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Weapons Tested in Syria: Russia's Pantsir S2 Mobile Air Defense Missile Gun System

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This February Russia deployed a new version of the Pantsir S2 air defense system to its Khmeimim airbase in Syria.

This is the newest short-to-medium range, mobile, fully autonomous system in Russia's inventory designed to protect infrastructure and troops.

The system is an "engagement cupola" with a 40 km radius and a 15 km height. The combined missile + 30 mm autocannon setup makes it an effective weapon against aircraft, cruise missiles, helicopters, anti-radiation missiles, ballistic missiles, rockets and even artillery shells. The list includes high velocity targets flying at over 3600 km/h, "stealth" aircraft and unmanned aerial vehicles (UAV).

The armament consists of 12 surface-to-air guided missiles and two 30 mm automatic guns. The reaction time is 4–6 seconds.

The new 57E6-E missile installed on the Pantsir SM2 version can shoot down airborne targets flying up to Mach 3 (1,000 m/s) at ranges between 1.2 to 20 kilometers and altitudes varying from 5 to 10,000 meters. Minimal range is 1 km. Maximum altitude is 8 km. Also noteworthy is the heavy weight of the warhead (16–20 kg) at the small launch weight of the missile (90 kg), along with the employment of rod subprojectiles in the warhead ensuring positive engagement of a broad class of targets. The warhead has a form of "continuous rod". The effectiveness of elongated rod warhead is proportional to warhead length and inversely proportional to warhead diameter. The missile is believed to have a hit probability of 70–95% and have a 15-year storage lifetime in its sealed containers.

The two automatic anti-aircraft 30 mm guns deliver a maximum rate of fire between 4,500 and 5,000 rounds per minute. The gun system is able to take out targets at ranges between 200 to 4,000 meters at altitudes between zero and 3,000 meters. The probability of destroying a target is 0.6 to 0.8 depending on its type and obstacles. The time of response is 5-6 seconds. Maximum rate of fire: 2,500 rounds per minute per gun. Ammunition: 700 rounds per gun.

The Pantsir-S2 fire control system includes a target acquisition radar and a dual waveband tracking radar (designation 1RS2-1E for export models), which operates in the UHF and EHF waveband. Detection range is 32–36 km and tracking range is 24–28 km for a target with 2 m2 radar cross section. The multi-range target acquisition system is capable of detecting aerial targets with effective surface of dispersion of up to 2-3 square meters at a distance of around 40 kilometers and tracking them down from a distance of over 24 kilometers. It can also operate in a passive mode using an infrared channel in the long-wave band with logical processing of the signal and automatic tracking. The system can fire at two targets at the same time and attack up to 12 targets within a minute.

The Pantsir system also has a limited capability against ground targets and fires armor-piercing projectiles.

The new SOTS S-band search radar installed on the Pantsir S2 version increases detection range from 30 km to over 40 km. The system can track more than 40 incoming targets. It can engage targets traveling at up to 1,200 meters per second. Search azimuth is 90 degrees.

The combat vehicle – the KamAZ-6560 heavy truck using 8x8 chassis – allows to fire the missiles on the move. The truck is powered by a turbocharged diesel engine (400 horsepower). It has a full-time all-wheel drive and is fitted with a centralized tire pressure regulation system. The vehicle is operated by a crew of three, including a commander, an operator and a driver.

The Pantsyr-S2 combat vehicle can operate in a standalone mode without any external support. Up to 3–5 combat vehicles can be used in a battery, where one of the vehicles operates as a command post and sends target data to other vehicles. These combat vehicles can also operate in conjunction with a separate air defense command post and early warning radar.

Also there are a number of support vehicles, such as a reloading vehicle, electronic and mechanical maintenance vehicles, a mobile workshop and a mobile trainer.

Summing it all up, these are some of the system's selling points:

• the system has the capability to carry out anti-munitions missions,

• it can hit targets overwater/above-water,

• the system can operate in fully automatic mode,

• it boasts the ability to work in a completely passive mode,

• it can fire missiles and gun armament in motion,

• the system can be set up with its radars orientated in opposing directions so that they can together provide 360o target scanning coverage,

A naval version is under development and will be used on future warships of the Russian Navy.

Pantsir systems will be depl on the Russian aircraft carrier Admiral Kuznetsov.

Russian destroyers and other large ships will be modernized to accommodate the system.

The Pantsir S2 Arctic version can operate at a temperature of −50° Celsius. After testing, it was decided to design a new version specifically for the Arctic, to use at temperatures below −50° Celsius.

The S2 predecessor – the Pantsir S1 version – is a big market success. Russia currently sells it to eight countries, including Brazil, Syria, United Arab Emirates and most recently, Iraq, which plans to use the system in the fight against the Islamic State jihadist group. The upgraded version went into service with the Russian Armed Forces only in 2015. Some specifications are still kept secret. Being a brand new weapon, Panzir S2 has already seen combat in Syria being deployed at Khmeimim to provide close-in defence against cruise missiles and other forms of precision-guided munitions.

Russia is an uncontested leader in ground based air defense systems with ballistic missile defense capability. Its military has surface to air missile systems for every possible mission to operate in any scenario. Among them, Pantsir S2 stands out due to its unique combination of rapid fire guns and sophisticated missiles. According to British *Business Insider*, the Pantsir family systems are included in to the list of Russia's ten most formidable weapons.