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What is Oreshnik Made Of?

Russia's Most Domestic Missile Yet

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INTRODUCTION

Russia's modern precision weapons have long relied on imported microelectronics. Investigations into missiles, drones, guided aerial bombs, electronic warfare systems, and combat aircraft have consistently revealed the presence of Western-designed semiconductors and, more recently, commercially available Chinese components.

The Oreshnik missile represents a notable departure from this pattern. Rather than relying predominantly on foreign-made electronics, the recovered remnants indicate extensive use of low- and medium-complexity semiconductors manufactured by Russian and Belarusian companies.

This report seeks to map the recovered semiconductor components, their manufacturers, production periods, and the sanctions status of these producers, providing new insight into the domestic industrial base supporting Russia's newest strategic missile system.

The analysis is based on information collected by Ukrainian military experts during forensic examinations of the instrument compartments recovered from the remnants of two Oreshnik missile strikes, conducted following the attacks in November 2024 and January 2026. The documented findings were subsequently reviewed and verified by NAKO.

The report does not represent a comprehensive technical assessment of the entire missile. Rather, it analyzes only those components that were recovered, documented, and identified from the available debris, providing a component-level assessment of the missile's observable architecture and supply chain.

KEY FACTS

≈470 components

were identified by the military experts and verified by NAKO

25 companies*

based in Russia and Belarus manufactured the identified components

62%

of the identified manufacturers are currently subject to at least one international sanction

93%

of identified entities in both states have been sanctioned by Ukraine alone

Most of the recovered components were manufactured between

2014 and 2018

*An additional four entities were identified but could not be conclusively confirmed based on the available evidence.

WHAT IS ORESHNIK

Current assessments indicate that Oreshnik should not be viewed as an isolated weapons program but as part of the evolutionary development of Russia's strategic missile complex.

Developed by **Votkinsk Machine Building Plant** system recycles established technologies from the **RS-26 Rubezh** and, by extension, **the Topol-M and Yars missile family**, including solid-propellant rocket stages, mobile launch capability, and multiple independently delivered reentry vehicles.

The principal distinction lies in its operational role. Whereas Topol-M and Yars were designed for intercontinental nuclear deterrence, Oreshnik appears intended for intermediate-range missions, allowing Russia to threaten targets throughout Europe while preserving strategic ICBM assets.

MAIN CHARACTERISTICS

Type Intermediate-range ballistic missile (IRBM)	**Warhead** Conventional and nuclear payloads
Range ≈ 2,000–5,500 km	**Weight** ≈ 40,000-50,000 kg
Speed ≈ 12,300-13,000 km/h	**Length** ≈ 20 m

According to open-source and expert estimates.

DNIPRO ATTACK

On **21 November 2024,** Russia carried out a missile attack on the Ukrainian city of Dnipro that became historically significant as the **first confirmed combat use of the Oreshnik.**

The primary target was an industrial facility in Dnipro associated with Ukraine's defense industry, commonly identified as the Pivdenmash complex. Russia claimed the strike was retaliation for recent Ukrainian attacks using Western-supplied ATACMS and Storm Shadow missiles against military targets inside Russia.

The strike was widely interpreted as both a military attack and a strategic demonstration aimed at Ukraine and its Western partners following the authorization of Ukrainian strikes on Russian territory with U.S.- and UK-supplied long-range missiles.

Photo credits: *The State Emergency Service of Ukraine, November 21, 2024*

LVIV ATTACK

The 8 January 2026 Oreshnik strike marked the second confirmed combat use of the Oreshnik missile. Immediately after the attack, Lviv Mayor Andriy Sadovyi reported that the strike had hit a critical infrastructure facility, with emergency services responding to extinguish the resulting fire.

Unlike the November 2024 strike on Dnipro, this attack brought the missile much closer to NATO territory and, importantly, yielded substantial physical debris that enabled a detailed technical examination of the system.

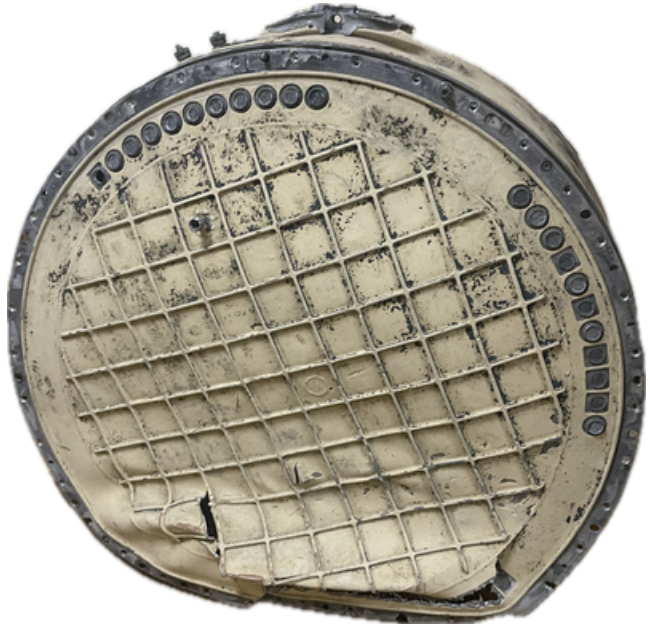
In particular, the Security Service of Ukraine claimed to have found the following sub-systems among the debris: the guidance and control unit; engine components; rocket nozzles; and fragments of the post-boost vehicle (warhead dispensing system), which is responsible for deploying the missile's multiple reentry vehicles.

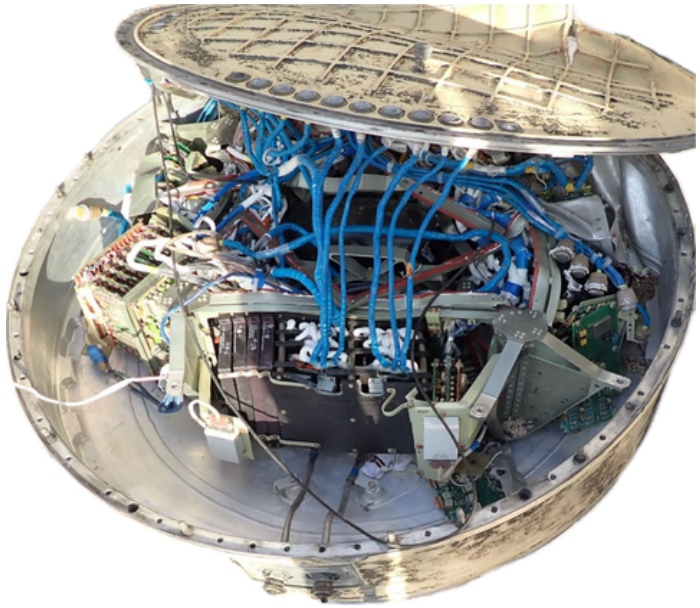
Photo credits: *The Security Service of Ukrainw, January 9, 2026*

ORESHNIK SUBSYSTEMS:
The Instrumentation Compartment

The Instrumentation Compartment is an integral part of the missile's post-boost vehicle deployment system. It is designed to house the missile's **Onboard Automatic Control System (OACS)** and the **Thermal Control System (TCS).**

The missile's OACS is designed to provide accurate target guidance, trajectory correction, and flight stabilization, as well as to issue commands for post-boost vehicle separation and the deployment of the reentry vehicles (hereinafter, the RVs).



