (SS-N-20)/**96** (SS-N-23)]	**127** [**30** (Tu-95G)/**27** (Tu-95H6)/**55** (Tu-95H16)/**15** (Tu-160)]
1991	Russia	**934** [**308** (SS-18M4/M5)/**300** (SS-19M3)/**36** (SS-24M1)/**56** (SS-24M2)/**234** (SS-25)]	**832** [**96** (SS-N-6M3)/**280** (SS-N-8)/**224** (SS-N-18)/**120** (SS-N-20)/**112** (SS-N-23)]	**102** [**31** (Tu-95H6)/**56** (Tu-95H16)/**15** (Tu-160)]
1992	Russia[32]	**905** [**308** (SS-18M4/M5)/**235** (SS-19M3)/**36** (SS-24M1)/**56** (SS-24M2)/**270** (SS-25)]	**628** [**172** (SS-N-8)/**224** (SS-N-18)/**120** (SS-N-20)/**112** (SS-N-23)]	**104** [**31** (Tu-95H6)/**56** (Tu-95H16)/**17** (Tu-160)]
1993	Russia	**859** [**290** (SS-18M4/5)/**200** (SS-19M3)/**36** (SS-24M1)/**36** (SS-24M2)/**297** (SS-25)]	**520** [**64** (SS-N-8)/**224** (SS-N-18)/**120** (SS-N-20)/**112** (SS-N-23)]	**107** [**31** (Tu-95H6)/**57** (Tu-95H16)/**19** (Tu-160)]
1994	Russia	**782** [**248** (SS-18M4/5)/**170** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**318** (SS-25)]	**456** [**224** (SS-N-18)/**120** (SS-N-20)/**112** (SS-N-23)]	**110** [**32** (Tu-95H6)/**56** (Tu-95H16)/**22** (Tu-160)]
1995	Russia	**753** [**186** (SS-18M4/5)/**170** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**351** (SS-25)]	**440** [**208** (SS-N-18)/**120** (SS-N-20)/**112** (SS-N-23)]	**113** [**31** (Tu-95H6)/**57** (Tu-95H16)/**25** (Tu-160)]
1996	Russia	**746** [**180** (SS-18M4/5)/**160** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**360** (SS-25)]	**440** [**208** (SS-N-18)/**120** (SS-N-20)/**112** (SS-N-23)]	**113** [**31** (Tu-95H6)/**57** (Tu-95H16)/**25** (Tu-160)]
1997	Russia	**746** [**180** (SS-18M4/5)/**160** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**360** (SS-25)]	**384** [**192** (SS-N-18)/**80** (SS-N-20)/**112** (SS-N-23)]	**113** [**32** (Tu-95H6)/**56** (Tu-95H16)/**25** (Tu-160)]
1998	Russia	**756** [**180** (SS-18M4/5)/**160** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**360** (SS-25)/**10** (SS-27)]	**348** [**176** (SS-N-18)/**60** (SS-N-20)/**112** (SS-N-23)]	**113** [**32** (Tu-95H6)/**56** (Tu-95H16)/**25** (Tu-160)]

32 Since 1992, some of Russian strategic nuclear forces were left in Belarus, Kazakhstan, and Ukraine. However, Russia was able to maintain a tight control over those forces.

1999	Russia	**756** [**180** (SS-18M4/5)/**150** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**360** (SS-25)/**20** (SS-27)]	**348** [**176** (SS-N-18)/**60** (SS-N-20)/**112** (SS-N-23)]	**112** [**33** (Tu-95H6)/**54** (Tu-95H16)/**25** (Tu-160)]
2000	Russia	**756** [**180** (SS-18M4/5)/**150** (SS-19M3)/**36** (SS-24M1)/**10** (SS-24M2)/**360** (SS-25)/**20** (SS-27)]	**348** [**176** (SS-N-18)/**60** (SS-N-20)/**112** (SS-N-23)]	**112** [**33** (Tu-95H6)/**54** (Tu-95H16)/**25** (Tu-160)]
2001	Russia	**706** [**144** (SS-18M4/5)/**137** (SS-19M3)/**36** (SS-24M1) /**360** (SS-25)/**29** (SS-27)]	**284** [**112** (SS-N-18)/**60** (SS-N-20)/**112** (SS-N-23)]	**78** [**32** (Tu-95H6)/**31** (Tu-95H16)/**15** (Tu-160)]
2002	Russia	**706** [**144** (SS-18M4/5)/**137** (SS-19M3)/**36** (SS-24M1) /**360** (SS-25)/**29** (SS-27)]	**232** [**96** (SS-N-18)/**40** (SS-N-20)/**96** (SS-N-23)]	**78** [**32** (Tu-95H6)/**31** (Tu-95H16)/**15** (Tu-160)]
1982	S.Africa	-	-	**6** (Buccaneer)[33]
1983	S.Africa	-	-	**6** (Buccaneer)
1984	S.Africa	-	-	**6** (Buccaneer)
1985	S.Africa	-	-	**6** (Buccaneer)
1986	S.Africa	-	-	**6** (Buccaneer)
1987	S.Africa	-	-	**5** (Buccaneer)
1988	S.Africa	-	-	**5** (Buccaneer)
1989	S.Africa	-	-	**5** (Buccaneer)
1990	S.Africa	-	-	**5** (Buccaneer)
1967	Israel	-	-	-
1968	Israel	**2** (Jericho-I)	-	-
1969	Israel	**12** (Jericho-I)	-	-
1970	Israel	**30** (Jericho-I)	-	-
1971	Israel	**36** (Jericho-I)	-	-
1972	Israel	**43** (Jericho-I)	-	-
1973	Israel	**49** (Jericho-I)[34]	-	-
1974	Israel	**55** (Jericho-I)	-	-

[33] The "pre-qualified" device, which could be "kicked out the back of a plane," made in 1982. The first "qualified" model, which was deliverable by Buccaneer bomber, was made in 1987. David Albright, "South Africa and the Affordable Bomb," *Bulletin of the Atomic Scientists* 50, no. 4 (July/August 1994): 43-44.

[34] Nuclear Notebooks point out that 1973 is the first year that Israel deployed its first nuclear-capable Jericho-I missile. Stockholm International Peace Research Institute, *SIPRI Yearbook 2003: Armaments, Disarmament and International Security* (New York: Oxford University Press, 2003), 627.

1975	Israel	**61** (Jericho-I)	-	-
1976	Israel	**68** (Jericho-I)	-	-
1977	Israel	**74** (Jericho-I)	-	-
1978	Israel	**80** (Jericho-I)	-	-
1979	Israel	missing	-	-
1980	Israel	missing	-	-
1981	Israel	missing	-	**53** (F-16A/B)[35]
1982	Israel	missing	-	**74** (F-16A/B)
1983	Israel	missing	-	**72** (F-16A/B)
1984	Israel	missing	-	**75** (F-16A/B)
1985	Israel	missing	-	**75** (F-16A/B)
1986	Israel	missing	-	**75** (F-16A/B)
1987	Israel	missing	-	**76** (F-16A/B)
1988	Israel	missing	-	**145** (F-16A/B/C/D)
1989	Israel	missing	-	**145** (F-16A/B/C/D)
1990	Israel	**100** (Jericho 1/2)	-	**139** (F-16A/B/C/D)
1991	Israel	missing	-	**149** (F-16A/B/C/D)
1992	Israel	missing	-	**209** (F-16A/B/C/D)
1993	Israel	missing	-	**209** (F-16A/B/C/D)
1994	Israel	missing	-	**209** (F-16A/B/C/D)
1995	Israel	missing	-	**205** (F-16A/B/C/D)
1996	Israel	missing	-	**205** (F-16A/B/C/D)
1997	Israel	missing	-	**205** (F-16A/B/C/D)
1998	Israel	missing	-	**203** (F-16A/B/C/D)
1999	Israel	missing	-	**237** (F-16A/B/C/D)
2000	Israel	**100** [**50** (Jericho-I)/**50** (Jericho-II)]	**18** (Popeye-Turbo)[36]	**237** (F-16A/B/C/D)

35 Some of various Israeli F-16s (A/B/C/D/I/Fighting Falcon) are thought to be nuclear-certified. Norris, Arkin, Kristensen, and Handler, "Israeli Nuclear Forces, 2002," 73.

36 It is reported that Israel had two Dolphin-class submarines in 1999 and three in 2000. Norris, Arkin, Kristensen, and Handler, "Israeli Nuclear Forces, 2002," 75. Other sources believe that Israel deployed one Dolphin-class sub in 1999 and additional two in 2000. "SSK Dolphin Class Submarine," *Naval Technology*, accessed October 12, 2018, https://www.naval-technology.com/projects/dolphin/. The Dolphin class submarines are known to have 10 21-inch tubes capable of launching torpedoes, mines, or cruise missiles. According to IISS' *Military Balance*, however, each submarine seems to have 6 missiles and 4 torpedoes. In 2000 Israel conducted a test of a submarine-launched cruise missile, though it is unclear whether that missile was a Popeye-Turbo. Hans M. Kristensen and Robert S. Norris, "Israeli Nuclear Weapons, 2014," *Bulletin of the Atomic*

