VII. Pakistani nuclear forces

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According to SIPRI estimates, Pakistan possessed approximately 170 nuclear warheads as of January 2024—the same number as the previous year (see table 7.8, end of section). These weapons were assigned to Pakistan's nascent triad of aircraft, ground-launched ballistic and cruise missiles, and sea-launched cruise missiles. The development of several new delivery systems and Pakistan's growing accumulation of fissile material (see section X of this chapter) suggest that its nuclear weapon arsenal and fissile material stockpile are likely to continue to expand over the next decade, although projections vary considerably.[1]

The Pakistani government has never publicly disclosed the size of its nuclear arsenal. Limited official public data and exaggerated news stories about Pakistan's nuclear weapons mean that analysing the number and types of Pakistani warheads and delivery vehicles is fraught with uncertainty. SIPRI's estimates of Pakistan's nuclear forces thus come with less confidence than those for most other nuclear-armed countries.[2] The estimates in this section are based on the authors' analysis of Pakistan's nuclear posture and fissile material production, analysis of commercial satellite imagery, public statements by Western officials, and private conversations with Pakistani officials.

This section starts by outlining the role played by nuclear weapons in Pakistan's military doctrine. It then describes Pakistan's air-delivered and land-based weapons and the nascent sea-based capability.

The role of nuclear weapons in Pakistani military doctrine

Pakistan does not have a no-first-use (NFU) doctrine and reserves the right to use nuclear weapons first in wartime, primarily due to what it perceives as an asymmetry in the strength of its conventional forces relative to India. Pakistan has placed an emphasis on non-strategic nuclear weapons specifically in

[1] See e.g. Sundaresan, L. and Ashok, K., 'Uranium constraints in Pakistan: How many nuclear weapons does Pakistan have?', *Current Science*, vol. 115, no. 6 (25 Sep. 2018); Salik, N., 'Pakistan's nuclear force structure in 2025', Regional Insight, Carnegie Endowment for International Peace, 30 June 2016; and Jones, G. S., 'Pakistan's nuclear material production for nuclear weapons', Proliferation Matters, 16 Feb. 2021. See also Berrier, S., Director, US Defense Intelligence Agency, 'Worldwide threat assessment', Statement for the record, US Senate, Armed Services Committee, 26 Apr. 2021. On Pakistan's fissile material stockpile see Kile, S. N. and Kristensen, H. M., 'Pakistani nuclear forces', *SIPRI Yearbook 2019*; and International Panel on Fissile Materials, 'Pakistan', 31 Aug. 2021.

[2] Kristensen, H. M. and Korda, M., 'Estimating world nuclear forces: An overview and assessment of sources', SIPRI Commentary, 14 June 2021.

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response to India's 'Cold Start' doctrine.[3] While it has no NFU doctrine, Pakistan has regularly co-sponsored resolutions in the United Nations General Assembly with the stated aim of assuring non-nuclear-armed states that it would not use or threaten to use nuclear weapons against them.[4]

Pakistan has been pursuing the development and deployment of new nuclear weapons and delivery systems as part of its 'full spectrum deterrence posture' in relation to India.[5] In May 2023 an advisor to Pakistan's National Command Authority—which oversees the country's nuclear doctrine and weapon programmes—explained that 'full spectrum deterrence' denotes Pakistan's possession of 'strategic, operational, and tactical' nuclear weapons with a wide range of yields, and noted that these could be used against 'a full spectrum of targets' in India, including countervalue, counterforce and battlefield targets.[6]

Aircraft and air-delivered weapons

As of January 2024 Pakistan was estimated to operate a small stockpile of nuclear gravity bombs, with cruise missiles in development.

Two versions of the Ra'ad (Hatf-8) air-launched cruise missile (ALCM) were being developed to supplement this stockpile by providing the Pakistan Air Force (PAF) with a nuclear-capable stand-off capability at ranges of 350–600 kilometres.[7] Neither version was thought to have been operationally deployed as of January 2024.