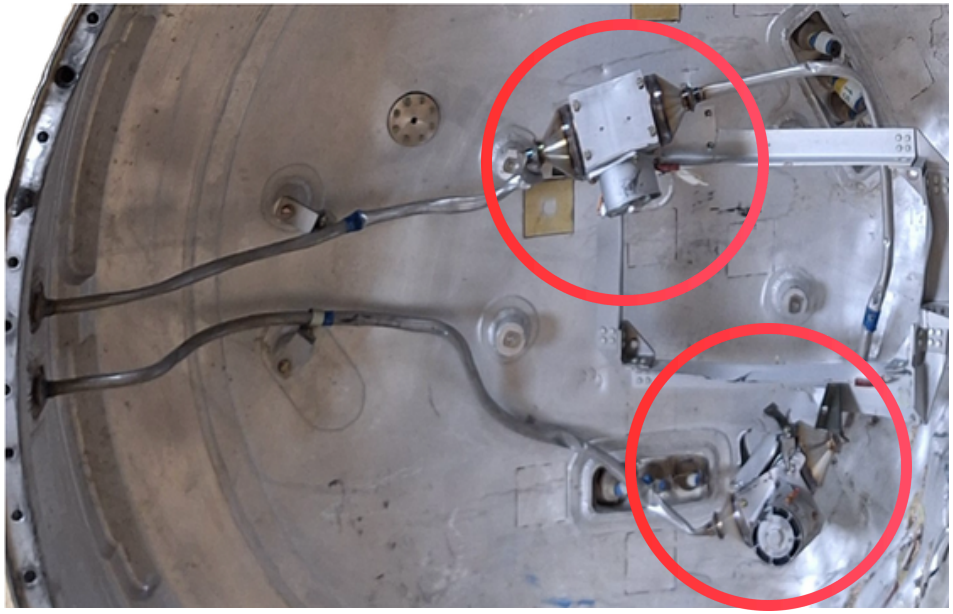


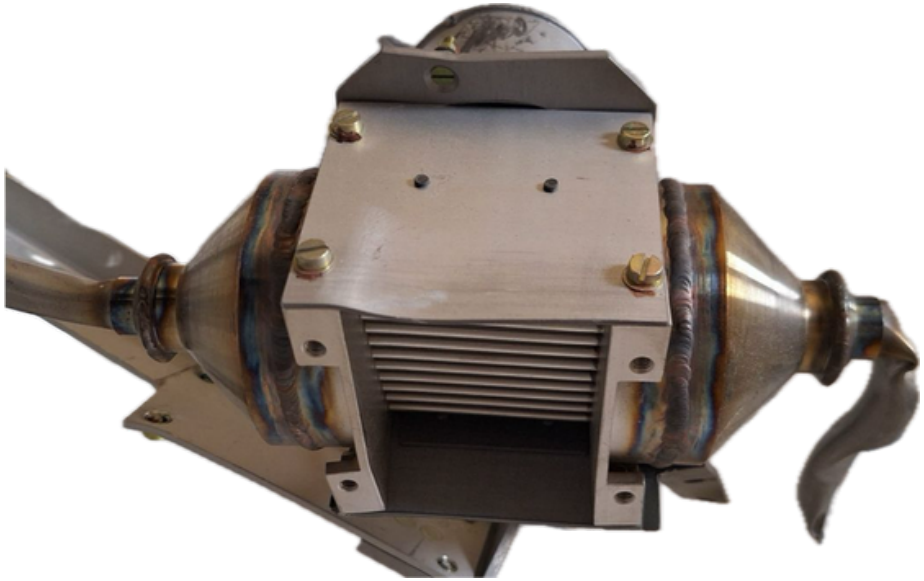
Oreshnik's Instrumentation Compartment
recovered in January after the Lviv attack

ORESHNIK SUBSYSTEMS:
Thermal Control System

The Thermal Control System is designed to maintain the required operating temperature of the missile's onboard control electronics housed within the instrumentation compartment.

The missile's onboard Thermal Control System consists of two temperature regulation units with integrated cooling fans, a network of coolant pipes, and inlet and outlet connectors used to circulate the cooling fluid through the system.



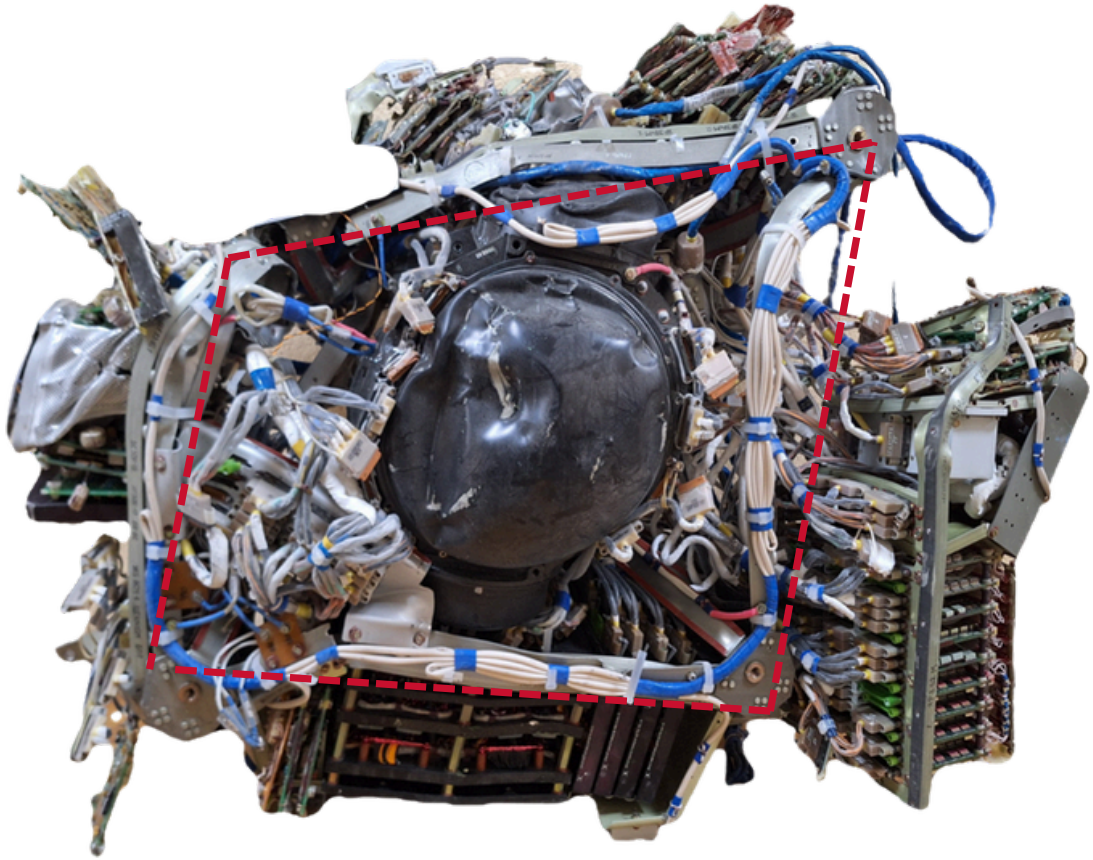


ORESHNIK SUBSYSTEMS:
The Instrumentation Frame

The instrumentation frame (in red) serves as the mounting structure for the missile's onboard control system. It is attached to the aft bulkhead of the instrumentation compartment.

The frame incorporates a series of mounting brackets that support the various modules and electronic units comprising the missile's OACS.

A gyrostabilized platform (center, black), a key component of the missile's OACS, provides a stable inertial reference for navigation and guidance. By measuring changes in the missile's attitude and compensating for external disturbances, it enables precise flight control and accurate target guidance.



