



Russia's "Pole-21" Electronic Warfare System's Role in Defeating UAVs

OE Watch Commentary: The accompanying excerpted article from *Izvestiya*, a large-circulation pro-Kremlin daily newspaper, discusses the fielding of Russia's Pole-21 electronic warfare (EW) system. Unlike most EW systems, which are typically mounted on a vehicle (truck, aircraft, ship, etc.), the Pole-21 is a stationary system that consists of multiple emitters, usually mounted on civilian infrastructure, such as cellular phone towers. The Pole-21's emitters are designed to impede unmanned aircraft, cruise missiles, and other high-precision weapons by jamming global navigation systems such as GPS, GLONASS, and BeiDou. The Pole-21's dispersed layout allows GPS jamming over hundreds, or even thousands of square kilometers, depending upon configuration. This dispersed configuration not only provides resiliency from kinetic targeting, but also is valuable for disrupting UAV operations.

The accompanying excerpted article from *Nezavisimoye Voyennoye Obozreniye*, a weekly military newspaper published by *Nezavisimaya Gazeta*, which is a large-circulation daily centrist newspaper that is occasionally critical of the Russian government, explains that most UAV software is configured to have UAVs fly away from areas where GPS jamming interferes with the UAV's GPS reception so the UAV may again acquire a GPS signal and ascertain its position. The Pole-21 is particularly effective against loitering munition-type UAVs employed in the recent Armenian-Azerbaijan conflict because, once turned on, it jams a large area, possibly preventing the UAV from gaining a GPS signal and eventually crashing.

The accompanying excerpted article from *Yezhenedelnik Zvezda*, a Russian website with geopolitical and Russian military news that is part of the Zvezda media group owned by the Russian Ministry of Defense, explains that the Russian strategy for defeating UAVs does not just include the Pole-21, and other electronic warfare systems, but is instead a combined effort that involves a network of electronic warfare, signals intelligence, air defense, and nuclear, chemical, and biological defense (particulate smoke), systems. **End OE Watch Commentary (Bartles)**

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Continued: Russia's 'Pole-21' Electronic Warfare System's Role in Defeating UAVs

Source: Anton Lavrov and Roman Krezul, “Русское «Поле»: комплекс защитит Сибирь и Урал от дронов и ракет (The ‘Pole’ system will protect Siberia and Urals against UAVs and missiles),” *Izvestiya* (pro-Kremlin daily newspaper), 1 February 2021. <https://iz.ru/1118768/anton-lavrov-roman-kretcul/russkoe-pole-kompleks-zashchitit-sibir-i-ural-ot-dronov-i-raket>

...This year, a grouping of Pole-21 electronic suppression systems will be deployed in the Urals and Siberia, sources in the Defense Ministry told *Izvestiya*. Last year, Lieutenant General Yuriy Lastochkin, chief of the Electronic Warfare (EW) Troops, explained that modern systems make it possible to disrupt the precision navigation systems of guided weapon carriers and reduce the probability of strikes against our country's critically important industrial and defense infrastructure facilities. The Pole-21 belongs precisely to this type of armament. Yet, unlike conventional EW systems, this one is built on the distributive principle. It uses not one or several units, but up to 100 jamming transmitters that are deployed at great distances from each other. Each of them can be controlled, activated, and switched off remotely when necessary. This makes it possible to cover a vast area of hundreds of square kilometers with dense jamming.

The performance and technical specifications of the Pole-21 system are not being disclosed. But, according to open publications, the export version of the station suppresses all three main foreign satellite navigation systems: the American Navstar (better known by the GPS designation), the European Galileo, and China's BeiDou. The jamming area of a single system may reach 150 by 150 km. One station alone is sufficient to suppress conventional GPS receivers at a distance of up to 25 kilometers. Nowadays, such receivers are used not only on smartphones, but also in commercial and military UAVs, as well as in high-precision weapons.

“The Pole-21 simultaneously incorporates means of electronic reconnaissance and electronic suppression of satellite navigation systems,” military expert Viktor Murakhovskiy told *Izvestiya*. “The system's capabilities make it possible to prevent the use of many types of high-precision weapons, including foreign-made unmanned vehicles. Moreover, it not only can suppress satellite navigation system signals, but also cause geolocation errors. This is a territorially-distributed system that can increase its capabilities and cover significant sections of terrain. The system is designed to be used in close interaction with air defense and missile defense systems.”...

