

= Arena (countermeasure) =

Arena (Russian : ?????) is an active protection system (APS) developed at Russia 's Kolomna @-@ based Engineering Design Bureau for the purpose of protecting armoured fighting vehicles from destruction by light anti @-@ tank weapons , anti @-@ tank guided missiles (ATGM) , and missiles with top attack warheads . It uses a Doppler radar to detect incoming warheads . Upon detection , a defensive rocket is fired that detonates near the inbound threat , destroying it before it hits the vehicle .

Arena is the successor to Drozd , a Soviet active protection system from the late 1970s , which was installed on several T @-@ 55s during the Soviet war in Afghanistan . The system improved the vehicle 's survivability rate , increasing it by up to 80 % . Drozd was followed by Shtora in the late 1980s , which used an electro @-@ magnetic jammer to confuse inbound enemy anti @-@ tank missiles and rockets . In late 1994 the Russian Army deployed a large number of armoured fighting vehicles to Chechnya , where they were ambushed and suffered heavy casualties . The effectiveness of Chechen rocket @-@ propelled grenades against Russian combat vehicles prompted the Kolomenskoye machine @-@ building design bureau to devise the Arena active protection system in the early and mid @-@ 1990s . An export variant , Arena @-@ E , was also developed . The system has been tested on the T @-@ 80UM @-@ 1 , demonstrated at Omsk in 1997 , and was considered for use on the South Korean K2 Black Panther main battle tank .

= = Background = =

The Soviet Union developed the first active protection system between 1977 and 1982 , named Drozd (Russian : ?????) . This system was designed as an alternative to passive or reactive armour , to defend against enemy anti @-@ tank weapons . The system 's development was stimulated in large part by the introduction of new high explosive anti @-@ tank warheads . Drozd was designed to destroy these warheads before they hit the armour of the vehicle being attacked . It was composed of three main parts : two launcher arrays placed on either side of the turret and an auxiliary power unit located to the rear of the turret . The arrays were controlled by two millimeter @-@ wave radar antennae . The system used a 19 kilograms (42 lb) , 107 millimeters (4 @-@ 2 in) cone @-@ shaped fragmentation warhead . Drozd could protect a tank between the elevations of ? 6 and 20 degrees along the vertical plane , and between 40 and 60 degrees along the horizontal plane . Although reported to offer an 80 % increase in survival rate during its testing in Afghanistan , the radar was unable to adequately detect threats and the firing of its rockets caused unacceptably high levels of collateral damage . About 250 Drozd systems were manufactured , all of which were installed on T @-@ 55s belonging to the Soviet Union 's naval infantry .

In the late 1980s , the Soviet Army began development of the Shtora @-@ 1 electro @-@ optical jammer . It was first mounted on a T @-@ 80U in 1989 , and later showcased on a T @-@ 72B (renamed T @-@ 72BM and later T @-@ 90) . Shtora @-@ 1 is designed to jam incoming anti @-@ tank missiles using a one @-@ kilowatt infrared radiator . In 1995 , it was fitted on a Ukrainian T @-@ 84 . The Shtora @-@ 1 system consists of an infra @-@ red radiator interface station , composed of the jammer , modulator and control panel , a number of forward @-@ firing grenade discharges capable of producing a smoke screen , a laser @-@ warning system and a general control panel . Shtora offers 360 degree all @-@ around protection , between the elevations of ? 5 and 25 degrees . The system is activated when the laser warning system alerts the tank commander , who responds by pressing a button on his control panel which automatically orients the turret towards the threat . This triggers the grenade launch , creating a smoke screen to reduce the ability of the missile to lock @-@ on the vehicle . The jammers are designed to jam the infra @-@ red seekers on the inbound missiles . According to the manufacturers , Shtora decreases the chances of a tank being hit by an anti @-@ tank missile , such as the Dragon , by a factor of 4 ? 5 : 1 .

The large number of Russia 's casualties during the First Chechen War prompted Russia to consider the development of a new active protection system . During the Battle of Grozny , for example , the Russian Army lost between 200 and 250 armoured fighting vehicles to Chechen

rebels . Vehicles which were knocked out included main battle tanks such as the T 72 and T 80 , and lighter armoured vehicles such as the BMP 2 . The majority of tanks deployed to Chechnya were not issued with explosive reactive armour , due to the " lack of time and funds " , while some of those that were issued with reactive armour did not have the explosive charge to start the reaction . Some of the most dangerous threats to Russian armour were rocket propelled grenades fired from buildings in Grozny . As a result of these vulnerabilities , Kolomenskoye developed the Arena active protection system , with the goal of providing Russian armour more reliable protection against these threats .

= = System details = =

The Arena system was primarily designed to defeat threats such as the rocket propelled grenade and the anti tank missile , including newer anti tank missiles with longer ranges . The active protection system can protect against missiles fired from both infantry carried rocket launchers and from helicopters , which attack the vehicle directly or by overflying it . Modern rocket propelled grenades can penetrate almost 1 metre (39 in) of steel armour , posing a serious threat to tanks operating in environments of asymmetric warfare . Therefore , increased tank protection requires either an increase in armour thickness and weight , or alternatively the use of an active protection system , like Arena .

The system uses a multi function Doppler radar , which can be turned on and off by the tank commander . In conjunction with radar input , a digital computer scans an arc around the tank for threats , and evaluates which of the tank 's 26 quick action projectiles it will release to intercept the incoming threat . In selecting the projectile to use for defeating the threat , the ballistic computer employs the information processed by the radar , including information such as flight parameters and velocity . The computer has a reaction time of 0 .05 seconds and protects the tank over a 300 degree arc , everywhere but the rear side of the turret . The system engages targets within 50 metres (55 yd) of the vehicle it is defending , and the ammunition detonates at around 1 .5 metres (1 .6 yd) from the threat . It will engage any threat approaching the tank between the velocities of 70 metres per second (230 ft / s) and 700 metres per second (2 ,300 ft / s) , and can detect false targets , such as outgoing projectiles , birds and small caliber bullets . Arena works during the day and night , and the lack of electromagnetic interference allows the system to be used by multiple vehicles as a team . The 27 volt system requires approximately one kilowatt of power , and weighs around 1 ,100 kilograms (2 ,400 lb) . Arena increases a tank 's probability of surviving a rocket propelled grenade by between 1 .5 ? 2 times .

Shtora was a soft kill system , designed to passively defeat anti tank missiles by jamming their guidance systems . By contrast , Arena is a hard kill system like Drozd , designed to destroy the warhead through the use of munitions before the missile can engage the vehicle being protected .

= = Deployment = =

The Arena active protection system was first tested at the Kubinka proving grounds in early 1995 , successfully defending a Russian tank against an anti tank guided missile . A Russian T 80UM 1 , with Arena , was demonstrated to the public at Omsk in late 1997 . Arena was also mounted on the BMP 3M modernization package , developed by the Kurganmashzavod Joint Stock Company , although the package has received no export orders .

An export variant , named Arena E (???? ?) , is available , worth an estimated \$ 300 ,000 . According to Russia , it was selected to be used on the South Korean K2 main battle tank , although this was not confirmed by South Korea .