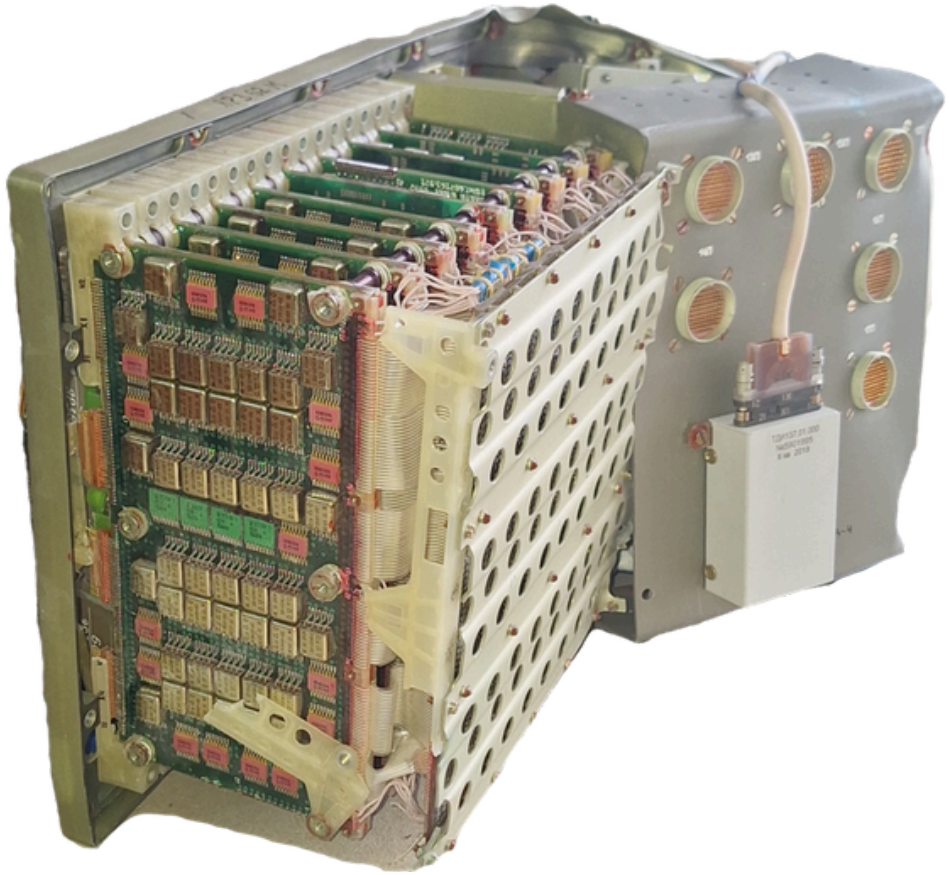
ORESHNIK SUBSYSTEMS:
Onboard Automatic Control System

The missile's OACS is responsible for monitoring the missile's status while it remains on combat alert, supporting pre-launch preparation, and controlling the missile throughout its flight to the target.

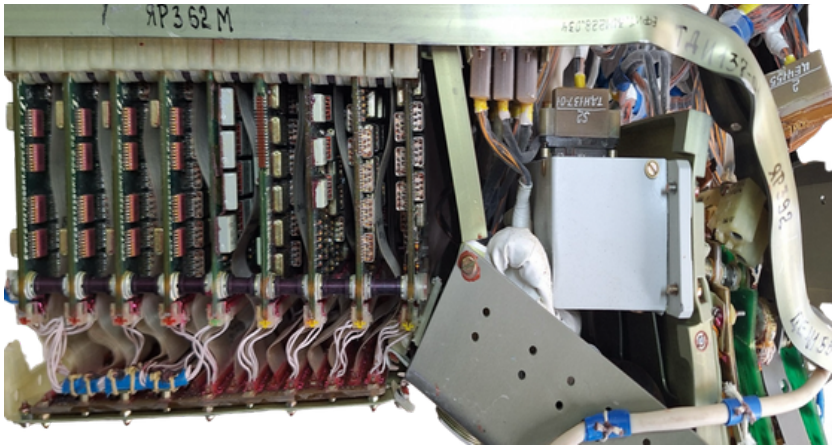
The OACS consists of:

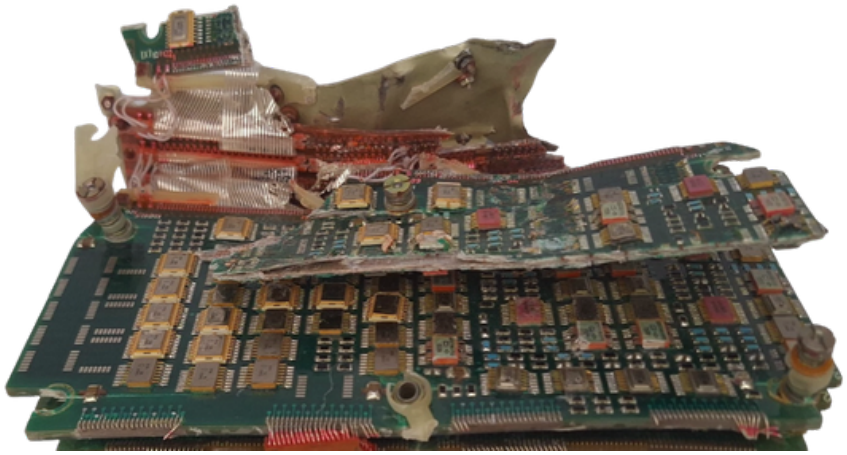
- the gyrostabilized platform;
- the Onboard Digital Computing System (ODCS);
- the onboard power supply; and
- the onboard electrical wiring network.

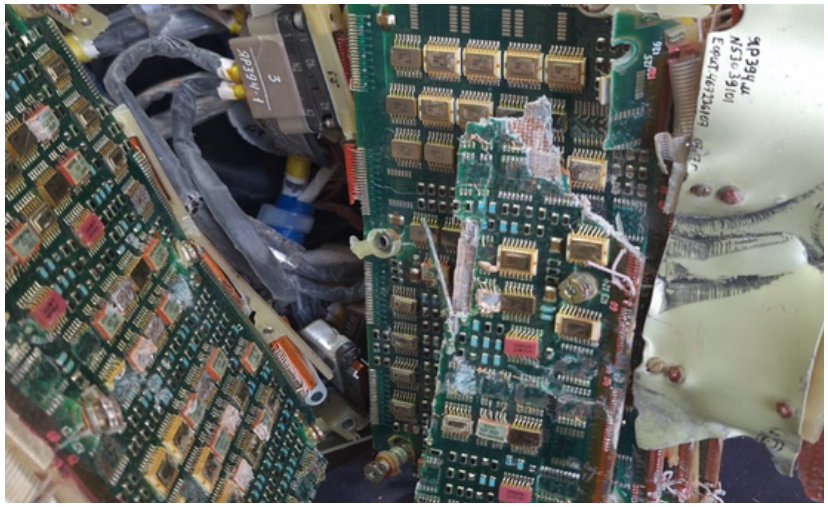
No equipment associated with satellite navigation (e.g., GNSS receivers) or telemetry collection and transmission was identified in the examined missile remnants.