[3] On the doctrine—under which India looks to maintain the capability to launch large-scale conventional strikes or incursions against Pakistani territory at a level below the threshold at which Pakistan would retaliate with nuclear weapons—see Kidwai, K., Advisor, Pakistani National Command Authority, Keynote address and discussion session, 7th South Asian Strategic Stability workshop, 'Deterrence, nuclear weapons and arms control', International Institute for Strategic Studies (IISS) and Centre for International Strategic Studies (CISS), London, 6 Feb. 2020; and Saalman, L. and Topychkanov, P., *South Asia's Nuclear Challenges: Interlocking Views from India, Pakistan, China, Russia and the United States* (SIPRI: Stockholm, Apr. 2021). For a US diplomatic assessment of India's 'Cold Start' strategy see Roemer, T., US Ambassador to India, 'Cold Start: A mixture of myth and reality', Cable New Delhi 000295, 16 Feb. 2010, accessible via WikiLeaks. Although Indian officials had previously denied the existence of the Cold Start doctrine, India's chief of the army staff acknowledged its existence in an interview in 2017. Unnithan, S., '"We will cross again"', *India Today*, 4 Jan. 2017.

[4] See e.g. United Nations, General Assembly, 'Conclusion of effective international arrangements to assure non-nuclear-weapon states against the use or threat of use of nuclear weapons', A/C.1/75/L.22, 7 Oct. 2020.

[5] Kidwai (note 3). For a detailed assessment of Pakistan's nuclear posture see Tasleem, S. and Dalton, T., 'Nuclear emulation: Pakistan's nuclear trajectory', *Washington Quarterly*, vol. 41, no. 4 (winter 2019). See also Kristensen, H. M. and Korda, M., 'Pakistani nuclear forces', *SIPRI Yearbook 2023*, p. 301.

[6] Kidwai, K., Advisor, Pakistani National Command Authority, Speech at '25 years of Yom Takbeer: Promoting Peace, Stability and Development' seminar, Arms Control and Disarmament Centre, Institute of Strategic Studies Islamabad, Islamabad, 24 May 2023.

[7] For further detail on the Ra'ad ALCM see Kristensen, H. M. and Korda, M., 'Pakistani nuclear forces', *SIPRI Yearbook 2021*, p. 387.

Pakistan has several types of combat aircraft with performance characteristics that make them suitable as nuclear-delivery platforms, including the Mirage III, the Mirage V, the F-16 and the JF-17. However, no official sources have confirmed their nuclear-capable roles. Given this significant uncertainty, SIPRI assesses that the Mirage III and possibly the Mirage V are the most likely to have a nuclear-delivery role. The Mirage III has been used for developmental test flights of the nuclear-capable Ra'ad ALCM, while the Mirage V is believed to have been given a strike role with Pakistan's small arsenal of nuclear gravity bombs.[8]

When the Mirage aircraft are eventually phased out, it is possible that the JF-17 will take over their nuclear role in the PAF and that the Ra'ad ALCM will be integrated on to the JF-17.[9] In March 2023 images emerged for the first time of a JF-17 carrying what resembled a Ra'ad ALCM, suggesting a potential dual-capable role for the aircraft—although this had not been officially confirmed as of January 2024.[10]

Land-based missiles

As of January 2024 Pakistan's nuclear-capable land-based missile arsenal comprised an estimated 126 short- and medium-range systems.

Pakistan has deployed four types of solid-fuelled, road-mobile short-range ballistic missile: the Abdali (also designated Hatf-2), the Ghaznavi (Hatf-3), the Shaheen-I/IA (Hatf-4) and the Nasr (Hatf-9). Except for the Abdali, all of these missiles were showcased at the annual Pakistan Day parades in 2021 and 2022 (the scheduled 2023 parade did not take place), suggesting that they are still operational.[11] The Abdali—Pakistan's oldest ballistic missile type—was not displayed at these parades and has not been tested since 2013, perhaps indicating that the missile is being superseded by newer systems.

