



Overview of Military Explosives

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Selected Explosives

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Russian Vacuum Bomb

Aviation Thermobaric Bomb of Increased Power (ATBIP)

"Father of all Bombs" (Sept 2007)

Explosive charge 7100 KG

TNT Equivalent = 44 metric tons

Destructive Radius = 300 meters (984 feet or a diameter of 1,968 feet)

U.S. Vacuum Bomb

Massive Ordnance Air Blast (MOAB)

"Mother of all Bombs"

Explosive charge 8480 KG

TNT Equivalent = 11 tons

Destructive Radius = 150 meters (489 feet or a diameter of 978 feet)

Mechanism¹

The term thermobaric is derived from the Greek words for "heat" and "pressure".

A thermobaric explosive consists of a container of a finely powdered solid fuel of differing particle size mixed with a low percentage of oxidizer and binder. Unlike conventional weapons, the thermobaric weapon is a type of explosive that utilizes oxygen from the surrounding air to generate an intense, high-temperature explosion, and in practice, the blast wave such a weapon produces is typically significantly longer in duration than a conventional condensed explosive.

Other terms used for this family of weapons are high-impulse thermobaric weapons (HITs), heat and pressure weapons, vacuum bombs, or fuel-air explosives (FAE or FAX).²

Vacuum bombs differ from conventional bombs in that they use oxygen from the atmosphere as opposed to carrying an oxidizing agent in their explosives.³ First tested by the Russians in 2007, the formal name of the device was the Aviation Thermobaric Bomb of Increased Power (ATBIP).

Having a TNT-equivalent of 44 metric tons (vs. the Hiroshima atomic bomb having had a TNT-equivalent of 15 metric tons), it was the largest non-nuclear device in existence at the time, purportedly four times as powerful as the U.S. military's GBU-43/B Massive Ordnance Air Blast bomb ("MOAB"), informally called the "Mother of All Bombs". In a game of one-upmanship, the Russians named their device the "Father of All Bombs" as a jab against the Americans.

In a vacuum bomb, the propellant is dispersed into the surrounding air and then ignited. In doing so, the blast range is greatly extended as is the thermal properties of the explosion. The resultant effects are a blast wave traveling over two miles per second (three kilometers per second) and blast temperatures of 5,000°F (2,800°C).⁴

This change in detonation methodology gave the Russian vacuum bomb a destructive blast radius of 300 meters (984 feet), equivalent to a blast area the size of nine square city blocks. In such an explosion, the greatest amount of damage was inflicted by a supersonic shockwave and extremely high temperatures. This had the effect of incinerating everything within close proximity to the blast.

Following the Nuclear Non-Proliferation Treaty of 1968, Russia began manufacturing RVB's in earnest as a way to bolster their arsenal without violating the treaty. After 30 years, they had created a substantial arsenal in excess of 350 RVB's. The theory was that their use in a global conflict would allow for the effective devastation of the enemy without any accompanying nuclear fallout.

Semtex

Semtex is a plastic explosive invented in the late 1950's by Stanislav Brebera, a chemist at VCHZ Synthesia, Czechoslovakia and widely found in the Middle East.

Semtex was very similar to other plastic explosives, especially C-4, in being highly malleable; but it is usable over a greater temperature range than other plastic explosives, since it stays plastic between -40 and +60 °C. It is also waterproof. The explosive was widely exported, notably to the government of North Vietnam, Libya; Ireland, and to Islamic militants in the Middle East.⁵

¹ http://www.worldlingo.com/ma/enwiki/en/Thermobaric_weapon

² http://en.wikipedia.org/wiki/Thermobaric_weapon

³ http://en.wikipedia.org/wiki/Father_of_All_Bombs

⁴ http://www.worldlingo.com/ma/enwiki/en/Thermobaric_weapon

⁵ <https://en.wikipedia.org/wiki/Semtex>