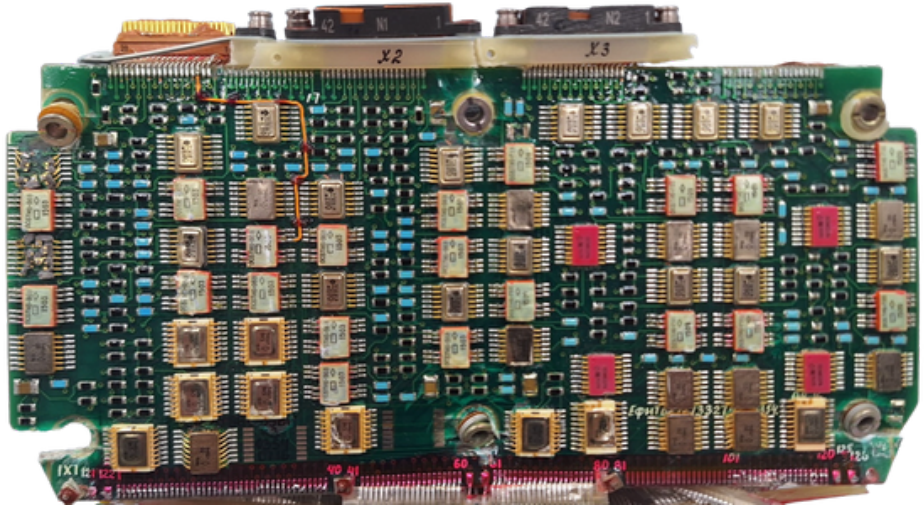


ORESHNIK SUBSYSTEMS:
Onboard Automatic Control System









MANUFACTURERS

The manufacturers identified in the recovered Oreshnik components are concentrated across four federal districts of the Russian Federation, with a clear dominance of the **Central Federal District**, which hosts the country's largest cluster of semiconductor and electronic component manufacturers in Moscow, Zelenograd, Moscow Oblast, Voronezh, Kaluga, Oryol, Bryansk, Ryazan, and Penza.

Additional manufacturers are located in the **Northwestern Federal District** (St. Petersburg, Pskov, Ostrov, Veliky Novgorod, and Borovichi), **the Volga Federal District** (Kazan, Sarapul, Yoshkar-Ola, and Sergach), and the **Siberian Federal District**, represented by a single enterprise in Novosibirsk. Beyond Russia, the analysis identified two Belarusian manufacturers - JSC Integral and its subsidiary State Enterprise Transistor Plant - both headquartered in **Minsk, Belarus.**

LIST OF MANUFACTURERS

VERIFIED ENTITIES

- Academician Pilyugin Center
- NPO Fizika
- JSC Optron
- JSC Angstrem
- JSC Mikron
- JSC Morion
- PJSC Svetlana
- PJSC MStator
- SKTB RT / NPO Start
- NPO Elekon
- PJSC Vektor
- Kremny EL Group
- JSC Elekond
- JSC Proton
- JSC Bolkhov SDP
- JSC NIIEMP
- JSC Polikond
- JSC Voskhod KRLZ
- JSC Voronezh-Sborka
- NPO Erkon
- JSC Kontakt
- OKB Eksiton
- NPP TEZ LLC

BELARUSIAN MANUFACTURERS

- Integral Holding
- Transistor Plant

POTENTIAL MANUFACTURERS

- JSK Pleskava Pskov Radio Components Plant
- Kulon LLC
- JSC Research Institute Giricond (NII Giricond)
- JSC Oxid Novosibirsk Capacitor Plant

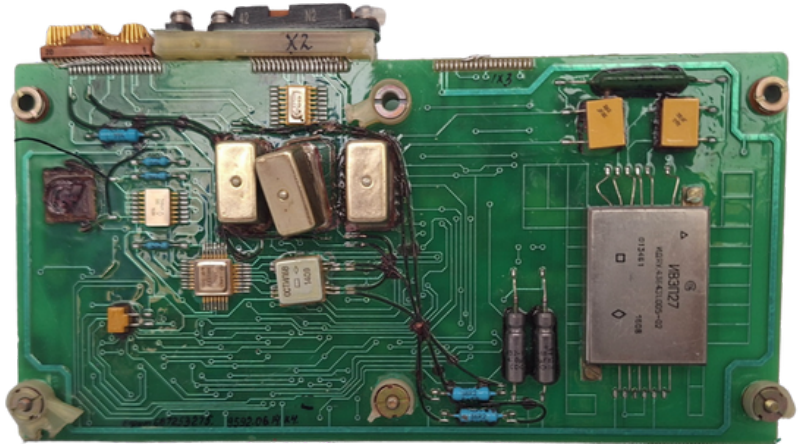
ACADEMICIAN PILYUGIN CENTER

JSC Academician N.A. Pilyugin Scientific Production Center of Automatics and Instrument Engineering

Location	TIN	Owner	Sanctioned by
Moscow	9728050571	Roscosmos	

Pilyugin Center is one of Russia's leading developers and manufacturers of guidance, navigation, and control systems for launch vehicles, upper stages, ballistic missiles, and spacecraft. The company specializes in inertial navigation systems, onboard digital computers, flight control systems, gyroscopic instruments, accelerometers, and integrated automation and instrumentation systems. It has developed control systems for major Russian missile and space programs, including Topol-M, Proton-M, Zenit, Fregat, and the Buran space shuttle, and remains a key enterprise within Roscosmos and Russia's defense-industrial complex.

Printed Circuit Boards



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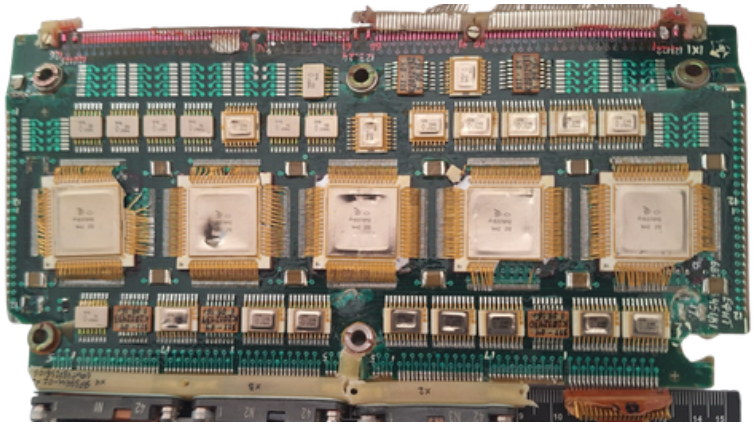

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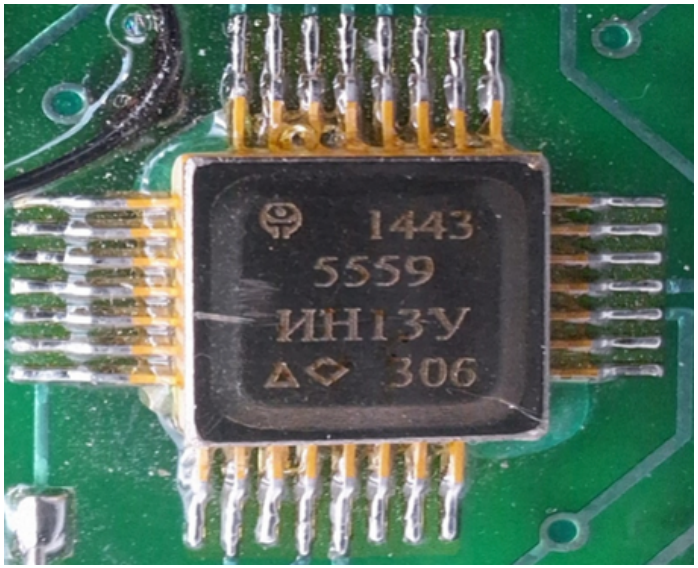
NPO FIZIKA

PJSC Research and Production Association (NPO) Fizika

Location	TIN	Owner	Sanctioned by
Moscow	7726019607	CJSC Fizika	

NPO Fizika is a developer and manufacturer of electronic components for control and embedded systems, specializing in integrated circuits, hybrid microassemblies, and chip-on-board (COB) electronic modules. Its product portfolio includes digital communication interface ICs (including MIL-STD-1553B and ARINC-429), analog-to-digital and digital-to-analog converters (ADCs/DACs), angle/position-to-digital converters, analog ICs, microprocessor support and interface chips, command and control interface circuits, galvanic isolation devices, transceivers, and COB modules for mission-critical avionics and embedded systems.