2001	Israel	**100** [**50** (Jericho-I)/**50** (Jericho-II)]	**18** (Popeye-Turbo)	**237** (F-16A/B/C/D)
2002	Israel	**100** [**50** (Jericho-I)/**50** (Jericho-II)]	**18** (Popeye-Turbo)	**232** (F-16A/B/C/D)
1964	China	-	-	**14** [**13** (Tu-4)/**1** (H-6)]
1965	China	-	-	**14** [**13** (Tu-4)/**1** (H-6)]
1966	China	**5** (DF-2/2A)	-	**15** [**13** (Tu-4)/**2** (H-6)]
1967	China	**10** (DF-2/2A)	-	**15** [**13** (Tu-4)/**2** (H-6)]
1968	China	**15** (DF-2/2A)	-	**19** [**13** (Tu-4)/**5** (H-6)/**1** (H-5)]
1969	China	**20** (DF-2/2A)	-	**24** [**13** (Tu-4)/**8** (H-6)/**3** (H-5)]
1970	China	**30** (DF-2/2A)	-	**31** [**13** (Tu-4)/**10** (H-6)/**5** (H-5)/**3** (Q-5)]
1971	China	**45** [**40** (DF-2/2A)/**5** (DF-3/3A)]	-	**36** [**13** (Tu-4)/**13** (H-6)/**7** (H-5)/**3** (Q-5)]
1972	China	**60** [**45** (DF-2/2A)/**15** (DF-3/3A)]	-	**57** [**13** (Tu-4)/**32** (H-6)/**9** (H-5)/**3** (Q-5)]
1973	China	**65** [**45** (DF-2/2A)/**20** (DF-3/3A)]	-	**79** [**13** (Tu-4)/**50** (H-6)/**11** (H-5)/**5** (Q-5)]
1974	China	**75** [**50** (DF-2/2A)/**25** (DF-3/3A)]	-	**96** [**13** (Tu-4)/**60** (H-6)/**13** (H-5)/**10** (Q-5)]
1975	China	**80** [**50** (DF-2/2A)/**30** (DF-3/3A)]	-	**108** [**13** (Tu-4)/**65** (H-6)/**15** (H-5)/**15** (Q-5)]
1976	China	**80** [**50** (DF-2/2A)/**30** (DF-3/3A)]	-	**118** [**13** (Tu-4)/**70** (H-6)/**15** (H-5)/**20** (Q-5)]
1977	China	**80** [**50** (DF-2/2A)/**30** (DF-3/3A)]	-	**133** [**13** (Tu-4)/**75** (H-6)/**20** (H-5)/**25** (Q-5)]
1978	China	**90** [**50** (DF-2/2A)/**40** (DF-3/3A)]	-	**148** [**13** (Tu-4)/**80** (H-6)/**25** (H-5)/**30** (Q-5)]
1979	China	**95** [**45** (DF-2/2A)/**50** (DF-3/3A)]	-	**163** [**13** (Tu-4)/**90** (H-6)/**30** (H-5)/**30** (Q-5)]
1980	China	**105** [**45** (DF-2/2A)/**60** (DF-3/3A)]	-	**170** [**10** (Tu-4)/**100** (H-6)/**30** (H-5)/**30** (Q-5)]

Scientists 70, no. 6 (2014): 109.

1981	China	**125** [**45** (DF-2/2A)/**70** (DF-3/3A)/**8** (DF-4)/**2** (DF-5/5A)]	-	**165** [**5** (Tu-4)/**100** (H-6)/**30** (H-5)/**30** (Q-5)]
1982	China	**135** [**45** (DF-2/2A)/**80** (DF-3/3A)/**8** (DF-4)/**2** (DF-5/5A)]	-	**165** [**105** (H-6)/**30** (H-5)/**30** (Q-5)]
1983	China	**140** [**40** (DF-2/2A)/**90** (DF-3/3A)/**8** (DF-4)/**2** (DF-5/5A)]	-	**170** [**110** (H-6)/**30** (H-5)/**30** (Q-5)]
1984	China	**149** [**35** (DF-2/2A)/**100** (DF-3/3A)/**10** (DF-4)/**4** (DF-5/5A)]	-	**170** [**110** (H-6)/**30** (H-5)/**30** (Q-5)]
1985	China	**139** [**30** (DF-2/2A)/**95** (DF-3/3A)/**10** (DF-4)/**4** (DF-5/5A)]	**12** (JL-1)	**170** [**110** (H-6)/**30** (H-5)/**30** (Q-5)]
1986	China	**131** [**30** (DF-2/2A)/**85** (DF-3/3A)/**12** (DF-4)/**4** (DF-5/5A)]	**12** (JL-1)	**175** [**115** (H-6)/**30** (H-5)/**30** (Q-5)]
1987	China	**118** [**20** (DF-2/2A)/**80** (DF-3/3A)/**14** (DF-4)/**4** (DF-5/5A)]	**12** (JL-1)	**175** [**115** (H-6)/**30** (H-5)/**30** (Q-5)]
1988	China	**116** [10 (DF-2/2A)/**80** (DF-3/3A)/**16** (DF-4)/**4** (DF-5/5A)/**6** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1989	China	**114** [**80** (DF-3/3A)/**18** (DF-4)/**4** (DF-5/5A)/**12** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1990	China	**108** [**60** (DF-3/3A)/**20** (DF-4)/**4** (DF-5/5A)/**24** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1991	China	**110** [**50** (DF-3/3A)/**20** (DF-4)/**4** (DF-5/5A)/**36** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1992	China	**110** [**50** (DF-3/3A)/**20** (DF-4)/**4** (DF-5/5A)/**36** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1993	China	**110** [**50** (DF-3/3A)/**20** (DF-4)/**4** (DF-5/5A)/**36** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1994	China	**110** [**50** (DF-3/3A)/**20** (DF-4)/**4** (DF-5/5A)/**36** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1995	China	**110** [**50** (DF-3/3A)/**20** (DF-4)/**4** (DF-5/5A)/**36** (DF-21/21A)]	**24** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]
1996	China	**113** [**50** (DF-3/3A)/**20** (DF-4)/**7** (DF-5/5A)/**36** (DF-21/21A)]	**12** (JL-1)	**180** [**120** (H-6)/**30** (H-5)/**30** (Q-5)]

1997	China	**113** [**50** (DF-3/3A)/**20** (DF-4)/**7** (DF-5/5A)/**36** (DF-21/21A)]	**12** (JL-1)	**150** [**120** (H-6)/ **30** (Q-5)]
1998	China	**113** [**50** (DF-3/3A)/**20** (DF-4)/**7** (DF-5/5A)/**36** (DF-21/21A)]	**12** (JL-1)	**150** [**120** (H-6)/ **30** (Q-5)]
1999	China	**128** [**40** (DF-3/3A)/**20** (DF-4)/**20** (DF-5/5A)/**48** (DF-21/21A)]	**12** (JL-1)	**150** [**120** (H-6)/ **30** (Q-5)]
2000	China	**128** [**40** (DF-3/3A)/**20** (DF-4)/**20** (DF-5/5A)/**48** (DF-21/21A)]	**12** (JL-1)	**150** [**120** (H-6)/ **30** (Q-5)]
2001	China	**128** [**40** (DF-3/3A)/**20** (DF-4)/**20** (DF-5/5A)/**48** (DF-21/21A)]	**12** (JL-1)	**150** [**120** (H-6)/ **30** (Q-5)]
2002	China	**120** [**40** (DF-3/3A)/**12** (DF-4)/**20** (DF-5/5A)/**48** (DF-21/21A)]	**12** (JL-1)	**150** [**120** (H-6)/ **30** (Q-5)]
1988	India	-	-	**112** [**72** (Jaguar IS/IB)/**40** (Mirage 2000H/TH)]
1989	India	-	-	**122** [**70** (Jaguar IS/IB)/**52** (Mirage 2000H/TH)]
1990	India	-	-	**126** [**80** (Jaguar IS/IB)/**46** (Mirage 2000H/TH)]
1991	India	-	-	**116** [**80** (Jaguar IS/IB)/**36** (Mirage 2000H/TH)]
1992	India	-	-	**116** [**80** (Jaguar IS/IB)/**36** (Mirage 2000H/TH)]
1993	India	-	-	**116** [**80** (Jaguar IS/IB)/**36** (Mirage 2000H/TH)]
1994	India	-	-	**124** [**89** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]
1995	India	-	-	**132** [**97** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]
1996	India	-	-	**123** [**88** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]
1997	India	-	-	**123** [**88** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]

1998	India	-	-	**123** [**88** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]
1999	India	-	-	**123** [**88** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]
2000	India	-	-	**123** [**88** (Jaguar IS/IB)/**35** (Mirage 2000H/TH)]
2001	India	-	-	**124** [**84**(Jaguar IS/IB)/**40** (Mirage 2000H/TH)]
2002	India	-	-	**75** [**35**(Jaguar IS/IB)/**40** (Mirage 2000H/TH)]
1990	Pakistan	-	-	**39** (F-16A/B)
1991	Pakistan	-	-	**39** (F-16A/B)
1992	Pakistan	-	-	**39** (F-16A/B)
1993	Pakistan	-	-	**35** (F-16A/B)
1994	Pakistan	-	-	**34** (F-16A/B)
1995	Pakistan	-	-	**34** (F-16A/B)
1996	Pakistan	-	-	**34** (F-16A/B)
1997	Pakistan	-	-	**34** (F-16A/B)
1998	Pakistan	-	-	**32** (F-16A/B)
1999	Pakistan	-	-	**32** (F-16A/B)
2000	Pakistan	-	-	**32** (F-16A/B)
2001	Pakistan	-	-	**32** (F-16A/B)
2002	Pakistan	-	-	**32** (F-16A/B)

V. The List of Strategic Nuclear Platforms and Their Range

This section provides information about the range of each strategic nuclear platform. It should be noted that in many cases, different sources offer different estimates. Accordingly, there could be some discrepancies that cannot be resolved entirely. I consider the highest and lowest estimation of a certain platform's range offered by different sources and choose the highest estimation. For estimating the range of strategic bombers, I try to gather information on a bomber's combat range, the maximum range that an aircraft can fly with (nuclear) payloads whenever such information is available. When information on combat radius, a measure of the maximum range that an aircraft can fly considering its return to the base on which it operates, and combat range is available, I choose to use combat range, because states often envision one-way nuclear mission. Refueling capability is also taken into consideration whenever information on refueling capability and how much it can extend the range of a given bomber is available.