The first series-produced model of the Pole-21 was accepted into service in 2016. The Defense Ministry reports that such systems have already been sent to several EW units in the Eastern Military District (VVO) and the 201st Russian Military Base located in Tajikistan. The press service of the defense department reported the arrival in the VVO of the already modernized Pole-21M model last year, but did not disclose details of the changes made to it...

“The uniqueness of the Pole-21 system lies in its configuration. As it has already been said above, it employs several dozen relatively small low-power jamming transmitters instead of several items with high-power signal strength. Therefore, the Pole covers hundreds of kilometers at once. Also, thanks to the advanced command and control system, the “Product 21” operators can analyze the situation and opt to use only a certain group of the transmitters, rather than all of them at once. This approach helps to avoid unmasking the Pole’s entire operational range. At the same time, the UAV will no longer be able to fly several kilometers back and try to reconnect with its satellite navigation systems...”



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Source: Alexey Ramm, “Электронное «Поле» против дронов-убийц (Electronic ‘Pole’ Against Kamikaze-UAVs),” *Nezavisimoye Voyennoye Obozreniye* Online (weekly military newspaper published by *Nezavisimaya Gazeta* a daily centrist newspaper that is occasionally critical of the Russian government), 4 December 2020. https://nvo.ng.ru/nvo/2020-12-04/1_1120_karabakh.html

...Until recently, the Pole-21 was one of the most closely guarded electronic warfare systems in the Russian Armed Forces. The first information about the Pole appeared in the fall of 2016. At the present time, the “Product 21” is already entering the inventory en masse. There are several dozen compact transmitters in the Pole-21 composition. They are installed on high stationary facilities, such as cellular communication towers. The Pole’s mission is to combat satellite navigation systems. One such system can shut down an area of 150 by 150 km. As the Russian Defense Ministry’s information reports indicate, “the Pole-21 is designed to protect strategically important facilities from cruise missiles, unmanned aerial vehicles, and guided aerial bombs.”...

Satellite navigation systems’ electronic jamming assets have long been present in the arsenal of the Russian Armed Forces. Their development began back in the early 2000s. And the first test of such EW assets took place in the course of the Zapad-2009 exercises. The R-330Zh Zhitel, is one of the most renowned Russian “anti-GPS” systems. The operational principle of satellite navigation suppression systems is quite simple.

The transmission of the simplest signal from the satellite to the transmitter is what is laid in the basis of the GPS, GLONASS, Beidou, and other systems. Therefore, a slightest deviation from the set frequency, even for milliseconds, will lead to the loss of precision. The signal transmission is conducted in a rather narrow range, according to open data -- in 1575.42 MHz [L1 Band] and 1227.60 MHz [L2 Band]. Therefore, the operation of modern jammers is aimed precisely at blocking it. With a sufficiently powerful noise disturbance, it is not too big of a challenge to suppress this range. However, modern unmanned aerial vehicles have learned to circumvent these systems. The EW systems need to emit a very powerful signal. But its operational range is relatively small. Therefore, having lost contact with satellite navigation systems, the UAV flies back for several kilometers. And as such, it exits the operational range of EW stations and restores the navigation system’s operation.

The uniqueness of the Pole-21 system lies in its configuration. As it has already been said above, it employs several dozen relatively small low-power jamming transmitters instead of several items with high-power signal strength. Therefore, the Pole covers hundreds of kilometers at once. Also, thanks to the advanced command and control system, the “Product 21” operators can analyze the situation and opt to use only a certain group of the transmitters, rather than all of them at once. This approach helps to avoid unmasking the Pole’s entire operational range. At the same time, the UAV will no longer be able to fly several kilometers back and try to reconnect with its satellite navigation systems...The main problem of the Pole-21 is its lack of mobility. This, in fact, is a stationary system. It is an optimal asset for protecting military bases, strategic missile positions, and important industrial and military facilities. Small-sized transmitters must be installed, mounted, and plugged in. And this takes quite a long time. Therefore, in the Russian Armed Forces, the Pole-21 operates in conjunction with the new-generation Silok EW mobile system.

