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PAKISTAN TESTS SHAHEEN-3 AND SHAHEEN-1A MISSILES

**Gp Capt Ravinder Singh Chhatwal (Retd.)
Senior Fellow, CAPS**



Image: Shaheen 1A being test fired from undisclosed test range in Pakistan.

Source: Inter Services Public Relations Pakistan, Press Release No PR382/2015-ISPR, December 15, 2015.

Introduction

In March 2015 Pakistan carried out the first test of its most advanced 2750 km range, Shaheen-3 Medium Range Ballistic Missile (MRBM)¹. The second test for this missile was carried out on December 11, 2015. The second test was closely followed by a test of its 900 km Short Range Ballistic Missile (SRBM) Shaheen1A, on December 15, 2015².

Shaheen-3 is an improved version of the 1500 km Shaheen-2 and can cover entire India. It is the longest range missile in Pakistan's inventory and is capable of carrying nuclear or conventional warheads. Shaheen-1A is an improved version of the 750 km Shaheen-1 missile. Pakistan has claimed that the Shaheen missile programme is indigenous but there are reports that Chinese engineers have helped Pakistan in the Shaheen-1 programme³. The Shaheen series of missiles are all solid fuel road



mobile systems. This article briefly discusses Pakistan's Shaheen missile programme.

Background

Pakistan started to develop knowledge on rockets in September 1961 when Pakistan Atomic Energy Commission (PAEC) set up the Space Sciences Research Wing and in the same month sent some of its engineers and scientists to NASA in USA for rocket launch training. On June 7, 1962, Pakistan successfully launched its first two stage rocket, Rehbar-1, from the Sonmiani Rocket Range. This was followed by another successful launch, two days later, of Rehbar-2, and thus set in motion Pakistan's sounding rocket program which provided the expertise for its future missile programmes.

In 1964 the Space Sciences Research Wing of PAEC was delinked from PAEC and new independent organisation named Space and Upper Atmosphere Research Commission (SUPARCO) was formed directly under the control of Pakistan's President. Later on in 1967 SUPARCO was brought under the control of the Scientific and Technical Research Division (S&TR) of the Pakistan Government. In 1981 President Zia-ul-Haq gave fresh impetus to the missile programme by granting autonomous status to SUPARCO. India's launch of the Prithvi surface to surface ballistic missile in 1988 spurred Pakistan to launch its own ballistic missiles and in 1989 the Hatf-1 and Hatf-2, solid propellant, short range ballistic missiles were

launched. Both these missiles benefited from the knowledge gained in launching sounding rockets in the 1960's for which NASA (National Aeronautics and Space Administration) of USA, assisted Pakistan. Hatf-1 and Hatf-2 did not meet Pakistan's requirements due to inaccuracies and limited range. Therefore, work on these missiles was stopped.

By 1987 Pakistan had developed its nuclear bomb with Chinese help⁴ but the only delivery system they had was the F-16 fighter and the Chinese A-5 attack aircraft. Fighter aircraft have limitations for nuclear delivery due to their limited range and capability to penetrate enemy air defence systems. To overcome these limitations, Pakistan felt an urgent need for ballistic missiles in its inventory for nuclear weapon delivery. Pakistan was also concerned about India's indigenous missile programme which was launched in 1983 as the Integrated Guided Missile Development Program (IGMDP). Since Pakistan's indigenous development was slow and speed was a priority, the only option for Pakistan was direct purchase from China. In 1992 Pakistan procured 34 M-11 SRBM's from China to diversify its delivery options. M-11 is the export version of the Chinese DF-11 SRBM. It is a single stage solid fuel mobile missile with an accuracy of 200 m CEP (Circular Error Probable) and has a maximum range of 320 km.

Pakistan's Missile Force

Pakistan's missile force consists of both liquid fuelled systems and solid fuel missiles. The liquid fuel programme was under the infamous Dr AQ Khan at the Khan Research Laboratories (KRL). It has been reported that KRL procured direct off the shelf No Dong missiles from North Korea and labelled them as the Ghauri (Hatf-5)⁵. The No Dong missiles were based on Chinese missile designs. The Chinese used the North Koreans to transfer liquid fuel missiles and technology to Pakistan. While the liquid fuel programme was under Dr AQ Khan, Pakistan's solid fuel programme was being run by PAEC simultaneously, with Chinese assistance, under the leadership of Dr Samar Mubarakmand. The solid fuel missiles in Pakistan's inventory are the Ghaznavi (Hatf-3), Abdali (Hatf-2), Nasr (Hatf-9) and the Shaheen series. Abdali is a 180-200 km indigenous missile and Nasr is a recently developed indigenous 60 km range battle field tactical nuclear weapon which was first tested in 2011. The Ghaznavi missile is apparently a "repainted" Chinese M-11⁶.

Shaheen Missile Programme

Shaheen-1 (Hatf-4) missile was developed in the years from 1993-1997. The missile looks similar to a scaled up version of the Chinese M-11 missile. The Chinese are reported to have sold a complete M-11 plant to Pakistan which was built on a turnkey basis at Tarwanah on the outskirts of Rawalpindi. This plant is being used

for producing missiles in Pakistan. The first test of Shaheen-1 was done in 1999 and the missile entered service with the Strategic forces Command of Pakistan Army in 2003. Shaheen-1 is a single stage solid fuel missile with inertial guidance. The missile warhead is about 700 kg and can carry probably up to 35 kT of nuclear warhead. The missile accuracy is about 200 m CEP⁷. An improved version of Shaheen-1, which has been labelled Shaheen-1A and has a range of 900 km, was tested in 2013 and again in 2015.