Table 3. Deployed Strategic Nuclear Platforms and Their Estimated Range

Country	Type	Name	Range
US	Land-based	Atlas D	10,180km[37]
		Atlas E	12,552km[38]
		Atlas F	12,552km[39]
		Titan I	10,299km[40]
		Titan II	13,518km[41]
		Minuteman I	11,667km[42]
		Minuteman II	12,472km[43]
		Minuteman III	12,874-14,800km[44]
		Peacekeeper	10,782km[45]
	Sea-based	Polaris A1	2,220km[46]
		Polaris A2	2,784km[47]
		Polaris A3	4,634km[48]
		Poseidon C3	4,506km[49]
		Trident I	7,402km[50]

37 Norman Polmar and Robert S. Norris, *The U.S. Nuclear Arsenal: A History of Weapons and Delivery Systems Since 1945* (Annapolis, MD: Naval Institute Press, 2009), 166.
38 Ibid., 166.
39 Ibid., 167.
40 Ibid., 182.
41 Ibid., 183.
42 Ibid., 172.
43 Ibid., 172.
44 Ibid., 173.
45 Ibid., 176.
46 Ibid., 188.
47 Ibid., 188.
48 Ibid., 190.
49 Ibid., 191.
50 Ibid., 198-99.

		Trident II	7,402km[51]
	Air-Based	B-29	6,215km[52]
		B-36	10,019-12,842km[53]
		B-50	7,483-7,711km[54]
		B-47	6,311km[55]
		B-52	9,656-11,482km[56] (14,162-16,000km since 1961[57])
		B-58	9,607-10,963km[58]
		FB-111A	12,070-14,816km[59]
		B-1B	6,662-19,000km[60]
		B-2	11,000-12,231km[61]
UK	Sea-Based	Polaris A3	4,350-4,600km[62]
		Chevaline	4,700km[63]
		Trident II	7,400-11,000km[64]
	Air-Based	Valiant	7,242km[65]
		Victor	4,022-7,400km[66]
		Vulcan	7,402-9,253km[67]
France	Land-Based	SSBS S2	3,300km[68]

51 Ibid., 199.

52 Ernest R. May, John D. Steinbruner, and Thomas W. Wolfe, eds., *History of the Strategic Arms Competition 1945-1972, Part II* (Washington, DC: Office of the Secretary of Defense, Historical Office, March 1981), 876. For a similar estimate, see Norman Polmar, ed., *Strategic Air Command: People, Aircrafts, and Missiles* (Annapolis, MD: Nautical and Aviation Publishing Company of America, 1979), 149.

53 May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, 877; Polmar, ed., *Strategic Air Command*, 158.

54 May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, 877; Polmar and Norris, *The U.S. Nuclear Arsenal*, 97.

55 May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, 878.

56 B-52B's combat radius is reported as 3,100 nautical miles. May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, 878. The range of B-52D, which is also an early model, is estimated as more than 6,000miles. Thomas B. Cochran, William M. Arkin, and Milton M. Hoenig, *Nuclear Weapons Databook*, vol. I, *U.S. Nuclear Forces and Capabilities* (Cambridge, MA: Ballinger, 1984), 149.

57 SIPRI, *SIPRI Yearbook 2001*, 458; Polmar and Norris, *The U.S. Nuclear Arsenal*, 99.

58 B-58's refueled combat radius is reported as 2,960 nautical miles. May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, 879; For a different estimate, see Polmar and Norris, *The U.S. Nuclear Arsenal*, 103.

59 May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, 880; Polmar and Norris, *The U.S. Nuclear Arsenal*, 107-8.

60 Polmar and Norris, *The U.S. Nuclear Arsenal*, 87; SIPRI, *SIPRI Yearbook 1997*, 394.

61 SIPRI, *SIPRI Yearbook 2001*, 458; Polar and Norris, *The U.S. Nuclear Arsenal*, 89.

62 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 163.

63 Ibid., 163.

64 Ibid., 169.

65 Ibid., 142.

66 *Nuclear Weapons Databook* estimates that Victor's range is 4,022-5,631km. Ibid., 146. Other sources say that its range is 7,400km. "Handley Page Victor: History," Thunder & Lightnings, last modified November 20, 2016, accessed December 28, 2018, http://www.thunder-and-lightnings.co.uk/victor/history.php

67 4,600miles without refueling; 5,750miles with refueling. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 144.

68 Ibid., 291.

		SSBS S3	3,500km[69]
	Sea-Based	MSBS M1	2,500km[70]
		MSBS M2	3,000km[71]
		MSBS M20	3,000km[72]
		MSBS M4	4,000km[73]
		MSBS M45	4,000km[74]
	Air-Based	Mirage IVA/P	1,574-3,862km[75]
		Mirage 2000N	2,750-2,778km[76]
USSR/Russia	Land-based	SS-3 Shyster	1,200km[77]
		SS-4 Sandal	2,080km[78]
		SS-5 Skean	4,500km[79]
		SS-6 Sapwood	8,000-12,000km[80]
		SS-7 Saddler	11,000-13,000km[81]
		SS-8 Sasin	12,500km[82]
		SS-9 Scarp M1	10,200-15,200km[83]
		SS-9 Scarp M2	10,200-15,200km[84]
		SS-9 Scarp M3	40,000km[85]
		SS-9 Scarp M4	10,200-15,200km[86]
		SS-11 Sego M1	11,000km[87]
		SS-11 Sego M2/M3	10,600-13,000km[88]
		SS-13 Savage	9,400-9,500km[89]
		SS-17 Spanker M1	10,000-10,320km[90]

69 Ibid., 292

70 Ibid., 300.

71 Ibid.

72 Ibid., 301.

73 Ibid., 304.

74 Robert S. Norris and Hans M. Kristensen, "French Nuclear Forces, 2008," *Bulletin of the Atomic Scientists* 64, no. 4 (2008): 53.

75 1,574km without refueling; 3,862km with refueling. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 281.

76 Ibid., 283; Robert S. Norris and William M. Arkin, "British, French, and Chinese Nuclear Forces," *Bulletin of the Atomic Scientists* 52, no. 6 (1996): 66.

77 Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA: MIT Press, 2001), 178-79.

78 Ibid., 185.

79 Ibid., 188.

80 Ibid., 181.

81 Ibid., 190.

82 Ibid., 193.

83 Ibid., 198.

84 Ibid.

85 Ibid.

86 Since this missile was the same SS-9 Scarp Mod 1 with the multiple reentry vehicles (MRV), I assume that its range is equal to Mod 1. Ibid., 199.

87 Ibid., 202.

88 Ibid.; Thomas B. Cochran, William M. Arkin, Robert S. Norris, and Jeffrey I. Sands, *Nuclear Weapons Databook*, vol. IV, *Soviet Nuclear Weapons* (New York: Ballinger, 1989), 101.

89 Podvig, ed., *Russian Strategic Nuclear Forces*, 207.

90 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 125; Podvig, ed., *Russian Strategic Nuclear Forces*, 213.

	SS-17 Spanker M2	10,200-10,320km[91]
	SS-17 Spanker M3	10,000km[92]
	SS-18 Satan M1	12,000km[93]
	SS-18 Satan M2	11,000km[94]
	SS-18 Satan M3	16,000km[95]
	SS-18 Satan M4	11,000km[96]
	SS-18 Satan M5	11,000-16,000km[97]
	SS-19 Stiletto M1	10,000km[98]
	SS-19 Stiletto M2	10,000km[99]
	SS-19 Stiletto M3	10,000km[100]
	SS-20 Saber	5,000km[101]
	SS-24 Scalpel M1	10,000km[102]
	SS-24 Scalpel M2	10,450km[103]
	SS-25 Sickle	10,500km[104]
	SS-27 Sickle B	11,000km[105]
Sea-Based	R-11FM	150km[106] (+17,594km)[107]
	SS-N-4	600km[108] (+16,668km)[109]
	SS-N-5	1,400km[110] (+16,668km)[111]
	SS-N-6 Serb	2,400-3,000km[112]

91 Podvig, ed., *Russian Strategic Nuclear Forces*, 213.

92 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 125.

93 Ibid., 127.

94 Ibid., 127.

95 Ibid., 127.

96 Ibid., 127-28.

97 Podvig, ed., *Russian Strategic Nuclear Forces*, 218.

98 Ibid., 222.

99 Ibid.

100 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 129.

101 Podvig, ed., *Russian Strategic Nuclear Forces*, 225.

102 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 131.

103 Podvig, ed., *Russian Strategic Nuclear Forces*, 228.

104 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 134.

105 Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington, DC: Smithsonian Institution Press, 2002), 237; CSIS Missile Defense Project, "SS-27 "Sickle B" (RT-2PM2 Topol-M)," *Missile Threat*, last modified June 15, 2018, accessed November 24, 2019, https://missilethreat.csis.org/missile/ss-27/.

106 Podvig, ed., *Russian Strategic Nuclear Forces*, 311.

107 Zulu Class submarine's range of operation on snorkel at 8 knots. Norman Polmar and Jurrien Noot, *Submarines of the Russian and Soviet Navies, 1718-1990* (Annapolis, MD: Naval Institute Press, 1991), 283.

108 Podvig, ed., *Russian Strategic Nuclear Forces*, 314.

109 Golf I Class submarine's range of operation on snorkel at 5 knots. Polmar and Noot, *Submarines of the Russian and Soviet Navies*, 288.

110 Podvig, ed., *Russian Strategic Nuclear Forces*, 318.

111 Golf I Class submarines' range. Some SS-N-4 missiles were carried by Golf-class, whereas others by Hotel II class submarines, which are nuclear-powered and therefore have virtually unlimited range, since 1964.