The arsenal also included two types of operational medium-range ballistic missile: the liquid-fuelled, road-mobile Ghauri (Hatf-5); and the two-stage, solid-fuelled, road-mobile Shaheen-II (Hatf-6).[12] A longer-range variant in

[8] International Institute for Strategic Studies (IISS), *The Military Balance 2022* (Routledge: London, 2022), p. 297; and Dominguez, G., 'Pakistan test-launches longer-range variant of Ra'ad II ALCM', Janes, 19 Feb. 2020. For further detail on the nuclear capability of the F-16s see Kristensen, H. M. and Kile, S. N., 'Pakistani nuclear forces', *SIPRI Yearbook 2020*, p. 370.

[9] 'Ra'ad ALCM: The custodian of Pakistan's airborne nuclear deterrence', PakDefense, 6 Dec. 2020; and Pakistan Strategic Forum, 'Update on Pakistan: "JF-17 Thunder's integration with RA'AD II ALCM"', 8 July 2020.

[10] 'Pakistani Thunder', Scramble, 21 Mar. 2023.

[11] Pakistani Inter Services Public Relations (ISPR), 'Pakistan Day Parade: 23 March 2022', ISPR Official, YouTube, 24 Mar. 2022; and Pakistani Inter Services Public Relations (ISPR), 'Pakistan Day Parade: March 2021', ISPR Official, YouTube, 25 Mar. 2021.

[12] United States Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat 2020* (NASIC: Wright-Patterson Air Force Base, OH, July 2020), p. 25; and Pakistani Inter Services Public Relations (ISPR), 'Pakistan conducted successful training launch of surface to surface ballistic missile Shaheen-II', Press release no. PR-104/2019-ISPR, 23 May 2019.

development, the Shaheen-III, has been test launched at least three times—in 2015, 2021 and 2022—but was probably not yet deployed as of January 2024.[13] This missile has a claimed range of 2750 km, making it the longest-range system that Pakistan has tested to date. The Ghauri, Shaheen-II and Shaheen-III were all displayed at the Pakistan Day Parade in 2022.

In October 2023 Pakistan conducted its second test launch (and the first since 2017) of the Ababeel—a developmental medium-range ballistic missile that can reportedly deliver multiple independently-targetable re-entry vehicles (MIRVs).[14] The Pakistani government stated that the test was 'aimed at re-validating various design, technical parameters and performance evaluation of different sub-systems of the weapon system', suggesting that the Ababeel was probably not yet operationally deployed as of January 2024.[15] Pakistan's pursuit of MIRV technology is most likely a countermeasure to India's procurement of advanced ballistic missile defences, including the S-400 system acquired from the Russian Federation.[16]

In addition to expanding its arsenal of land-based ballistic missiles, Pakistan has continued to develop the nuclear-capable Babur (Hatf-7) ground-launched cruise missile, with an estimated range of 350 km.[17] The Babur has been test launched about 12 times since 2005 and has been used in army field training since 2011, indicating that the system is probably operational—although there is some uncertainty as to whether the nuclear version is also operational. An upgraded version, with a claimed range of 450 km, is known as the Babur-1A and was featured in the Pakistan Day Parade in 2022.[18] A version known as the Babur-2 (sometimes referred to as the Babur-1B) has a claimed range of 900 km and was tested most recently in December 2021.[19]

[13] Pakistani Inter Services Public Relations (ISPR), 'Shaheen 3 missile test', Press release no. PR-61/2015-ISPR, 9 Mar. 2015; Jamal, S., 'Pakistan tests nuclear-capable Shaheen-III ballistic missile', *Gulf News*, 20 Jan. 2021; and DG ISPR (@OfficialDGISPR), Twitter, 9 Apr. 2022, <https://twitter.com/OfficialDGISPR/status/1512710884518359042>.

[14] 'Pakistan conducts successful flight test of Ababeel weapon system', Radio Pakistan, 18 Oct. 2023; and Pakistani Inter Services Public Relations (ISPR), Press release no. PR-34/2017-ISPR, 24 Jan. 2017. The US Air Force's National Air and Space Intelligence Center also describes the 2017 test as involving 'the MIRV version of the Ababeel'. US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat 2017* (NASIC: Wright-Patterson Air Force Base, OH, June 2017), p. 25. On the Ababeel see also Kile and Kristensen (note 1), p. 335.