Shaheen-2 (Hatf-6) is a two stage solid fuel 1500 km⁸ range missile with a 1000 kg warhead. The missile has an accuracy of 350 m CEP with inertial navigation guidance system and probably is fitted with terminal guidance system also⁹. The Pakistanis have claimed that the warheads of both Shaheen-1 and Shaheen-2 separate after re-entry. Pakistan has also claimed that they have indigenously produced solid fuel and other parts of the missile but these claims are suspect. According to American intelligence the Chinese have provided Pakistan with special steels, missile engines, guidance technology, training and technology for producing solid fuel¹⁰. Chinese assistance is critical for Pakistan's missile programme because Pakistan does not have the technical capabilities to execute such projects on their own.

Shaheen-3 is an upgraded version of the Shaheen-2 with an increased range of 2750 km. Pakistan's press release announcing the test of

Shaheen-3 in 2015 did not give any details on its performance other than the maximum range of 2750 km but it is likely to have used the same Transporter Erector Launcher (TEL) vehicles used for earlier variants. Shaheen-3 being a solid fuel missile will perhaps replace the liquid fuel obsolete Ghauri missile. Liquid fuel missiles are inherently more cumbersome and require long missile preparation time compared to the short time required for solid fuel missiles.

Comments

Pakistan's missile developments have all along been focussed against India whereas India has to take into account the Chinese threat also. In a short period, since the 1990s, Pakistan has been able to acquire missiles and missile technology from China and from China's proxy - North Korea. Pakistan's Shaheen series of missiles are based on China's DF (Dongfeng, meaning East Wind) series of ballistic missiles. It is likely that Pakistan may have internalised some capabilities to manufacture missiles but Pakistan's missile development will continue to bank on Chinese assistance. Shaheen-1 and Shaheen-2 are both operational in the Pakistan Army. Shaheen-3 and Shaheen-1A are still under development and are likely to be inducted in the next one or two years. Pakistan at present has a small missile force with a total of about 86 missile launchers which includes 16 Shaheen1 and about 8 Shaheen-2 launchers¹¹. Against these India has a total of about 56 missile launchers

out of which the solid fuel Agni class SRBM/MRBM's are about 32 (20 Agni-1 700 km range, 8 Agni-2 2000 km range and 4 Agni-3 3200 km range launchers)¹². India needs to increase its missile inventory to meet threats from both China and Pakistan.

Reports indicate that Pakistan is increasing its inventory of nuclear warheads at a furious pace and has about 110 to 130 nuclear warheads in its inventory and is expected to have about 220 to 250 nuclear warheads by 2025¹³. Pakistan will have to produce more nuclear capable missiles to meet the requirement for additional warheads. This is a development which India will have to monitor. India's plans to deploy its own BMD system and to procure S-400 surface to air missiles (SAM) from Russia will counter the Pakistani missile threat. The S-400 has ABM (Anti Ballistic Missile) capability. S-400 can engage ballistic missiles in the terminal phase, up to a distance of 60 km and travelling at speeds of approximately 5000 m/s (14.7 mach)¹⁴. Normal terminal speed of a ballistic missile is about 5000 m/s. India's BMD will make it more costly for Pakistan to produce more advanced missiles and penetrate the Indian BMD shield. Whether Pakistan understands the dangers of getting into a nuclear arms race against India, or not, is a moot point but the Cold War is a pointer as to how this slippery path led to the collapse of the Soviet Union.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily

reflect the position of the Centre for Air Power Studies [CAPS])

Notes

¹ Pakistan Inter Services Public Relations press release, "Shaheen-3 Missile Test", March 9, 2015, https://www.ispr.gov.pk/front/main.asp?o=t-press_release&date=2015/3/9 , accessed on November 6, 2015.

² Pakistan Inter Services Public Relations press release No PR382/2015-ISPR, dated December 15, 2015, https://www.ispr.gov.pk/front/t-press_release.asp?id=3130&print=1 , accessed on January 15, 2016.

³ IHS Jane's Weapons: Strategic 2014-15, p. 68.

⁴ Federation of American Scientists website, "Pakistan Nuclear Weapons: A Brief History of Pakistan's Nuclear Program", <http://fas.org/nuke/guide/pakistan/nuke/> , accessed on October 16, 2015.

⁵ IHS Jane's Weapons: Strategic 2014-2015.

⁶ IHS Jane's Weapons: Strategic 2014-2015.

⁷ IHS Jane's Weapons: Strategic 2014-2015, p. 69.

⁸ Pakistan Inter Services Public Relations press release No PR248/2014-ISPR, dated November 13, 2014, https://www.ispr.gov.pk/front/main.asp?o=t-press_release&date=2014/11/13#pr_link2701 , accessed on January 15, 2016.

⁹ IHS Jane's Weapons: Strategic 2014-2015, p. 72.

¹⁰ Jane's Intelligence Review, "New details for Shaheen-2," January 1, 2001.

¹¹ Hans M. Kristensen and Robert S. Norris, "Pakistani nuclear forces,2015", Bulletin of the Atomic Scientists, Nuclear Notebook, <http://fas.org/wp-content/uploads/2015/10/Nov-Dec-Pakistan-FINAL.pdf> , accessed on January 20, 2016.

¹² Hans M. Kristensen and Robert S. Norris, "Indian nuclear forces,2015", Bulletin of the Atomic Scientists, Nuclear Notebook, <http://bos.sagepub.com/content/71/5/77.full.pdf+html>, accessed on January 20, 2016.

¹³ Ibid. n-11.

¹⁴ "Jane's Land Based Air Defence Systems 2013-2014".