112 Podvig, ed., *Russian Strategic Nuclear Forces*, 321.

		SS-N-8 Sawfly	7,800-9,100km[113]
		SS-N-17 Snipe	3,900km[114]
		SS-N-18 Stingray	6,500-8,000km[115]
		SS-N-20 Sturgeon	8,300km[116]
		SS-N-23 Skiff	8,300km[117]
	Air-Based	Tu-4	8,000km[118]
		Tu-16	5,800km[119]
		Tu-95 Bear A	13,200-16,600km[120]
		Tu-95 Bear B/C	10,300-16,600km[121]
		Tu-95 Bear G	16,600km[122]
		Tu-95 Bear H	10,500-16,600km[123]
		Tu-22 Blinder	2,200km[124]
		MYA-4 Bison	5,000km[125] (15,400km since 1958[126])
		Tu-26 Backfire	5,000-5,100km[127]
		Tu-160 Blackjack	14,000km[128], 10,500-13,200km[129]
South Africa	Air-Based	Buccaneer	1,610-1,930km[130]
Israel	Land-Based	Jericho I	500km[131]
		Jericho II	1,800km[132]

113 Ibid., 326.

114 Ibid., 329.

115 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 148.

116 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 150.

117 Ibid., 151.

118 With aerial refueling. Steven Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington, DC: Smithsonian Institution Press, 2002), 16.

119 Ibid., 372.

120 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 238; Podvig, ed., *Russian Strategic Nuclear Forces*, 382.

121 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 238; Podvig, ed., *Russian Strategic Nuclear Forces*, 382.

122 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 238.

123 Podvig, ed., *Russian Strategic Nuclear Forces*, 382; Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 238.

124 Podvig, ed., *Russian Strategic Nuclear Forces*, 388.

125 "Molot M-4/Mya-4/3M Myasishchev 'Bison'," *Federation of American Scientists*, last modified August 08, 2000, accessed January 18, 2019, https://fas.org/nuke/guide/russia/bomber/m-4.htm.

126 The 3M's maximum service range was increased to 15,400km, with refueling capabilities in 1958. Podvig, ed., *Russian Strategic Nuclear Forces*, 375-76.

127 Zaloga, *The Kremlin's Nuclear Sword*, 175.

128 Ibid., 397.

129 SIPRI, *SIPRI Yearbook 2001*, 466.

130 British Buccaneer's estimated range of operation. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 153.

131 Norris, Arkin, Kristensen, and Handler, "Israeli Nuclear Forces, 2002," 74; CSIS Missile Defense Project, "Jericho 1," *Missile Threat*, last modified June 15, 2018, accessed October 10, 2019, https://missilethreat.csis.org/missile/jericho-1/.

132 Ibid.

	Sea-Based	Popeye Turbo	350-1,500km[133] (+640km[134])
	Air-Based	F-16	1,600km[135]
China	Land-Based	DF-2/2A	1,050-1,250km[136]
		DF-3/3A	2,650-3,000km[137]
		DF-4	4,750-5,500km[138]
		DF-5	12,000-13,000km[139]
		DF-21	1,800km[140]
	Sea-Based	JL-1	1,000-1,700km[141]
	Air-Based	Tu-4	5,740km[142]
		Hong-5	1,105-1,200km[143]
		Hong-6	6,200km[144]
India	Air-Based	Jaguar	1,600km[145]
		Mirage 2000H	1,850km[146]
Pakistan	Air-Based	F-16	1,600km[147]

[133] Kristensen and Norris, "Israeli Nuclear Forces, 2014," 108; Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkmar, *Deadly Arsenals: Nuclear, Biological, and Chemical Threats*, 2nd ed. (Washington, DC: Carnegie Endowment for International Peace, 2005), 261.

[134] I add the range of the submarine at an economical speed of 8kt dived, which is roughly 400miles (640km). Naval Technology, "SSK Dolphin Class Submarine," *Naval Technology*, accessed December 5, 2018, https://www.naval-technology.com/projects/dolphin/.

[135] Kristensen and Norris, "Israeli Nuclear Forces, 2014," 102.

[136] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 378.

[137] Ibid., 380; Hans M. Kristensen, "Chinese Nuclear Missile Upgrade Near Dalian," *FAS Strategic Security Blog*, May 21, 2014, accessed November 17, 2018, https://fas.org/blogs/security/2014/05/dengshaheupgrade/.

[138] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 382; Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists* 74, no. 4 (2018): 290.

[139] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 384; Kristensen and Norris, "Chinese Nuclear Forces, 2018," 290.

[140] Norris and Arkin, "British, French, and Chinese Nuclear Forces," 67; John Wilson Lewis and Hua Di, "China's Ballistic Missile Programs: Technologies, Strategies, Goals," *International Security* 17, no. 2 (Fall 1992): 10.

[141] Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2016," *Bulletin of the Atomic Scientists* 72, no. 4 (2016), 206; Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 396.

[142] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 389.

[143] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 390.

[144] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 392.

[145] Hans M. Kristensen and Matt Korda, "Indian Nuclear Forces, 2018," *Bulletin of the Atomic Scientists* 74, no. 6 (2018): 362.

[146] Ibid.

[147] Hans M. Kristensen, Robert S. Norris, and Julia Diamond, "Pakistani Nuclear Forces, 2018," *Bulletin of the Atomic Scientists* 74, no. 5 (2018): 349.

VI. Accuracy of Strategic Nuclear Platforms

This section provides information about the estimated accuracy of each strategic nuclear platform. If different sources provide different estimations, I choose the most reliable estimate given the reliability of the source. If multiple estimates appear to be reliable, I specify the minimum and maximum estimated value of the accuracy of a given delivery platform and take the average of both values.

Table 4. Estimated Accuracy of Strategic Nuclear Platforms

Country	Type	Name	Accuracy
US	Land-based	Atlas D	3,334m[148]
		Atlas E	1,852m[149]
		Atlas F	1,852m[150]
		Titan I	1,204m[151]
		Titan II	1,204m[152]
		Minuteman I	2,037m[153]
		Minuteman II	366-610m[154]; 481m[155]
		Minuteman III	183-213m[156]
		Peacekeeper	90m[157]; 111m[158]
	Sea-based	Polaris A1	3,704m[159]
		Polaris A2	3,704m[160]
		Polaris A3	926m[161]
		Poseidon C3	457m[162]
		Trident I	457m[163]
		Trident II	90m[164]

148 Donald Mackenzie, *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance* (Cambridge, MA: MIT Press, 1990), 428.

149 Mackenzie, *Inventing Accuracy*, 428.

150 Mackenzie, *Inventing Accuracy*, 428.

151 Mackenzie, *Inventing Accuracy*, 428.

152 Mackenzie, *Inventing Accuracy*, 428.

153 Mackenzie, *Inventing Accuracy*, 428.

154 Polmar and Norris, *The U.S. Nuclear Arsenal*, 172.

155 Mackenzie, *Inventing Accuracy*, 428.

156 Congressional Budget Office, *Counterforce Issues for the U.S. Strategic Nuclear Forces* (Washington, DC: Congressional Budget Office, 1978), 18; Congressional Budget Office, *Modernizing U.S. Strategic Offensive Forces: Costs, Effects, and Alternatives* (Washington, DC: Congressional Budget Office, 1987), 86; Polmar and Norris, *The U.S. Nuclear Arsenal*, 173;

157 CSIS Missile Defense Project, "Peacekeeper," *Missile Threat*, last modified June 15, 2018, accessed October 25, 2019, https://missilethreat.csis.org/missile/lgm-118-peacekeeper-mx/.

158 Mackenzie, *Inventing Accuracy*, 428.

159 Mackenzie, *Inventing Accuracy*, 429.

160 Ibid.

161 Ibid.

162 Polmar and Norris, *The U.S. Nuclear Arsenal*, 191.

163 Polmar and Norris, *The U.S. Nuclear Arsenal*, 198.

164 CSIS Missile Defense Project, "Trident D-5," *Missile Threat*, last modified June 15, 2018, accessed October 25, 2019, https://missilethreat.csis.org/missile/trident/; Keir A. Lieber and Daryl G. Press, "The End of MAD?

	Air-Based	B-29	3,080m (1949)[165] 1,413m (1950)[166]
		B-36	
		B-50	
		B-47	
		B-52	Hound Dog (1097-1981m)[167];SRAM (430m)[168]; ALCM (10-30.5m)[169]; ACM (4.9m)[170]; gravity bomb (130m-185m) in 1987[171]; gravity bomb (116m) in the late 1990s[172]
		B-58	
		FB-111A	
		B-1B	
		B-2	
UK	Sea-Based	Polaris A3	926m
		Chevaline	930m[173]
		Trident II	90m[174]
	Air-Based	Valiant	
		Victor	Blue Steel (91-640m)[175]
		Vulcan	Blue Steel (91-640m)
France	Land-Based	SSBS S2	1,000m[176]

The Nuclear Dimension of U.S. Primacy," *International Security* 30, no. 4 (Spring 2006): 18; Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security* 41 no. 4 (Spring 2017): 26.

165 The circular error probable (CEP) of 10,100 feet was obtained during October 1948's military exercise. B-29 was the only nuclear-certified bomber in 1949. Edward Kaplan, *To Kill Nations: American Strategy in the Air-Atomic Age and the Rise of Mutually Assured Destruction* (Ithaca, NY: Cornell University Press, 2015), 31.