NPO Fizika also supplies electronic components for several Russian precision-guided weapons. It manufactures N1582VZh2 gate-array ICs for the Monoblok-L module of the Kh-101 cruise missile, 5559IN13U1 and N1582VZh3V-0244 integrated circuits for the onboard electronics of the S8000 "Banderol" cruise missile, and transceivers integrated into the BUBS-30 combat payload control unit of the "Izdeliye-30" cruise missile.

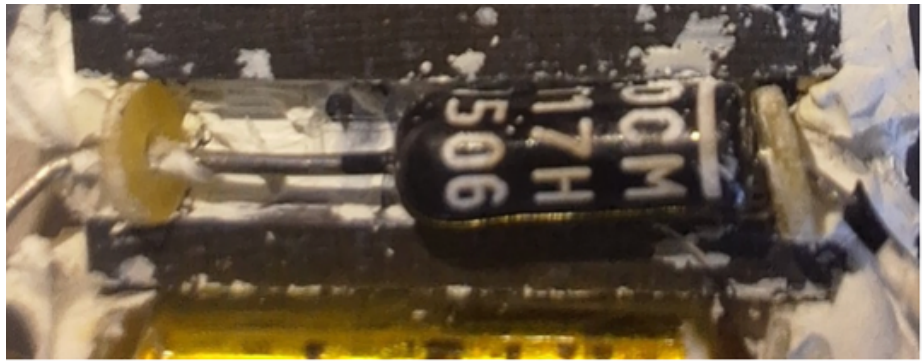


Application-Specific CMOS Transceiver
Manufacturing date: October 2014

JSC OPTRON

Location	TIN	Owner	Sanctioned by
Moscow	7719019691	RosEl (Rostec)	

The company manufactures rectifier diodes, Zener diodes, RF and microwave diodes, optoelectronic semiconductor devices, and automotive lighting products. Its product portfolio also includes semiconductor indicators, optocouplers, LED display modules and information boards, intelligent traffic signs, and energy-efficient power equipment, including frequency converters and automated pump control systems.



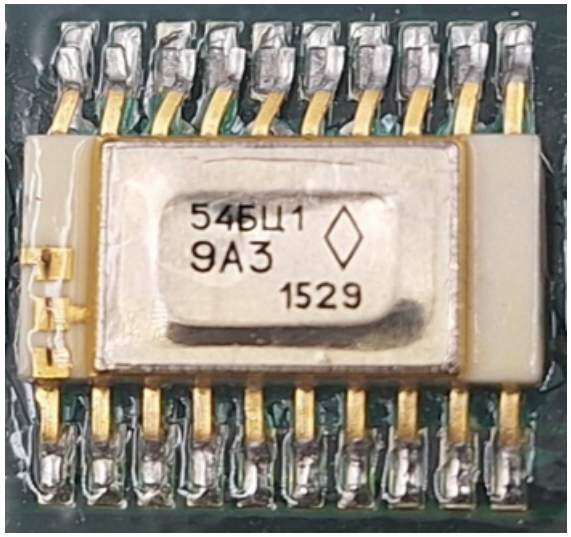
Precision (high-stability) silicon Zener diodes

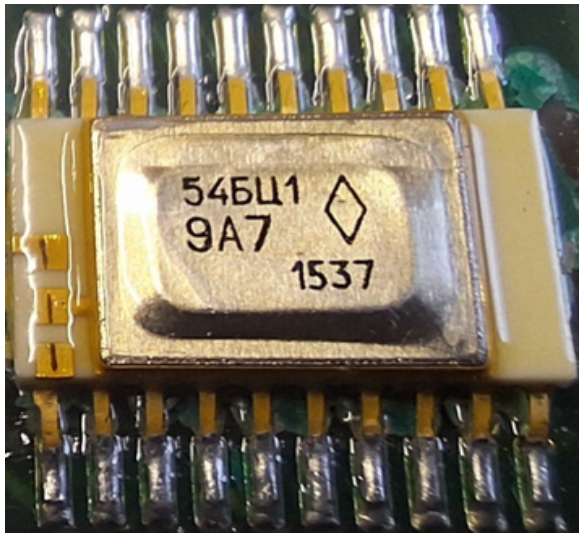
JSC ANGSTREM

Location	TIN	Owner	Sanctioned by
Zelenograd, Moscow	7735010706	RosEl (Rostec)	

This company is specializing in the design and production of microprocessors, microcontrollers, digital signal processors, radiation-hardened integrated circuits, and other application-specific ICs for military, aerospace, industrial, and embedded electronic systems.

Integrated circuit
Manufacturing date: October 2014





CMOS logic integrated circuits
Manufacturing dates: July and September 2015

JSC MIKRON

Location	TIN	Owner	Sanctioned by
Zelenograd, Moscow	7735007358	The Element Group (Rostec)	

Mikron is Russia's leading semiconductor manufacturer, that provides a full semiconductor manufacturing cycle and serves commercial, industrial, government, and defense sectors. Branded as "Chipmaker No. 1," the company claims to account for approximately 70% of Russia's microelectronics exports, serving commercial, industrial, government, and defense sectors. The portfolio includes:

- Integrated circuits (ICs) for secure identification, payment, and transport cards;
- RFID chips and tags for identification, logistics, and asset tracking;
- Microcontrollers and embedded processors, including the MIK32 RISC-V family;
- Power management integrated circuits (PMICs);
- Application-specific integrated circuits (ASICs);
- Secure microchips for electronic passports, banking cards, and other secure documents;
- Contract semiconductor manufacturing (foundry services) using 180 nm and 90 nm process technologies, with limited capabilities at 65 nm.

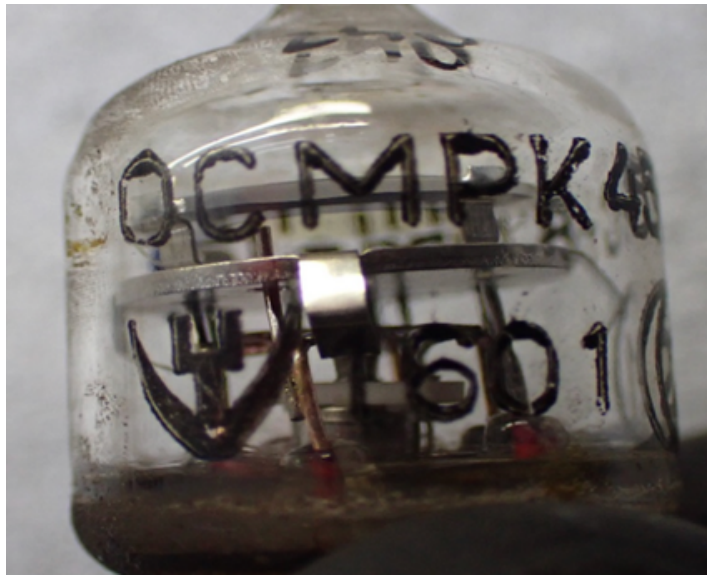
Hardened TTL (Transistor–Transistor Logic) integrated circuit
Manufacturing date: August 2015

