

Rockets and Missiles



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SA-2 Missile on Transporter



Source: Space History

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The SA-2 missile is the most widely used air defense missile in the world. It is known in the West by its NATO code name, SA-2 Guideline (SA meaning surface-to-air) but in the former USSR was called the Dvinia, after the name of a river. Since it became operational in 1959, the SA-2 was used not only by the Soviet Union but virtually all its client states including Afghanistan, Albania, Algeria, Bulgaria, the People's Republic of China, Cuba, Czechoslovakia, Egypt, the former East Germany, Hungary, India, Indonesia, Iraq, Jordan, North Korea, Libya, Mongolia, Peru, Poland, Romania, Somalia, Syria, the former North Vietnam, North and South Yemen, and the former Yugoslavia.

Several of these countries made their own modifications of the missile or missile system with corresponding new names for their systems. There were also many variants of the original Soviet version of the missile. Advanced versions of the SA-2 are still in use even after the close of the Cold War. The SA-2 has also been fired in anger more times than most any missile, after the V-1 of World War II fame. It is estimated 13,000 have been

fired in battle.

To the Americans, the most famous use of the SA-2 was when one downed the U-2 spy plane of Francis Gary Powers in 1960, while in 1961 SA-2 missiles were shipped to Cuba by the USSR which led to the Cuba Missile Crisis. The Americans faced the SA-2 in combat during the Vietnam War.

The SA-2 shown here is the SA-2B Mod 1, one of the more common export types and dates to 1969. It was used in a Middle East campaign, probably from Egypt during the Arab-Israeli conflict of 1972, or Yom Kippur War of 1973. Other Soviet designations of this model are the V-750 or V-750VK and the 11DMK as seen by its Cyrillic serial number on the side, 11DMKUS20, the 11DMK being the export version of the 11DM (the "k" means "kommercheskiy," or "export"). For the same reason, the handling and caution instructions on the missile and transporter are both in Cyrillic (Russian lettering) and English since English is the second language for several of the former USSR's client states in the Middle East.

The trailer, or transloader semi-trailer is a standard one for all models of the SA-2s. It was not used for launching the missile but for transporting it to a launching site on the battlefield and made the system very mobile. The transloader was usually hauled by a ZIL-157 cross-country truck.

The SA-2 has a maximum range of about 31 miles, a maximum operating altitude of 80,000 ft, and speed of Mach 3.5. It usually carried a high explosive warhead of 287 lbs, though nuclear versions are also known.

Construction:

Slender, cylindrical body of 2-stages, each with four large, cropped delta fins. The first, larger diameter stage is the solid-propellant booster and has a large protruding exhaust nozzle at the rear. The second stage is the liquid-propellant sustainer and ends with a pointed nose.

Dimensions:

L.: 35 ft
 Dia., Booster: 2.3 ft
 Dia., Sustainer (2nd stage): 1.6 ft
 Span: Booster, 7.2 ft
 Span: Sustainer (2nd stage): 5.6 ft
 Launch Wt.: 5,070 lbs

History:

The development of the Dvina began in 1952-1953 and was administered by the Ministry of Aircraft Production (MAP), with the overall management carried out by the Lavochkin OKB (Special Design Office), headed by Petr D. Grushin, an aircraft designer. The engine development is believed to have been undertaken by the Soviet rocket engine designer Alexei Isayev at Khimki. The missile was to be a great improvement over the SA-1 Guild in that it was to be more mobile, had an increased maximum altitude capable of reaching the newer generation of American bombers, and took advantage of then new developments in early warning radar.

The first tests of the Dvina were made about 1954 near Lake Balkash, Central Asia. It was soon seen that the Dvina was far superior to the SA-1 Guild which was developed about the same time and quickly replaced it. Deployment was ready about 1957 and it first appeared in public in a parade in Red Square on November 7, 1957, towed by ZIL-157 trucks. It was then that the missile also received its NATO code name of SA-2.

Full scale deployments of the missile began in Moscow, Baku, and Leningrad by 1958, and its first foreign deployment took place in East Germany, near Berlin, by the summer of 1959.

The Dvinia's booster burns for 4-5 seconds, then drops off, while the sustainer's main stage is ignited and burns kerosene and red fuming nitric acid and burns for 22 seconds.

The guidance system uses an automatic radio command of the missile to the target's line of sight. The Dvina system consisted of the missile, a computer unit, a radar called the Fan Song which detected the target and transmitted the data to the missile then converted the signals into the right launch commands such as launch angle, and the power generator on the ZIL-157 truck.

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