166 In 1950's evaluation, an average CEP of 4,635 feet was achieved. Kaplan, *To Kill Nations*, 33.

167 Polmar and Norris, *The U.S. Nuclear Arsenal*, 203.

168 Strategic Air Command, "Boeing AGM-69 "SRAM"," accessed November 25, 2019, https://web.archive.org/web/20040407003242/http://www.strategic-air-command.com/missiles/Aircraft-Launched_Missiles/agm-69_SRAM_missile.htm

169 Ibid., 202. NRDC team's estimate is 10m. Cochran, Arkin, and Hoenig, *Nuclear Weapons Databook*, 177.

170 Polmar and Norris, *The U.S. Nuclear Arsenal*, 201.

171 Congressional Budget Office, *Modernizing U.S. Strategic Offensive Forces: Costs, Effects, and Alternatives* (Washington, DC: Congressional Budget Office, 1987), 87.

172 Drop tests in the late 90s typically obtained a CEP of 116m. "Video Shows Earth-Penetrating Capability of B61-12 Nuclear Bomb," *FAS Strategic Security Blog*, January 14, 2016, accessed November 27, 2019, https://fas.org/blogs/security/2016/01/b61-12_earth-penetration/.

173 Christopher Chant, A Compendium of Armaments and Military Hardware (London: Routledge, 1988).

174 CSIS Missile Defense Project, "Trident D-5," *Missile Threat*, last modified June 15, 2018, accessed October 25, 2019, https://missilethreat.csis.org/missile/trident/; Lieber and Press, "The End of MAD?" 18; Lieber and Press, "The New Era of Counterforce," 26.

175 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 148.

176 David Miller, *The Cold War: A Military History* (New York: St. Martin's, 1998), 419.

		SSBS S3	800m[177]
	Sea-Based	MSBS M1	610m[178]; 1,000m[179]
		MSBS M2	610m; 1,000m
		MSBS M20	800m[180]
		MSBS M4	185-480m[181]
		MSBS M45	350m[182]
	Air-Based	Mirage IVA/P	ASMP (350-400m)[183] Gravity bomb (200m)[184]
		Mirage 2000N	ASMP (350-400m)
USSR/Russia	Land-based	SS-3 Shyster	543-652m[185]
		SS-4 Sandal	2,174m[186]
		SS-5 Skean	2,174m[187]
		SS-6 Sapwood	3,704m[188]; 4,348m[189]
		SS-7 Saddler	2,700-4,348m[190]
		SS-8 Sasin	3,000-3,500m[191]; 8,000m[192]
		SS-9 Scarp M1	2,174m[193]
		SS-9 Scarp M2	2,174m[194]
		SS-9 Scarp M3	2,174m[195]
		SS-9 Scarp M4	2,174m[196]
		SS-11 Sego M1	900-1,300m[197]; 1,400-

177 Miller, *The Cold War*, 419.

178 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 300.

179 Miller, *The Cold War*, 419.

180 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 302.

181 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 305.

182 CSIS Missile Defense Project, "M45," *Missile Threat*, last modified June 15, 2018, available at < https://missilethreat.csis.org/missile/m45/>

183 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 288.

184 Miller, *The Cold War*, 419.

185 Maximum error is 1.25-1.5km. Podvig, *Russian Strategic Nuclear Forces*, 178. The Soviet tradition is to use maximum error, rather than CEP. Following Pavel Podvig's formula, I divide the value of the maximum error by 2.3 with subsequent rounding. Pavel Podvig, "The Window of Vulnerability That Wasn't: Soviet military Buildup in the 1970s—A Research Note," *International Security* 33, no. 1 (Summer 2008), 126 n. 28.

186 Podvig, ed., *Russian Strategic Nuclear Forces*, 185

187 Ibid., 188.

188 Mackenzie, *Inventing Accuracy*, 428.

189 Maximum error 10km. Podvig, ed., *Russian Strategic Nuclear Forces*, 181.

190 Ibid., 190.

191 "R-9—SS-8 Sasin," *Federation of American Scientists*, last modified August 9, 2000, accessed November 25, 2019, https://fas.org/nuke/guide/russia/icbm/r-9.htm.

192 Robert S. Norris and Hans M. Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles, 1959-2008," *Bulletin of the Atomic Scientists* 65, no. 1 (January/February 2009): 67; Zaloga, *The Kremlin's Nuclear Sword*, 232.

193 Maximum error 5,000m. Podvig, ed., *Russian Strategic Nuclear Forces*, 198.

194 Ibid.

195 Ibid.

196 Ibid.

197 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 122.

	2,174m[198]
SS-11 Sego M2/M3	960-1,200m[199]; 1,100-1,350m[200]
SS-13 Savage	1,500-1,850m[201]; 1,800m[202]
SS-17 Spanker M1	700m[203]
SS-17 Spanker M2	700m[204]
SS-17 Spanker M3	350-430m[205]; 400m[206]
SS-18 Satan M1	700m[207]
SS-18 Satan M2	700m[208]
SS-18 Satan M3	700m[209]
SS-18 Satan M4	190-260m[210]; 370m[211]
SS-18 Satan M5	220m[212]
SS-19 Stiletto M1	650m[213]
SS-19 Stiletto M2	650m[214]
SS-19 Stiletto M3	350-430m[215]
SS-20 Saber	435-566m[216]
SS-24 Scalpel M1	200m[217]; 220m[218]
SS-24 Scalpel M2	220m[219]
SS-25 Sickle	200-400m[220]; 391m[221]; 350-430m[222]
SS-27 Sickle B	348m[223]

198 Podvig, ed. *Russian Strategic Nuclear Forces*, 202.
199 Podvig, "The Window of Vulnerability That Wasn't," 128.
200 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 122.
201 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 124.
202 Podvig, "The Window of Vulnerability That Wasn't," 128.
203 Podvig, "The Window of Vulnerability That Wasn't," 128.
204 Podvig, "The Window of Vulnerability That Wasn't," 128.
205 Podvig, "The Window of Vulnerability That Wasn't," 128.
206 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 126.
207 Podvig, "The Window of Vulnerability That Wasn't," 128.
208 Podvig, "The Window of Vulnerability That Wasn't," 128.
209 Podvig, "The Window of Vulnerability That Wasn't," 128.
210 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 128.
211 Podvig, "The Window of Vulnerability That Wasn't," 128.
212 Podvig, "The Window of Vulnerability That Wasn't," 128.
213 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.
214 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.
215 Podvig, "The Window of Vulnerability That Wasn't," 128.
216 Podvig, ed., *Russian Strategic Nuclear Forces*, 225.
217 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 132.
218 Podvig, "The Window of Vulnerability That Wasn't," 128.
219 Podvig, "The Window of Vulnerability That Wasn't," 128.
220 Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 134.
221 Maximum error 900m. Podvig, *Russian Strategic Nuclear Forces*, 232.
222 Podvig, "The Window of Vulnerability That Wasn't," 128.
223 Maximum error 800m. Podvig, *Russian Strategic Nuclear Forces*, 233.

	Sea-Based	R-11FM	1,500m[224]
		SS-N-4	4,000m[225]
		SS-N-5	2,800m[226]
		SS-N-6 Serb M1	1,900m[227]
		SS-N-6 Serb M2/3	1,300-1,800[228]
		SS-N-8 Sawfly	900-1,500m[229]
		SS-N-17 Snipe	1,400m[230]
		SS-N-18 Stingray	900-1,400m[231]
		SS-N-20 Sturgeon	600m[232]
		SS-N-23 Skiff	500m[233]
	Air-Based	Tu-4	
		Tu-16	
		Tu-95 Bear A	
		Tu-95 Bear B/C	AS-3 (1,852-5,556m)[234]
		Tu-95 Bear G	AS-4 (1,852-3,704m)[235]
		Tu-95 Bear H	AS-15 (25m)[236]
		Tu-22	
		MYA-4 Bison	
		Tu-26	
		Tu-160 Blackjack	AS-15 (25m)
South Africa	Air-Based	Buccaneer	
Israel	Land-Based	Jericho I	
		Jericho II	
	Sea-Based	Popeye Turbo	
	Air-Based	F-16	

[224] Podvig, ed., *Russian Strategic Nuclear Forces*, 311.

[225] Podvig, ed., *Russian Strategic Nuclear Forces*, 314.

[226] Podvig, ed., *Russian Strategic Nuclear Forces*, 318.

[227] Podvig, ed., *Russian Strategic Nuclear Forces*, 321.

[228] Podvig, ed., *Russian Strategic Nuclear Forces*, 321.

[229] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 146; Podvig, ed., *Russian Strategic Nuclear Forces*, 326.

[230] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 147; Podvig, ed., *Russian Strategic Nuclear Forces*, 329.

[231] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 149. Other sources estimated the accuracy of the platform as a CEP of 900m. Podvig, ed., *Russian Strategic Nuclear Forces*, 331.

[232] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 150; Podvig, ed., *Russian Strategic Nuclear Forces*, 334.

[233] Podvig, ed., *Russian Strategic Nuclear Forces*, 336.

[234] Central Intelligence Agency, *Intelligence Handbook: Soviet Guided Missiles*, SR IH 69-2, May 1969 (Langley, VA: Central Intelligence Agency), 43; "Kh-20/AS-3 Kangaroo," *Federation of American Scientists*, last modified August 8, 1997, accessed November 29, 2019, https://fas.org/nuke/guide/russia/bomber/as-3.htm.

[235] Central Intelligence Agency, *Intelligence Handbook*, 43.

[236] Missile Defense Advocacy Alliance, "AS-15 Kent (Kh-55 Granat)," Missile Threat and Proliferation, accessed November 25, 2019, https://missiledefenseadvocacy.org/missile-threat-and-proliferation/missile-proliferation/russia/as-15-kent-kh-55-granat/.

China	Land-Based	DF-2/2A	1,852-3,704m[237]
		DF-3/3A	1,000m[238]
		DF-4	1,370m[239]
		DF-5	500m[240]
		DF-21	700m[241]
	Sea-Based	CSS-N-3	300-400m[242]
	Air-Based	Tu-4	
		Hong-5	
		Hong-6	
India	Air-Based	Jaguar	
		Mirage 2000H	
Pakistan	Air-Based	F-16	

[237] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 378.