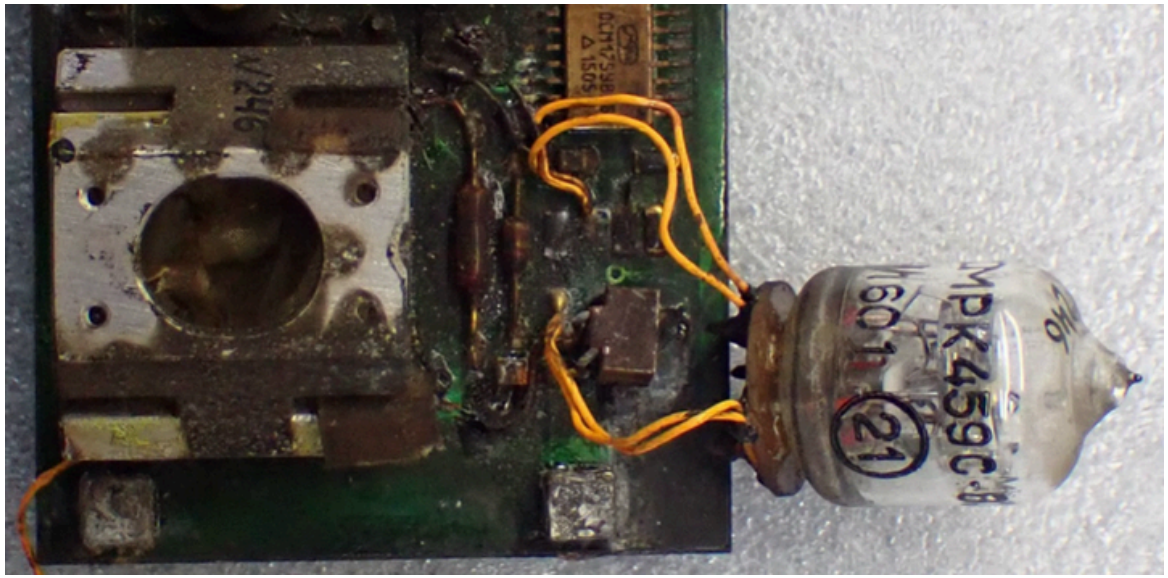
JSC MORION

Location	TIN	Owner	Sanctioned by
St. Petersburg	7801016421	Gazprombank	

Morion specializes in frequency-control and timing devices, including quartz oscillators, quartz filters, quartz resonators, piezoelectric crystal components, and rubidium frequency standards, as well as associated equipment and engineering services.

Quartz resonators





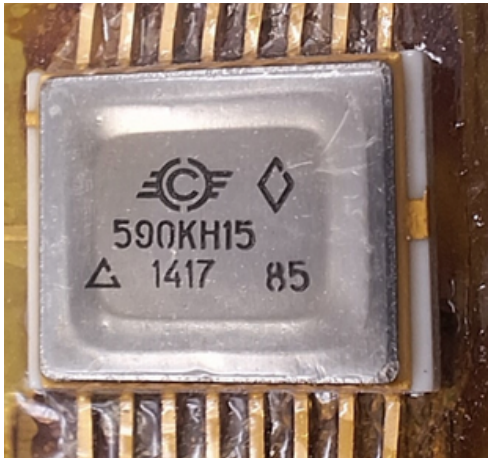
PJSC SVETLANA

Location	TIN	Owner	Sanctioned by
St. Petersburg	7802001308	RosEl (Rostec)	

Originally established as a lighting company, the company manufactures products including high-power transmitting tubes, magnetrons, klystrons, traveling-wave tubes, vacuum capacitors, semiconductor devices, and microwave components for industrial, telecommunications, scientific, aerospace, and defense applications. The company states that its products are used in several Russian military radar systems, including Pantsir-S1, Buk-M, and Zaslon-M.

Svetlana's vacuum electronic devices provide high-power RF generation, amplification, and signal transmission for military radar, electronic warfare, satellite communications, and missile guidance systems. It also manufactures specialized microwave and ultra-high-frequency components engineered for operation in harsh military and aerospace environments.

Beyond radar applications, Svetlana supplies critical RF and microwave technologies for electronic warfare systems, military satellite payloads, command-and-control networks, and secure communications equipment.

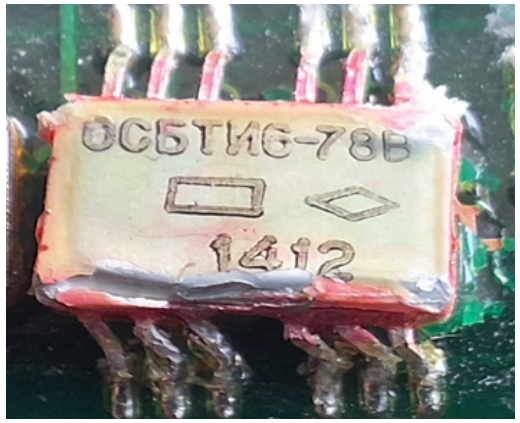


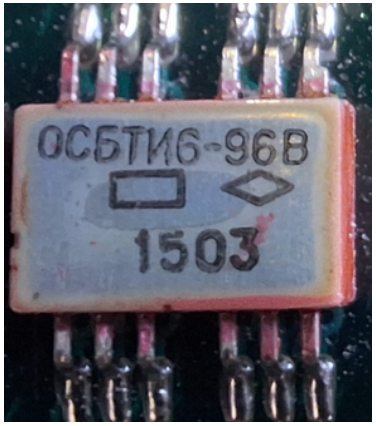
Four-channel high-speed analog switch with a CMOS control circuit
Manufacturing date: April 2014

PJSC MSTATOR

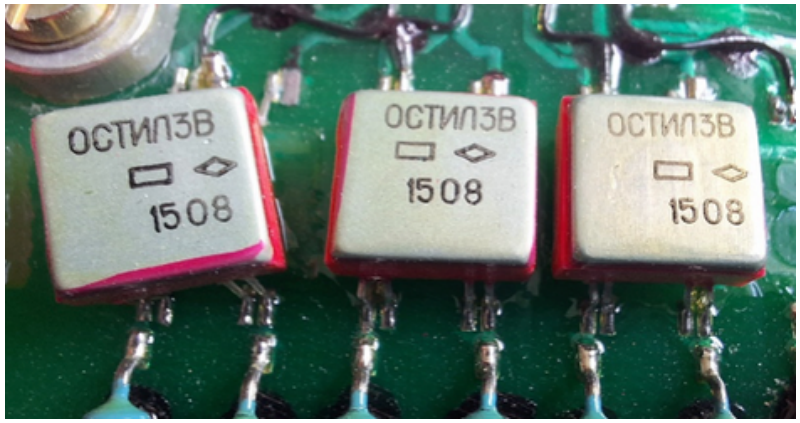
Location	TIN	Owner	Sanctioned by
Borovichi, Novgorod Oblast	5320002221	RosEl (Rostec)	

The company manufactures magnetic components, including toroidal magnetic cores, pulse transformers, chokes, and high- and low-frequency transformers for telecommunications, industrial, and defense applications. It supplies pulse and linear transformers used in the onboard electronics of several Russian cruise missiles, including the S8000 "Banderol", Kh-101, and 9M727 (Iskander-K). These components are integrated into onboard digital computers, inertial navigation systems, and control units, including the Baget 62-04, Zarya-61M, GIB-123-4, and UVK-208 subsystems.





Magnetic assembly (saturable choke)
Manufacturing dates: March 2014 and January 2015

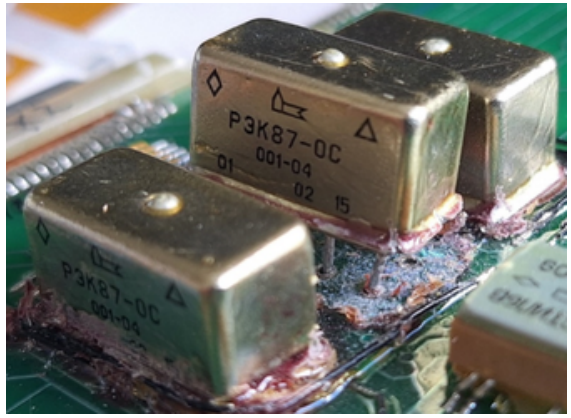


Miniature pulse transformer assembly
Manufacturing date: March 2015

SKTB RT / NPO START

JSC Special Relay System Design and Engineering Bureau / JSC Research and Production Enterprise “Start”	**Location** Velikiy Novgorod	**TIN** 5321095589	**Owner** RosEl (Rostec)	**Sanctioned by**

The company manufactures electromagnetic relays, including reed and intermediate relays, phase power controllers, signal and indicator lighting equipment, and other electromechanical components used in industrial and defense applications. Following the 2021 merger of NPP Start into SKTB RT, the company acquired the predecessor's complete portfolio of design documentation, production technologies, and engineering expertise, strengthening its capabilities in the development and manufacture of military-grade relay technologies.