[15] 'Pakistan conducts successful flight test of Ababeel weapon system' (note 14).

[16] SIPRI Arms Transfers Database, Mar. 2024.

[17] US Air Force (note 14), p. 37.

[18] Pakistani Inter Services Public Relations, 'Pakistan Day Parade: 23 March 2022' (note 11); and Pakistani Inter Services Public Relations (ISPR), 'Press release no. PR24/2021, Pak conducted successful launch of Babur cruise missile—11 Feb 2021(ISPR)', ISPR Official, YouTube, 11 Feb. 2021.

[19] Pakistani Inter Services Public Relations (ISPR), 'Pakistan conducted a successful test of an enhanced range version of the indigenously developed Babur cruise missile', Press release no. PR-142/2018-ISPR, 14 Apr. 2018; Gupta, S., 'Pakistan's effort to launch 750km range missile crashes', *Hindustan Times*, 23 Mar. 2020; and Pakistani Inter Services Public Relations (ISPR), 'Pakistan conducted a successful test of an enhanced range version of the indigenously developed Babur cruise missile 1B', Press release no. PR-222/2021-ISPR, 21 Dec. 2021.

Overall, in 2022 and 2023 Pakistan conducted significantly fewer public missile test launches than in previous years, which may be related to Pakistan's ongoing political and military instability following the removal of Imran Khan as prime minister in 2022 and his subsequent arrest in 2023.[20]

Sea-based missiles

As part of its efforts to achieve a secure second-strike capability, Pakistan has sought to create a nuclear triad by developing a sea-based nuclear force. The Babur-3 submarine-launched cruise missile (SLCM) is intended to establish a nuclear capability for the Pakistan Navy's three Agosta-90B diesel–electric submarines.[21] Pakistan test-launched the Babur-3 in 2017 and 2018.[22]

[20] Turak, N., 'Former Pakistani Prime Minister Imran Khan arrested amid tensions with military', CNBC, 9 May 2023.

[21] Pakistani Inter Services Public Relations (ISPR), Press release no. PR-10/2017-ISPR, 9 Jan. 2017; and Panda, A. and Narang, V., 'Pakistan tests new sub-launched nuclear-capable cruise missile. What now?', The Diplomat, 10 Jan. 2017.

[22] Pakistani Inter Services Public Relations (ISPR), 'Pakistan conducted another successful test fire of indigenously developed submarine launched cruise missile Babur having a range of 450 kms', Press release no. PR-125/2018-ISPR, 29 Mar. 2018. Reports of a ship-launched cruise missile test in 2019 might have been for a different missile. Gady, F.-S., 'Pakistan's Navy test fires indigenous anti-ship/land-attack cruise missile', The Diplomat, 24 Apr. 2019.

Table 7.8. Pakistani nuclear forces, January 2024

All figures are approximate and some are based on assessments by the authors.

Type/designation	No. of launchers	Year first deployed	Range (km)[a]	Warheads x yield[b]	No. of warheads[c]
Aircraft[d]	*36*				*36*
Mirage III/V	36[e]	1998	2 100	1 x 5–12 kt bomb or Ra'ad-I/II ALCM[f]	36
[JF-17]	–	..	..	Ra'ad-I/II ALCM[f]	–
Land-based missiles	*126*[g]				*126*
Abdali (Hatf-2)	10	2002	200	1 x 5–12 kt	10
Ghaznavi (Hatf-3)	16	2004	300	1 x 5–12 kt	16
Shaheen-I/IA (Hatf-4)[h]	16	2003/2022	750/900	1 x 5–12 kt	16
Shaheen-II (Hatf-6)	24	2014	2 000	1 x 10–40 kt	24
Shaheen-III[i]	–	[2024]	2 750	1 x 10–40 kt	–
Ghauri (Hatf-5)	24	2003	1 250	1 x 10–40 kt	24
Nasr (Hatf-9)	24	2013	70	1 x 5–12 kt	24
Ababeel	–	..	2 200	[MRV or MIRV][j]	–
Babur/-1A GLCM (Hatf-7)[k]	12	2014/[early 2020s]	350/450	1 x 5–12 kt	12
Babur-2/-1B GLCM[l]	–	..	900	1 x 5–12 kt	–
Sea-based missiles					
Babur-3 SLCM	–	[2025]	450	1 x 5–12 kt	–
Other stored warheads[m]					[*8*]
Total stockpile	**162**				**170**[m]