[238] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 381.

[239] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 382.

[240] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 385.

[241] CSIS Missile Defense Project, "DF-21 (Dong Feng 21/CSS-5)," *Missile Threat*, last modified October 8, 2019, accessed November 2, 2019, https://missilethreat.csis.org/missile/df-21/.

[242] "JL-1 [CSS-N-3]," *FAS*, last modified June 10, 1998, accessed November 2, 2019, https://fas.org/nuke/guide/china/slbm/jl-1.htm

VII. Warhead Yield

This section contains information on the estimated yield of nuclear weapons delivered by each strategic nuclear platform. When different sources offer various estimated values of yields, I provide the maximum value of a given warhead's yield.

Information on the yield of gravity bombs, often delivered by strategic bombers, remains unknown in many cases. For the **Soviet Union/Russia** case, I assume that the RDS-4, a fission weapon with a yield of 0.042MT, which was delivered by Tu-95 bombers, was the main nuclear ordnance for all Soviet bomber forces.[243] Since 1956, the RDS-37, a thermonuclear bomb that was tested in late 1955 and 1957,[244] started to replace the RDS-4. It had a 1.6MT yield when tested in 1955 and a 2.9MT in 1957.[245] Thus, I assume that all Soviet strategic bombers' nuclear gravity bombs produced a 1.6MT yield in 1956-1957 and 2.9MT since 1958.[246]

For **China**, it is believed to have two types of gravity bombs: a fission bomb with a yield of 20-40kt, and a 3MT thermonuclear gravity bomb.[247] The first test of a thermonuclear bomb took place in 1967.[248] I assume that since 1968, all nuclear gravity bombs have 3MT yield. Before 1968, all gravity bombs are assumed to have a yield of 40kt.

For **Pakistan**, I assume that Pakistan's nuclear gravity bombs have a maximum yield of 0.012MT, the same yield of early Pakistan's nuclear warheads carried by missile platforms, which again is estimated based on Pakistan's nuclear tests in 1998.[249]

Lastly, I assume that **India**'s gravity bombs have a maximum yield of 0.015MT, an estimation produced by experts on Indian nuclear forces.[250]

Table 5. Estimated Warhead Yield

Country	Type	Name	Accuracy
US	Land-based	Atlas D	W49Y2 (1.4MT)[251]
		Atlas E	W38Y1 (4.5MT)[252]
		Atlas F	W38Y1 (4.5MT)[253]
		Titan I	W38 (4.5MT)[254]
		Titan II	W53Y1 (9MT)[255]
		Minuteman I	W59Y1 (1MT) or

243 Zaloga, *The Kremlin's Nuclear Sword*, 29.
244 Podvig, *Russian Strategic Nuclear Forces*, 487.
245 Ibid., 487, 489.
246 Ibid., 29-30.
247 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 358. Similar estimations can be found in several *Nuclear Notebook* reports. See for instance, Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2015," *Bulletin of the Atomic Scientists* 71, no. 4 (2015): 78.
248 Ibid., 420.
249 Kristensen, Norris, and Diamond, "Pakistani Nuclear Forces, 2018," 349.
250 Tellis, *India's Emerging Nuclear Posture*, 519.
251 Polmar and Norris, *The U.S. Nuclear Arsenal*, 166.
252 Polmar and Norris, *The U.S. Nuclear Arsenal*, 166.
253 Polmar and Norris, *The U.S. Nuclear Arsenal*, 167.
254 Polmar and Norris, *The U.S. Nuclear Arsenal*, 182.
255 Polmar and Norris, *The U.S. Nuclear Arsenal*, 183.

	Minuteman II	W56 (1.2MT)[256] W56 Mod 4 (1.2MT)[257]
	Minuteman III	200xW62 (0.17MT, 1970-), 300xW78 (0.335MT, 1979-)[258]
	Peacekeeper	W87-1 (0.3MT)[259]
Sea-based	Polaris A1	W47Y1 (0.6MT)[260]
	Polaris A2	W47Y2 (1.2MT)[261]
	Polaris A3	W58 (0.2MT, x3 MRV)[262]
	Poseidon C3	W68 (0.05MT)[263]
	Trident I	W76 (0.1MT)[264]
	Trident II	W76 (0.1MT), W88 (0.455MT)[265]
Air-Based	B-29	Mk3 (0.021MT)[266]; Mk4 (0.031MT),[267] B5 (0.12MT),[268] B6 (0.16MT)[269]
	B-36	Mk3, Mk4, B5, B6, Mk17 (13.5MT),[270] B18 (0.5MT),[271] B24 (15MT),[272] B36 (19MT),[273] B39 (3.8MT)[274]
	B-50	Mk3, Mk4, B5, B6
	B-47	Mk4, Mk5, Mk6, Mk8 (0.03MT),[275] B15

256 Polmar and Norris, *The U.S. Nuclear Arsenal*, 172.
257 Polmar and Norris, *The U.S. Nuclear Arsenal*, 173.
258 Polmar and Norris, *The U.S. Nuclear Arsenal*, 173.
259 Polmar and Norris, *The U.S. Nuclear Arsenal*, 176.
260 Polmar and Norris, *The U.S. Nuclear Arsenal*, 188.
261 Polmar and Norris, *The U.S. Nuclear Arsenal*, 188.
262 Polmar and Norris, *The U.S. Nuclear Arsenal*, 190.
263 Polmar and Norris, *The U.S. Nuclear Arsenal*, 191.
264 Polmar and Norris, *The U.S. Nuclear Arsenal*, 199.
265 Polmar and Norris, *The U.S. Nuclear Arsenal*, 199.
266 Polmar and Norris, *The U.S. Nuclear Arsenal*, 39.
267 Polmar and Norris, *The U.S. Nuclear Arsenal*, 40.
268 Polmar and Norris, *The U.S. Nuclear Arsenal*, 40.
269 Polmar and Norris, *The U.S. Nuclear Arsenal*, 41.
270 Polmar and Norris, *The U.S. Nuclear Arsenal*, 45.
271 Polmar and Norris, *The U.S. Nuclear Arsenal*, 45.
272 Polmar and Norris, *The U.S. Nuclear Arsenal*, 47.
273 Polmar and Norris, *The U.S. Nuclear Arsenal*, 51.
274 Polmar and Norris, *The U.S. Nuclear Arsenal*, 52.
275 Polmar and Norris, *The U.S. Nuclear Arsenal*, 42.

			(3.4MT),[276] B28 (1.45MT),[277] B36, B39, B41 (25MT),[278] B43 (1MT),[279] B53 (9MT)[280]
		B-52	Mk6, B15, B28, B43, B53, B57 (0.02MT),[281] B61 (0.36MT),[282] B83 (1MT),[283] Hound Dogs (1.1MT),[284] SRAM (0.2MT),[285] ALCM (0.15MT)[286]
		B-58	B39, B53, B43
		FB-111A	B43, B57, B61, SRAM
		B-1B	B61-7 (0.36MT), B83 (1MT)
		B-2	B61, B83
UK	Sea-Based	Polaris A3	W58 (0.2MT)[287]
		Chevaline	TK-100 (0.04MT)[288]
		Trident II	W76 (0.1MT)[289]
	Air-Based	Valiant	Blue Danube (0.016MT)[290]
		Victor	Blue Danube, Red Beard, Yellow Sun Mk2 (1MT),[291] Blue Steel (1.6MT)[292]
		Vulcan	Blue Danube, Yellow

[276] Polmar and Norris, *The U.S. Nuclear Arsenal*, 44.
[277] Polmar and Norris, *The U.S. Nuclear Arsenal*, 49.
[278] Polmar and Norris, *The U.S. Nuclear Arsenal*, 53.
[279] Polmar and Norris, *The U.S. Nuclear Arsenal*, 54.
[280] Polmar and Norris, *The U.S. Nuclear Arsenal*, 58.
[281] Polmar and Norris, *The U.S. Nuclear Arsenal*, 60.
[282] Polmar and Norris, *The U.S. Nuclear Arsenal*, 61.
[283] Polmar and Norris, *The U.S. Nuclear Arsenal*, 68.
[284] Polmar and Norris, *The U.S. Nuclear Arsenal*, 204.
[285] Polmar and Norris, *The U.S. Nuclear Arsenal*, 208.
[286] Polmar and Norris, *The U.S. Nuclear Arsenal*, 202.
[287] Polmar and Norris, *The U.S. Nuclear Arsenal*, 190.
[288] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 163.
[289] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 168.
[290] John R. Walker, “British Nuclear Weapon Stockpiles, 1953-1978,” *The RUSI Journal* 156, no. 5 (2011): 68. Valiant bombers can carry the Blue Danube and the Red Beard gravity bomb (0.015MT), but I assume that all Valiant bombers carry the Blue Danube due to its greater yield.
[291] Richard Moore, “The Real Meaning of the Words: A Pedantic Glossary of British Nuclear Weapons,” UK Nuclear History Working Paper No. 1, Mountbatten Centre for International Studies, last modified March 2004, accessed October 20, 2019, http://nuclear-weapons.info/Working_Paper_No_1.pdf.
[292] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 148. Two Victor squadrons carry 16 Blue Steel missiles since 1963. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 149.