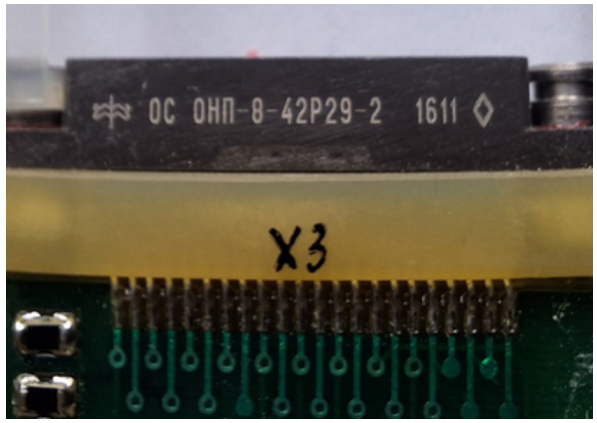
Relay (NPO Start)
Manufacturing dates: February and July 2015

Secondary power supply module (SKTB RT)
Manufacturing date: February 2018

NPO ELEKON

Location	TIN	Owner	Sanctioned by
Kazan	1657032272	RosEl (Rostec)	

Elekon specializes in the manufacture of electrical connectors, telemetry devices, and connector assemblies for military, aerospace, and industrial applications. Its products are used across a wide range of Russian defense and space systems, including the Soyuz, Proton, and Zenit launch vehicles, Topol-M intercontinental ballistic missile, Vostok, Voskhod, Soyuz, Kosmos, Molniya, Ekran, and Raduga satellites, as well as military aircraft, helicopters, naval vessels, submarines, tanks, radar systems, and satellite communications and navigation equipment.



Low-frequency electrical cable-and-connector assembly
Manufacturing dates: January-March 2016

KREMNY EL GROUP

Location	TIN	Owner	Sanctioned by
Bryansk	3234043140	RosEl (Rostec)	

Kremniy EL is one of Russia's largest microelectronics manufacturers and a leading producer of power electronics, integrated circuits, and discrete semiconductor devices.

Low-power silicon Zener diode
Manufacturing dates: January-March 2016

The company has evolved into a full-cycle semiconductor manufacturer with in-house design, wafer fabrication, assembly, and testing capabilities.

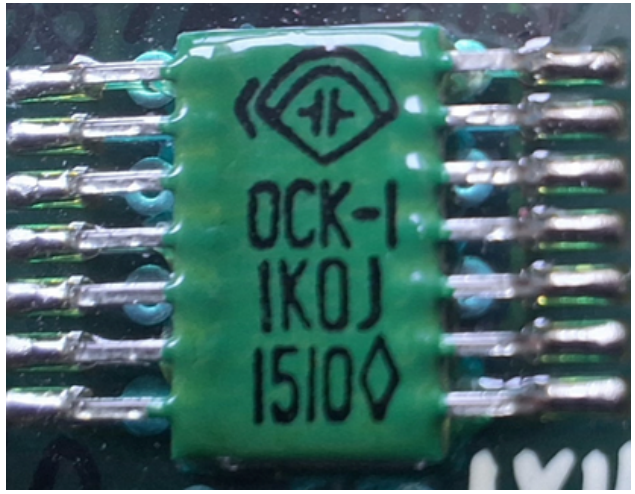
Kremniy's product portfolio includes analog and mixed-signal integrated circuits, power modules, silicon and silicon carbide (SiC) diodes, transistors, BiCMOS devices, Hall-effect sensors, power management ICs, and electronic modules for industrial, telecommunications, automotive, aerospace, and defense applications.

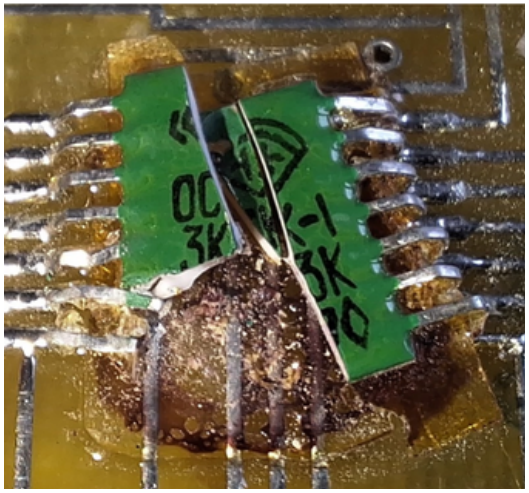
More than 90% of its production is reportedly used in military applications, including components for Topol-M and Bulava strategic missile systems, S-300 and S-400 air defense systems, Pantsir-S1 air defense complexes, and the onboard electronics of MiG and Su aircraft.

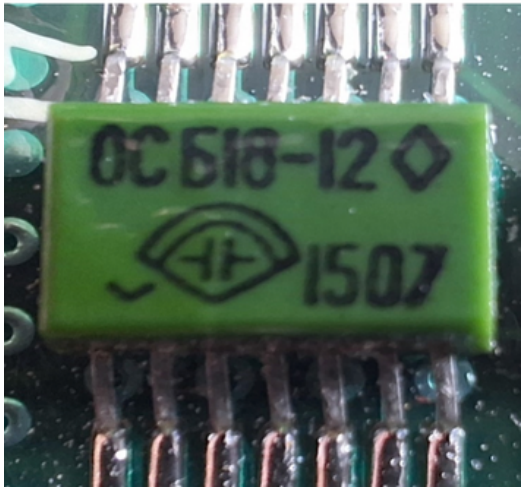
PJSC VEKTOR

Location	TIN	Owner	Sanctioned by
Ostrov, Pskov Oblast	6013000866	Unknown	

The company specializes in the production of mica capacitors, capacitor and resistor assemblies, electromagnetic relays, wirewound fixed resistors, ceramic heating elements, and specialized electronic devices, while also developing new products based on thick-film technology. Its components are supplied to the missile and defense industries, as well as the shipbuilding, aerospace, petrochemical, and mining sectors.







Multi-channel resistor network
Manufacturing dates: February and March 2015

JSC ELEKOND

	Location	TIN	Owner	Sanctioned by
JSC Special Relay System Design and Engineering Bureau / JSC Research and Production Enterprise “Start”	Sarapul, Udmurt Republic	1827003592	Unknown	

Elekond supplies K53-68 and K53-69 capacitors used in the onboard systems of the S8000 "Banderol" cruise missile and maintains contracts with manufacturers of tank sighting systems. It also regularly participates in Russian military technology exhibitions, underscoring its role as a supplier to the country's defense-industrial complex.

The company also manufactures capacitors for several Russian weapons systems. It supplies capacitors for the combat payload control unit (BUBS-30) of the "Izdeliye-30" cruise missile and K53-72 capacitors for the automated workstation of the Pantsir-S1 air defense system.

