



Russian Media: US Sanctions Hinder GLONASS Modernization

OE Watch Commentary: The accompanying excerpted article from *Vedemosti* discusses how US sanctions are hindering Russian efforts to modernize and refurbish the GLONASS constellation. According to *Vedemosti*, US sanctions are hindering GLONASS by way of access to space-grade (radiation resistant) electrical, electronic, and electromechanical components, which are necessary for the construction of satellites. Due to the life span of Russia's GLONASS satellites (7-10 years), and US sanctions that have reportedly set back satellite production schedules, the GLONASS constellation now has 13 satellites that are serving past their designed life span. According to the Russian article, Russia is not keen on Chinese imports for this technology and so is trying to develop its own space-grade electrical, electronic, and electromechanical components, but due to economies of scale these efforts are much more expensive and result in little technological advancement. **End OE Watch Commentary (Bartles)**

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Spacecraft Navigation and Orientation System.

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Source: “Космический масштаб: импортозамещения Что происходит с «Глонасс» (Cosmic Scale of Import Substitution: What’s Going on with GLONASS),” *Vedomosti Online*, 27 September 2020. <https://www.vedomosti.ru/technology/articles/2020/09/27/841310-kosmicheskii-masshtab>

...At a government meeting in Novo-Ogarevo five years ago, on 28 October 2015, the then Deputy Premier Dmitriy Rogozin was in a confident mood. In the presence of the President Putin, he made a policy statement on the future of GLONASS. New satellites, Rogozin reported, are to have enhanced navigation signals, which, once the entire constellation has been replaced, will allow a signal accuracy higher than one meter to be reached by 2020, which is quite competitive when compared with GPS... The reality proved to be less impressive.... Thirteen of the satellites currently in operation are already past their seven-year warranty lifespan... Meanwhile, the target value of GLONASS accuracy in the federal targeted program was changed from 60 centimeters to 2.7 meters...

The reason why Russia has been unable to carry out the planned renewal of satellites in its navigation system is US technology sanctions, which prevent onboard equipment manufacturers from buying the necessary Space-grade electrical, electronic, and electromechanical (EEE) components, that are radiation resistant... Of course, this is not the first time Russian manufacturers have faced such restrictions. To overcome them, back in Soviet times, the intelligence services set up schemes making it possible for the requisite parts to be acquired. These schemes have not been abandoned, but they do not always work: It is very hard to cheat the system when this involves not just one item, but batches of microcircuits that are produced by just one or two developers in the entire world...

In 2015, the scientific and technical council of Roscosmos adopted a logical decision: GLONASS-K satellites were to be redesigned so that they would consist of Russian parts. But since not all the necessary parts could be made in Russia, building such satellites would have to be a long-term project. Roscosmos subsidiary OAO Rossiyskiye Kosmicheskiye Sistemy (Russian Space Systems), which was put in charge of import substitution in the space sector, said that Russian industry was capable of building such an apparatus within four or five years. Over time, these plans were proved to be unrealistic. Now we are talking about another time frame like that.

“Import substitution is a long and difficult road. We started it in 2014 and are planning to complete it in 2025. By that time, we will be able to source all components from Russian suppliers,” Nikolay Testoyedov, General Director of the Informatsionnyye Sputnikovyye Sistemy Imeni V.I. Reshetneva company (Reshetnev ISS [Information Satellite Systems]), which makes satellites for GLONASS. Testoyedov said that he is “optimistic” about the import substitution program.

With the arrival of an entirely Russian GLONASS satellite postponed, the constellation will be replenished with GLONASS-K and GLONASS-K2 satellites that are assembled from whatever is available. This has not been an easy process. In 2016, Reshetnev ISS was awarded a contract for the manufacture of nine GLONASS-K and two GLONASS-K2 satellites, worth a total of 62 billion rubles. It was assumed that the initial satellites would be completed in 2018 and that they would start being launched in 2019. Reshetnev ISS has so far sent only one GLONASS-K satellite to Plesetsk cosmodrome. Essentially, the hope now is that the existing GLONASS-M satellites will last longer than their seven-year warranty lifespan. If satellites start failing in the next year or two, there will be nothing to replace them with. In that case, the entire system will risk degradation...

Russian manufacturers of EEE components that use Western technology, such as Angstrom, Mikron, and NIIME, have also been sanctioned by the BIS, which, if not paralyzed, then greatly complicated their current activities. This means that the previously tested method of buying equipment abroad and launching it here is no longer relevant for Russia. In this situation, it is hard to think of anything other than creating your own industry. That is a costly, lengthy, and cumbersome process. Moreover, having paid for EEE component production facilities, the government will then be forced to support this industry.

The special feature of space instrumentation is that it brings together all the latest microelectronics know-how. “But at the same time, building satellites does not generate a lot of demand,” Pokrovskiy observes. “How many identical microcircuits could a spacecraft manufacturer buy? Tens, perhaps hundreds at most. For microelectronics, that is not the kind of demand that would enable technology to develop. It can develop when demand is measured in the millions of pieces.”

Parts from China could be used as a temporary alternative, although the manufacturer is not particularly keen on Chinese-made EEE components. “We are able to buy the requisite EEE components in China, but we give priority to Russian products,” says Testoyedov. “Only in cases where Russian or Western components cannot be bought would we be prepared to consider buying Chinese EEE components, while paying a great deal of attention to quality control and reliability.”