			Sun Mk1 (0.4MT)[293] and Mk2, Blue Steel,[294] WE 177A (0.01MT),[295] WE 177B (0.4MT)[296]
France	Land-Based	SSBS S2 SSBS S3	MR 31 (0.12MT)[297] TN 61 (1MT)[298]
	Sea-Based	MSBS M1 MSBS M2 MSBS M20 MSBS M4 MSBS M45	MR 41 (0.5MT)[299] MR 41 TN 60/61 (1MT) TN 70/71 (0.15MT)[300] TN 75 (0.1MT)[301]
	Air-Based	Mirage IVA/P	ASMP (0.3MT)[302]; AN 11 (0.06MT)/22 (0.07MT)[303]; AN 52 (0.025MT)[304]
		Mirage 2000N	ASMP
USSR/Russia	Land-based	SS-3 Shyster SS-4 Sandal SS-5 Skean SS-6 Sapwood SS-7 Saddler SS-8 Sasin	(0.3MT)[305] (2.3MT)[306] (2.3MT)[307] (5MT)[308] (6MT)[309] (5MT)[310]

[293] All Vulcan bombers are assumed to load the Yellow Sun Mk 1 bomb since 1959, when it entered service. Walker, "British Nuclear Weapon Stockpiles," 68.

[294] Three Vulcan squadrons carry 24 Blue Steel missiles since 1963. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 149. Between 1968 and 1970, three Vulcan squadrons stood down. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 96. I reduce one Blue Steel-equipped Vulcan squadron each year between 1968 and 1970.

[295] Walker, "British Nuclear Weapon Stockpiles," 68.

[296] Walker, "British Nuclear Weapon Stockpiles," 68.

[297] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 291.

[298] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 292.

[299] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 300.

[300] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 218.

[301] Federation of American Scientists, "M-4/M-45," last modified August 11, 2000, available at <https://fas.org/nuke/guide/france/slbm/m-4.htm>.

[302] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 288. The first Mirage IVP squadron equipped with ASMP in May 1986, and the second squadron acquired ASMP in December 1986. All three Mirage IVP were armed with ASMP by December 1987. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 231. I thus assume that 6 Mirage bombers had ASMP in 1986, 12 in 1987, and 18 in 1988.

[303] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 225.

[304] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 215.

[305] Podvig, ed., *Russian Strategic Nuclear Forces*, 178.

[306] Podvig, ed., *Russian Strategic Nuclear Forces,* 185.

[307] Podvig, ed., *Russian Strategic Nuclear Forces*, 188.

[308] Podvig, ed., *Russian Strategic Nuclear Forces*, 181.

[309] Podvig, ed., *Russian Strategic Nuclear Forces*, 190.

[310] Podvig, ed., *Russian Strategic Nuclear Forces*, 193.

SS-9 Scarp M1	(20MT)[311]
SS-9 Scarp M2	(10MT)[312]
SS-9 Scarp M3	(5MT)[313]
SS-9 Scarp M4	(2MT, x3 MRV)[314]
SS-11 Sego M1	(1.1MT)[315]
SS-11 Sego M2/M3	Mod2 (1MT); Mod3 (0.22MT, x3 MRV)[316]
SS-13 Savage	(0.8MT)[317]
SS-17 Spanker M1	(0.4MT)[318]
SS-17 Spanker M2	(0.5MT)[319]
SS-17 Spanker M3	(0.4MT)[320]
SS-18 Satan M1	(0.9MT)[321]
SS-18 Satan M2	(0.9MT)
SS-18 Satan M3	(0.9MT)
SS-18 Satan M4	(0.75MT)[322]
SS-18 Satan M5	(0.75MT)[323]
SS-19 Stiletto M1	(0.4MT)[324]
SS-19 Stiletto M2	(0.4MT)
SS-19 Stiletto M3	(0.4MT)
SS-20 Saber	(0.15MT)[325]
SS-24 Scalpel M1	(0.4MT)[326]
SS-24 Scalpel M2	(0.4MT)
SS-25 Sickle	(0.8MT)[327]

311 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67.

312 Podvig, ed., *Russian Strategic Nuclear Forces*, 198.

313 "R-36/SS-9 Scarp," *Federation of American Scientists*, last modified July 29, 2000, accessed November 25, 2019, https://fas.org/nuke/guide/russia/icbm/r-36.htm; Zaloga, *The Kremlin's Nuclear Sword*, 233.

314 "R-36/SS-9 Scarp," *Federation of American Scientists*, last modified July 29, 2000, accessed November 25, 2019, https://fas.org/nuke/guide/russia/icbm/r-36.htm; Podvig, ed., *Russian Strategic Nuclear Forces*, 198; Zaloga, *The Kremlin's Nuclear Sword*, 233.

315 Podvig, ed., *Russian Strategic Nuclear Forces*, 202.

316 Podvig, "The Window of Vulnerability That Wasn't," 128.

317 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

318 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

319 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

320 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

321 Podvig, ed., *Russian Strategic Nuclear Forces*, 218.

322 Podvig, ed., *Russian Strategic Nuclear Forces*, 218.

323 Podvig, ed., *Russian Strategic Nuclear Forces*, 218.

324 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

325 Warhead yield of a MIRVed version. Podvig, ed., *Russian Strategic Nuclear Forces*, 225; Zaloga, *The Kremlin's Nuclear Sword*, 238.

326 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

327 Norris and Kristensen, "Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles," 67; Podvig, "The Window of Vulnerability That Wasn't," 128.

		SS-27 Sickle	(0.8MT)[328]
	Sea-Based	R-11FM	(0.5MT)[329]
		SS-N-4	(1MT)[330]
		SS-N-5	(1MT)[331]
		SS-N-6 Serb	(1MT); (0.2MT, x3 MRV)[332]
		SS-N-8 Sawfly	(1MT)[333]
		SS-N-17 Snipe	(0.5MT)[334]
		SS-N-18 Stingray	(0.45MT); MIRV (3, 0.2MT); MIRV (7, 0.1MT)[335]
		SS-N-20 Sturgeon	(0.1MT)[336]
		SS-N-23 Skiff	(0.1MT)[337]
	Air-Based	Tu-4	(0.25-0.35MT)
		Tu-16	(0.25-0.35MT)
		Tu-95 Bear A	(0.25-0.35MT)
		Tu-95 Bear B/C	AS-3 (3MT)[338]
		Tu-95 Bear G	AS-4 (1MT)[339]
		Tu-95 Bear H (6/16)	AS-15 (0.25MT)[340]
		Tu-22	AS-4 (1MT)
		MYA-4 Bison	(0.25-0.35MT)
		Tu-26	AS-4 (1MT); AS-16 (0.35MT)[341]
		Tu-160 Blackjack	AS-15 (0.25MT)
South Africa	Air-Based	Buccaneer	(0.018MT)[342]
Israel	Land-Based	Jericho I	(0.02MT)[343]
		Jericho II	(1MT)[344]
	Sea-Based	Popeye Turbo	?
	Air-Based	F-16	?

[328] Norris and Kristensen, “Nuclear U.S. and Soviet/Russian Intercontinental Ballistic Missiles,” 67.
[329] Podvig, ed., *Russian Strategic Nuclear Forces*, 311.
[330] Podvig, ed., *Russian Strategic Nuclear Forces*, 314.
[331] Podvig, ed., *Russian Strategic Nuclear Forces*, 318.
[332] Podvig, ed., *Russian Strategic Nuclear Forces*, 321.
[333] Podvig, ed., *Russian Strategic Nuclear Forces*, 326.
[334] Podvig, ed., *Russian Strategic Nuclear Forces*, 329.
[335] Podvig, ed., *Russian Strategic Nuclear Forces*, 331.
[336] Podvig, ed., *Russian Strategic Nuclear Forces*, 334.
[337] Podvig, ed., *Russian Strategic Nuclear Forces*, 336.
[338] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 163.
[339] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 164.
[340] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 169.
[341] Weaponsystems.net, “KH-15,” accessed October 15, available at <https://weaponsystems.net/weaponsystem/HH08%20-%20AS-16%20Kickback%20(Kh-15).html>.
[342] Albright, “South Africa and the Affordable Bomb,” 45.
[343] CSIS Missile Defense Project, “Jericho 1,” *Missile Threat*, last modified June 15, 2018, available at <https://missilethreat.csis.org/missile/jericho-1/>
[344] CSIS Missile Defense Project, “Jericho 2,” *Missile Threat*, last modified June 15, 2018, available at <https://missilethreat.csis.org/missile/jericho-2/>

China	Land-Based	DF-2/2A	(0.02MT)[345]
		DF-3/3A	(3.3MT)[346]
		DF-4	(3.3MT)[347]
		DF-5	(5MT)[348]
		DF-21	(0.3MT)[349]
	Sea-Based	CSS-N-3	(0.3MT)[350]
	Air-Based	Tu-4	(0.04MT-3MT)
		Hong-5	(0.04MT-3MT)
		Hong-6	(0.04MT-3MT)
India	Air-Based	Jaguar	(0.015MT?)
		Mirage 2000H	(0.015MT?)
Pakistan	Air-Based	F-16	(0.012MT?)

345 Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 378.

346 Kristensen and Norris, "Chinese Nuclear Forces, 2015," 78.

347 Kristensen and Norris, "Chinese Nuclear Forces, 2018," 290.

348 Kristensen and Norris, "Chinese Nuclear Forces, 2015," 78.

349 Kristensen and Norris, "Chinese Nuclear Forces, 2018," 290.

350 Kristensen and Norris, "Chinese Nuclear Forces, 2016," 206; Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 396.

VIII. Multiple Warheads Delivery Platforms

This section shows information about how many nuclear warheads a delivery platform can load. In many cases, information about the number of nuclear warheads that are carried by strategic nuclear platforms is publicly available. The warheads that are delivered by the platforms with multiple reentry vehicles (MRVs) are counted as one, as these warheads aim at one target and do not hit multiple targets independently. If a given platform can carry both a single warhead or multiple warheads, I assume that the platform would carry multiple warheads in an all-out nuclear conflict. If various sources provide different estimations about the same platform, I try to rely on either the latest source or choose the most commonly reported value.