“A new way of protecting ground sites against hostile UAVs was practiced during an exercise in the Central Military District. Air defense subunits trained for the first time to engage UAVs in concert with electronic warfare, signals intercept, and aerosol countermeasures teams. More than 500 personnel and about 50 items of military equipment were involved. Taking part in this integrated air defense exercise were the crews of Pole-21, Zhitel, and Svet-KU electronic warfare and jamming stations, TDA-3 thermal smoke generators, Podlet-K1 and Niobiy radar stations, and Tor-M1 and Pantsir-S SAM system vehicles.”



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Source: Aleksandr Grigoryev, “«Великая русская стена»: беспилотники утыкаются в завесу из огня и импульсов (‘The Great Wall of Russia’: UAVs Encounter a Shroud of Fire and Pulses),” *Yezhenedelnik Zvezda* Online (Russian website with geopolitical and Russian military news, part of the Zvezda media group owned by the Russian Ministry of Defense), 13 January 2021. <https://zvezdaweekly.ru/news/20211111126-9nttJ.html>

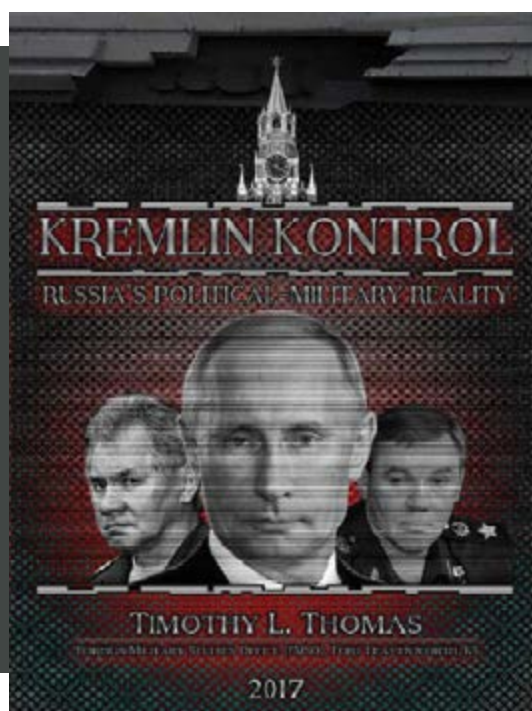
From the first days of the incoming year of 2021, Russia's forces have been busy assimilating the latest weaponry and equipment and combining that with applying new methods of warfare. It is a fact of the times that in the very near future the course and the outcome of modern-day warfare will be largely determined by unmanned aviation. But to every force there is a counter, and all of Russia's military districts are now practicing ways of protecting forces and ground infrastructure against enemy unmanned aerial vehicles (UAVs). At the same time they are refining techniques for using their own UAVs during combat training, and increasing the flying hours of their metallic reconnaissance scouts.

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Three tactical episodes were played out during the hands-on practice at a training ground in Chelyabinskaya Oblast. First, the signal intercept crews detected the control frequencies of UAVs being made ready for takeoff, and transmitted this data to a command post. The electronic warfare specialists then jammed the UAVs' communication and navigation channels, thereby preventing them from taking to the air.

In the second episode aerosol countermeasures teams concealed and protected the location and air defenses in the visual and infrared spectrums, using the thermal smoke generating capabilities of a TDA-3 vehicle. In the concluding phase of the exercise drones were detected and hypothetically destroyed by the crews of the Tor-M1 and Pantsir-S SAM systems. Every last drone was “shot down” with electronic [simulated] launches at altitudes from 350 to 3,000 meters at ranges of up to 12 kilometers.

“Russia is getting better at taking down enemy UAVs. That could have serious implications for the United States as it makes more use of unmanned aircraft ... The proliferation of jammers and Russia's prowess in using them could threaten the American military's fleet of UAVs. US UAVs are becoming more autonomous. But they will always need some kind of radio link in order to transmit data. That's one weakness Russia exploits.”



In 2016, Russian President Vladimir Putin and Chief of the General Staff Valery Gerasimov instituted sweeping changes that have reorganized the country's security forces and reestablished the nation's military prowess. This study, *Kremlin Kontrol*, aims to describe how control over the security services and the military have hastened those changes.

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