**Table of Pakistani Nuclear Forces, 2002**

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| **Type/Designation** | **Range (km)** | **Payload (kg)** | **Comment** |
| ***Aircraft*** | | | |
| F-16A/B | 1,600 | 5,450 | At Sargodha AB |
| ***Missiles*** | | | |
| Ghauri I (Hatf-5) | 1,300-1,500 | 500-750 | Basically North Korean No Dong missile |
| Ghauri II (Hatf-6) | 2,000-2,300 | 750-1,000 | Test-fired on April 14, 1999 |

**NOTES**

It is extremely difficult to estimate the number and types of nuclear weapons in the Pakistan arsenal. Outside experts estimate the number at between 24 and 48 nuclear weapons. Their implosion design uses a solid-core of highly enriched uranium rather than plutonium, requiring an estimated 15-20 kg of HEU per warhead. Seismic measurements of the tests conducted on May 28 and 30 suggest that the yields were on the order of 9-12 kilotons and 4-6 kilotons respectively, lower than what the Pakistan government announced. Early Chinese tests in the 1960s used similar designs and it is suspected that the Chinese assisted Pakistan to develop its program in the 1970s and 80s. Over a 20-year period Pakistan pursued a gas centrifuge uranium-enrichment method to produce the material for its nuclear weapons, at what is now known as the Abdul Qadeer Khan Research Laboratories in Kahuta. There is some uncertainty about how many centrifuges Pakistan has and thus how much weapon-grade uranium has been produced. By the early 1990s some 3,000 centrifuges were thought to be operating. The most careful estimate is that Pakistan has produced enough fissile material for 30-52 nuclear weapons. A moratorium on the production of highly enriched uranium was declared in 1991. It is unclear when production resumed but it is thought to have been well before the May 1998 nuclear tests.

Like the other nations that have developed nuclear weapons Pakistan does not seem content with just a first generation nuclear weapon and may be pursuing other designs and refinements. The 40-50 megawatt thermal Khushab reactor constructed at Joharabad in the Khushab district of Punjab has the capability to produce weapon-grade plutonium that could be used for nuclear weapons. Loading the reactor's target materials with Lithium-6 could produce tritium. Producing plutonium provides the Pakistan military with several options: making weapons with plutonium cores, mixing plutonium with HEU to make composite cores, or using tritium for "boosting." Separation of the plutonium is reported to take place at the "New Labs" reprocessing plant next to the Pakistan Institute of Nuclear Science and Technology (PINSTECH) at Rawalpindi. Through these efforts Pakistan seems to be positioning itself to increase and enhance its nuclear forces significantly in the coming years, especially if they try to match India's plan to deploy a nuclear triad of "aircraft, mobile land-based missiles and sea-based assets."

The aircraft in the Pakistani Air Force that is most likely to be used in the nuclear weapon delivery role is the U.S. manufactured F-16, although other aircraft, such as the Mirage V or the Chinese-produced A-5, also could be used. Twenty-eight F-16A (single-seat) and 12 F-16B (two-seat) trainers were delivered to the Pakistani Air Force between 1983 and 1987. At least eight of the original order are no longer in service. In December 1988 Pakistan ordered 11 additional F-16A/Bs as attrition replacements but to date they have not been delivered because of the Pressler Amendment, which forbids military aid to suspected nuclear weapon states. The U.S. Government announced on October 6, 1990 that it had embargoed any further arms deliveries to Pakistan. The 11 embargoed aircraft are being stored in the Arizona desert near Davis-Monthan AFB. In September 1989 plans were announced for Pakistan to acquire 60 more F-16s. Of that order 17 were built by the end of 1994, but because of the embargo they joined the others at Davis-Monthan and have not been delivered. And they are unlikely to be even under the new relationship between the U.S. and Pakistan in the war against terrorism.

The F-16s most likely to have been modified to carry nuclear weapons are deployed with Squadrons 9 and 11 at Sargodha AB, 160 km northwest of Lahore. The F-16 has a range of over 1,600 km, or more if drop tanks are used. It can carry up to 5,450 kg externally on one under-fuselage centerline pylon and six under-wing stations. Given the F-16's payload constraint of weight and size the bomb probably weighs around 1,000 kg and would most likely be attached to the centerline pylon. The assembled nuclear bombs and/or bomb components for these planes may be stored in a nearby ammunition depot to Sargodha. An alternative possibility is that, fearing a first strike by the Indians if war were to break out, the weapons are stored at other operational or satellite bases further to the west, near the Afghanistan border, where the F-16s would disperse to pick up their bombs. It has also been reported that M-11 missiles may be stored at the depot near Sargodha.

According to Pakistani bomb designer A. Q. Khan, the Ghauri missile is currently the only nuclear-capable missile, although other missiles in the Pakistani armed forces could be configured to carry a nuclear warhead. The single-stage Ghauri I was first flight-tested on April 6, 1998 to a distance of 1,100 km, probably with a payload of up to 700 kg. The missile was reportedly launched near the city of Jhelum in northeastern Pakistan, 100 kilometers southeast of Islamabad, and impacted the target near Quetta in the southwest. The liquid-fuelled Ghauri is basically a North Korean No Dong missile, itself a Scud derivative. A two-stage Ghauri II was tested on April 14, 1999, three days after the Indian Agni II test flight. It was launched from a mobile launcher at Dina, near Jhelum, and landed after an eight-minute flight in Jiwani, near the coast in the southwestern Baluchistan province. A third version of the Ghauri, with an unconfirmed range of 2,500 to 3,000 km is under development and was test launched on August 15, 2000. The choice of the name Ghuari is highly symbolic. Muslim Sultan Muhammad Ghauri defeated the Hindu ruler Prithvi Raj Chauhan in the year 1192. Prithvi is the name India has assigned to its short-range ballistic missiles.

Pakistan obtained approximately 30 or more complete M-11 missiles from China beginning in 1992. Subsequently it has had Chinese assistance in constructing maintenance and storage facilities and may produce its own missile, the Tarmuk, based on the M-11. Pakistan has also reverse-engineered the Chinese M-9 missile. That missile, called the Shaheen-I (Eagle), has a range of 700 km, can carry a payload of 1,000 kg. Pakistan conducted the initial flight test of the Shaheen from the coastal town of Sonmiani on April 15, 1999. The two-stage Shaheen-II medium-range missile, which was unveiled at the Pakistan Day parade on March 23, 2000, is said by the Pakistani government to have a range of 2,500 km and carry a 1,000 kg payload. The missile is carried on a 16-wheel mobile launcher similar to the Russian MAZ-547V used to transport the Soviet Union's SS-20 prior to 1987. Neither missile is reported to have a nuclear capability at this time, though that could change.

In November 2000 Pakistan placed its key nuclear institutions under the control of the National Command Authority established in February 2000, in an apparent effort to create an effective nuclear command and control system. After the terrorist attacks on September 11 a great deal of attention was focused on the security of the Pakistani arsenal. According to press reports the Pakistani military began relocating nuclear weapon components within two days of the attacks on New York and Washington. One potential danger to the arsenal involves extremist Islamic elements within the intelligence service, the armed forces, the nuclear weapons program, and in the population at large. Musharraf took several actions in the Fall of 2001 to mitigate these problems, including firing his intelligence chief and other officers, detaining several suspected retired nuclear weapon scientists, and redeploying the arsenal to at least six secret new locations.