Table 6. Multiple Warheads Platforms

State	Platform	Year of Deployment	Number of Warheads
US	Minuteman III		3[351]
	Peacekeeper		10[352]
	Poseidon C3		10[353]
	Trident I		8[354]
	Trident II		8[355]
	B-36		1[356]
	B-47		1.5[357]
	B-52		2-16[358]
	B-58		4[359]

351 Polmar and Norris, *The U.S. Nuclear Arsenal*, 173.

352 Ibid., 176.

353 Each Poseidon normally carries only 10 nuclear warheads, though it technically can carry up to 14 warheads. Ibid., 190-91.

354 Ibid., 199.

355 Ibid.

356 Each B-36 bomber can carry technically two nuclear bombs. Ibid., 95. Following NRDC's counting assumption, however, I assume that each B-36 bomber carries one nuclear bomb. "Table of US Strategic Bomber Forces," *NRDC*, last modified November 25, 2002, accessed November 2, 2019, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp

357 Technically, each B-47 bomber can carry two nuclear bombs. Polmar and Norris, *The U.S. Nuclear Arsenal*, 96. However, following NRDC's assumption, I posit that each B-47 bomber carries 1.5 bombs. "Table of US Strategic Bomber Forces," *NRDC*, last modified November 25, 2002, accessed November 2, 2019, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp.

358 Each B-52 bomber can carry up to 20 missiles. Polmar and Norris, *The U.S. Nuclear Arsenal*, 100. Following NRDC's counting assumption, however, I posit that each B-52 bomber can carries the following warheads: 1956-1959: 2 bombs; 1960-62: 3.3 bombs; 1963: 4 bombs; 1964: 4.5 bombs; 1965: 5 bombs; 1966: 5.5 bombs; 1967: 6 bombs; 1968: 7 bombs; 1969-1971: 8 bombs; 1972-: 12 short-range attack missiles (SRAMs), air-launched cruise missiles (ALCMs), advanced cruise missiles (ACMs) and 4 bombs. In addition, each B-52 is assumed to carry two Hound Dog missiles first and then load gravity bombs during 1961-1975. Polmar and Norris, *The U.S. Nuclear Arsenal*, 100. It should also be noted that not all B-52 bombers since 1972 carry the equal number of nuclear warheads. Some B-52 load SRAMs, ALCMs, or ACMs; after all those missiles are loaded, the remaining B-52s are assumed to carry gravity bombs. For details, see "Table of US Strategic Bomber Forces," *NRDC*, last modified November 25, 2002, accessed November 2, 2019, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp.

359 Polmar and Norris, *The U.S. Nuclear Arsenal*, 103; "Table of US Strategic Bomber Forces," *NRDC*, last modified November 25, 2002, accessed November 2, 2019, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp.

	FB-111A	6[360]
	B-1B	8[361]
	B-2	20[362]
UK	Valiant	1[363]
	Victor	1-2[364]
	Vulcan	1-4[365]
	Trident II	3[366]
France	MSBS M4/M45	6[367]
USSR/Russia	SS-17 Spanker	4[368]
	SS-18 Satan M1/M2/M3	8[369]
	SS-18 Satan M4	10[370]
	SS-18 Satan M5	10[371]
	SS-19 Stiletto M1/M3	6[372]
	SS-20 Saber	3[373]
	SS-24 Scalpel	10[374]
	SS-N-18 Stingray	3[375]

[360] 6 SRAMs or 6 bombs. "Table of US Strategic Bomber Forces," *NRDC*, last modified November 25, 2002, accessed November 2, 2019, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp.

[361] Each B-1 bomber can carry up to 16 nuclear bombs. Following NRDC's counting assumption, however, I assume that each bomber can carry 8 nuclear bombs. "Table of US Strategic Bomber Forces," *NRDC*, last modified November 25, 2002, accessed November 2, 2019, https://web.archive.org/web/20041027183038/https://www.nrdc.org/nuclear/nudb/datab7.asp

[362] Polmar and Norris, *The U.S. Nuclear Arsenal*, 89.

[363] One Blue Danube bomb. Thunder and Lightnings, "Vickers Valiant: History," last modified November 20, 2016, accessed January 28, 2019, http://www.thunder-and-lightnings.co.uk/valiant/history.php

[364] A Victor bomber can carry either one Blue Steel missile or two gravity bombs. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 146.

[365] A Vulcan bomber can carry either one Blue Steel missile or four gravity bombs. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 144.

[366] Robert S. Norris and William M. Arkin, "British Nuclear Forces, 2001," *Bulletin of the Atomic Scientists* 57, no. 6 (2001): 79.

[367] Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, 304.

[368] Podvig, ed., *Russian Strategic Nuclear Forces*, 213; Podvig, "The Window of Vulnerability That Wasn't," 123.

[369] Podvig, ed., *Russian Strategic Nuclear Forces*, 218; CSIS Missile Defense Project, "SS-18 "Satan"," *Missile Threat*, last modified August 10, 2016, accessed November 1, 2019, https://missilethreat.csis.org/missile/ss-18/; Zaloga, *The Kremlin's Nuclear Sword*, 235.

[370] Podvig, ed., *Russian Strategic Nuclear Forces*, 218; CSIS Missile Defense Project, "SS-18 "Satan"," *Missile Threat*, last modified August 10, 2016, accessed November 1, 2019, https://missilethreat.csis.org/missile/ss-18/

[371] Podvig, "The Window of Vulnerability That Wasn't," 128; Podvig, ed., *Russian Strategic Nuclear Forces*, 218.

[372] Podvig, ed., *Russian Strategic Nuclear Forces*, 222. Mod 2 carries single warhead.

[373] Podvig, ed., *Russian Strategic Nuclear Forces*, 226; Zaloga, *The Kremlin's Nuclear Sword*, 238.

[374] Podvig, ed., *Russian Strategic Nuclear Forces*, 228.

[375] CSIS Missile Defense Project, "SS-N-18 "Stingray"," *Missile Threat*, last modified August 10, 2016, accessed November 1, 2019, https://missilethreat.csis.org/missile/ss-n-18/; Zaloga, The Kremlin's Nuclear Sword, 239. Some sources state that some SS-N-18 missiles carry seven warheads. See Podvig, ed., *Russian Strategic Nuclear Forces*, 331; Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 148. However, NRDC report considers three warheads as their counting assumption. "Table of USSR/Russian Ballistic Missile Submarine Forces," NRDC, last modified November 25, 2002, accessed November 1, 2019, https://web.archive.org/web/20041027183456/https://www.nrdc.org/nuclear/nudb/datab6.asp

SS-N-20 Sturgeon	10[376]
SS-N-23 Skiff	4[377]
Tu-4	1-2[378]
Tu-16	1-2[379]
Tu-95 Bear A	2[380]
Tu-95 Bear B/C	1[381]
Tu-95 Bear G	6[382]
Tu-95 Bear H6	6[383]
Tu-95 Bear H16	16[384]
Tu-22	1[385]
MYA-4 Bison	1-2[386]
Tu-26	1-10[387]
Tu-160 Blackjack	12[388]

[376] Podvig, ed., *Russian Strategic Nuclear Forces*, 334; "Table of USSR/Russian Ballistic Missile Submarine Forces," NRDC, last modified November 25, 2002, accessed November 1, 2019, https://web.archive.org/web/20041027183456/https://www.nrdc.org/nuclear/nudb/datab6.asp.

[377] Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 151; Podvig, ed., *Russian Strategic Nuclear Forces*, 336.

[378] Tu-4A carries one nuclear free-falling bomb. Tu-4K carries two KS-1 nuclear cruise missiles. Podvig, ed., *Russian Strategic Nuclear Forces*, 369.

[379] Various models of Tu-16 carry various combinations of gravity bombs and nuclear cruise missiles. Podvig, ed., *Russian Strategic Nuclear Forces*, 372.

[380] Each Tu-95A delivers two gravity bombs. Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 238.

[381] Each Tu-95B/C carries one AS-3 missile. Podvig, ed., *Russian Strategic Nuclear Forces*, 382. Though Tu-95B/C also can carry four bombs, I assume that a nuclear-tipped cruise missile is more suitable payload than gravity bombs, given that cruise missiles increase the bomber's survivability and the chance of a successful strike.

[382] Each Tu-95G carries four bombs and two AS-4 missiles. Cochran, Arkin, Norris, and Sands, *Nuclear Weapons Databook*, 238. "Table of USSR/Russian Strategic Bomber Forces," NRDC, last modified November 25, 2002, accessed November 1, 2019, https://web.archive.org/web/20041027183159/https://www.nrdc.org/nuclear/nudb/datab8.asp.

[383] Each Tu-95H6 carries 6 AS-15 missiles. Podvig, ed., *Russian Strategic Nuclear Forces*, 382; "Table of USSR/Russian Strategic Bomber Forces," NRDC, last modified November 25, 2002, accessed November 1, 2019, https://web.archive.org/web/20041027183159/https://www.nrdc.org/nuclear/nudb/datab8.asp.

[384] Each Tu-95H16 delivers 16 AS-15 missiles. Podvig, ed., *Russian Strategic Nuclear Forces*, 382; "Table of USSR/Russian Strategic Bomber Forces," NRDC, last modified November 25, 2002, accessed November 1, 2019, https://web.archive.org/web/20041027183159/https://www.nrdc.org/nuclear/nudb/datab8.asp.

[385] Each Tu-22 carries one AS-4 missile. Podvig, ed., *Russian Strategic Nuclear Forces*, 388.

[386] Each Bison bomber carries one or two nuclear bombs. Podvig, ed., *Russian Strategic Nuclear Forces*, 376.

[387] Podvig, ed., *Russian Strategic Nuclear Forces*, 392.

[388] Each Tu-160 bomber delivers up to 12 AS-15 missiles. Podvig, ed., *Russian Strategic Nuclear Forces*, 397.