.. = not available or not applicable; – = nil or a negligible value; [ ] = uncertain SIPRI estimate; ALCM = air-launched cruise missile; GLCM = ground-launched cruise missile; kt = kiloton; MIRV = multiple independently targetable re-entry vehicle; MRV = multiple re-entry vehicle; SLCM = sea-launched cruise missile.

[a] For aircraft, the listed range is for illustrative purposes only; actual mission range will vary according to flight profile, weapon payload and in-flight refuelling.

[b] The yields of Pakistan's nuclear warheads are not known. The 1998 nuclear tests demonstrated a yield of up to 12 kt. Since then, it is possible that boosted warheads have been introduced with a higher yield. There is no open-source evidence that Pakistan has developed 2-stage thermonuclear warheads.

[c] Aircraft and several missile types are dual-capable—that is, they can be armed with either conventional or nuclear warheads. Cruise missile launchers (aircraft and land- and sea-based missiles) can carry more than 1 missile. This estimate counts an average of 1 nuclear warhead per launcher. Pakistan does not deploy its warheads on launchers but keeps them in separate storage facilities.

[d] There are unconfirmed reports that Pakistan modified for a nuclear weapon-delivery role some of the 40 F-16 aircraft procured from the United States in the 1980s. However, it is assumed here that the nuclear weapons assigned to aircraft are for use by Mirage aircraft. When the Mirage IIIs and Vs are eventually phased out, it is possible that the JF-17 will take over their nuclear role in the Pakistan Air Force.

[e] Pakistan possesses many more than 36 Mirage aircraft, but this table only includes those that are assumed to have a nuclear weapon-delivery role.

[f] The Ra'ad (Hatf-8) ALCM has a claimed range of 350 km and an estimated yield of 5–12 kt. However, there is no available evidence to suggest that the Ra'ad has been deployed and it is therefore not included in the operational warhead count. In 2017 the Pakistani military displayed

a Ra'ad-II variant with a reported range of 600 km. It was test flown for the first time in 2020 and several additional flights will be needed before it becomes operational. In 2023 images emerged for the first time of a JF-17 carrying what resembled a Ra'ad ALCM, suggesting a potential dual-capable role for the aircraft—although this had not been officially confirmed as of Jan. 2024.

[g] Some launchers might have 1 or more missile reloads.

[h] It is unclear whether the Shaheen-IA has the same 'Hatf-4' designation as the Shaheen-I.

[i] The designation for the Shaheen-III is unknown.

[j] The Pakistani military claimed in 2017 that the Ababeel can deliver multiple warheads using MIRV technology, but does not appear to have provided any further information since then.

[k] Pakistan has been upgrading its original Babur GLCMs to Babur-1As by improving their avionics and target-engagement systems to hit both land and sea targets. The range of the original Babur is listed as 350 km by the US Air Force's National Air and Space Intelligence Center, while Pakistan claims that the range of the improved Babur-1A is 450 km.

[l] The Babur-2 GLCM is sometimes referred to as the Babur-1B.

[m] In addition to the *c.* 162 warheads estimated to be assigned to operational forces, SIPRI estimates that *c.* 8 warheads have been produced to arm future Shaheen-III missiles, for a total estimated stockpile of *c.* 170 warheads. Pakistan's warhead stockpile is expected to continue to increase.

Sources: Pakistani Ministry of Defence, various documents; US Air Force (USAF), National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat*, various years; International Institute for Strategic Studies, *The Military Balance*, various years; *Bulletin of the Atomic Scientists*, 'Nuclear notebook', various issues; and authors' estimates.