Capacitors
Manufacturing date: January 2014

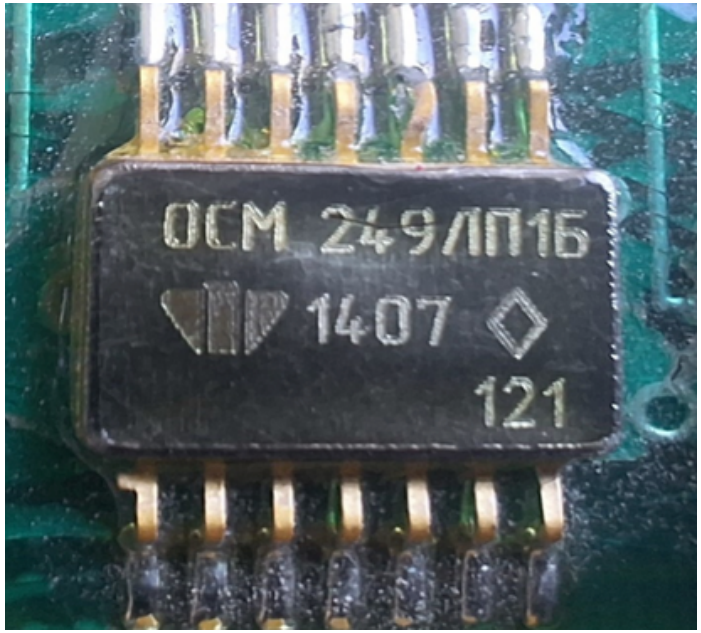
JSC PROTON

Location	TIN	Owner	Sanctioned by
Orel	5753018359	Unknown	

Proton is one of Russia's leading manufacturers of optoelectronic components, operating a full production cycle from semiconductor crystals to finished devices.

The company specializes in the production of optocouplers, solid-state relays, high-brightness LEDs, LED modules and indicators, LED lighting systems, and LED traffic control equipment. As part of Russia's import substitution program, Proton has developed and launched domestic production of optocouplers and solid-state relays, reducing reliance on foreign electronic components.

Proton also supplies components for several Russian weapons systems. Its 2M420A4 diode modulesare used in the S-71 "Kover" air-launched cruise missile, while 2M419A1 electronic switching modulesand 249KP8U transistor optocoupler integrated circuits are supplied for the Pantsir-S1 air defense system, where they are integrated into the automated workstation and TVK-2 television channel subsystems, respectively.



Logic optocoupler
Manufacturing date: February 2014

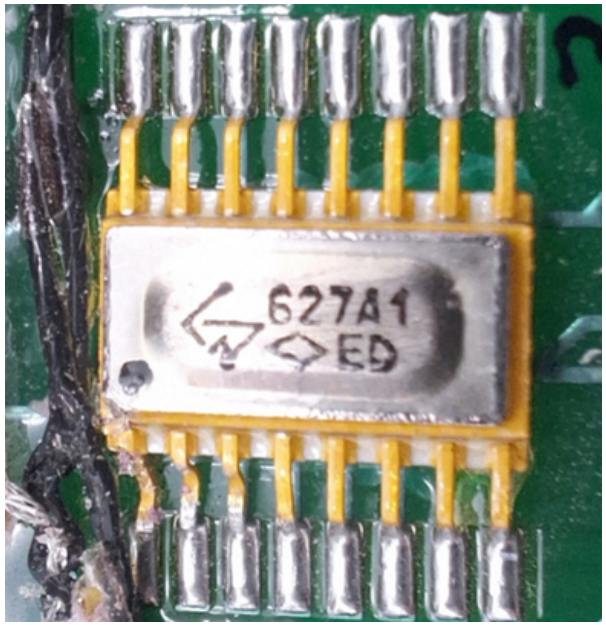
JSC BOLKHOV SDP

JSC Bolkhov Semiconductor Devices Plant (BZPP)	**Location** Bolhov, Orel Oblast	**TIN** 5704003487	**Owner** Unknown	**Sanctioned by**

BZPP is a Russian manufacturer of semiconductor devices and electronic components.

Its product portfolio includes diodes, transistors, integrated circuits, semiconductor devices, alphanumeric displays, hybrid microassemblies, multichip modules, and other electronic components for radio-electronic equipment, as well as components for railway rolling stock.

The company produces more than 100 product types and approximately 200 electronic components used across virtually all categories of Russian weapons systems. Included in Russia's register of defense-industrial enterprises, BZPP supplies products to more than 500 defense and space industry organizations, making it a significant supplier to the Russian defense-industrial complex.

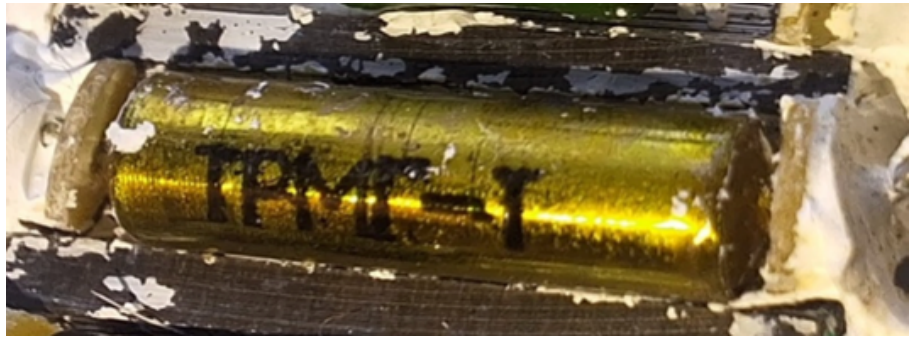


Diode array
Manufacturing date: September 2014

JSC NIIEMP

JSC Penza Research Institute of Electromechanical Devices	**Location** Penza	**TIN** 5834054179	**Owner** RosEl (Rostec)	**Sanctioned by**

NIIEMP is a Russian developer and manufacturer of passive electronic components and precision analog devices. The institute specializes in three core product areas: resistors and resistor components, vacuum high-frequency switching devices, and precision thin-film resistor networks, voltage dividers, and hybrid DAC/ADC integrated circuits. It is also the country's sole developer and manufacturer of several categories of vacuum electronic devices. Its products are designed for high-reliability military, aerospace, and industrial electronics, including precision measurement systems, computing equipment, communications, and defense applications.



Thermistor
Manufacturing date: January 2015

JSC POLIKOND

Location	TIN	Owners	Sanctioned by
Ryazan	6230002109	***Pankov*** Aleksei Alekseevich, ***Mezhevich*** Aleksandr Sergeevich	

Polikond specializes in film, metallized paper, combined, and power compensation capacitors for industrial, automotive, and defense applications.

The company is the exclusive manufacturer of several capacitor series, including K75-10, K75-24, K77-1, and K42-18, designed for DC, AC, and pulse-current circuits. According to the manufacturer, K77-1 capacitors are intended for military and special-purpose equipment, while K75-10 and K75-24 are designed for industrial as well as military applications.

Polikond is also Russia's sole producer of K75 combined capacitors and manufactures capacitors for low- and high-voltage reactive power compensation systems.

Metallized polycarbonate film capacitor
Manufacturing date: February 2015

JSC VOSKHOD KRLZ

JSC Voskhod Kaluga Radio Tube Plant	Location	TIN	Owner	Sanctioned by
	Kaluga	4026000108	Unknown	

Voskhod is a Russian developer and manufacturer of active electronic components.

KRLZ's product portfolio includes digital integrated circuits, operational amplifiers, transistor arrays, integrated circuits for automatic control and monitoring systems, transistor optocouplers, semiconductor lasers, infrared LEDs, photodiodes, and thermal print heads.

As part of the production of the Kh-101 cruise missile, the company manufactures operational amplifiers, precision high-speed dual operational amplifiers, and quad analog switches used in the missile's onboard computer. It also supplies electronic components for the Iskander-K missile, which are used in its the Zarya-61M onboard digital computer and inertial navigation system.

Operational amplifier
Manufacturing date: August 2014

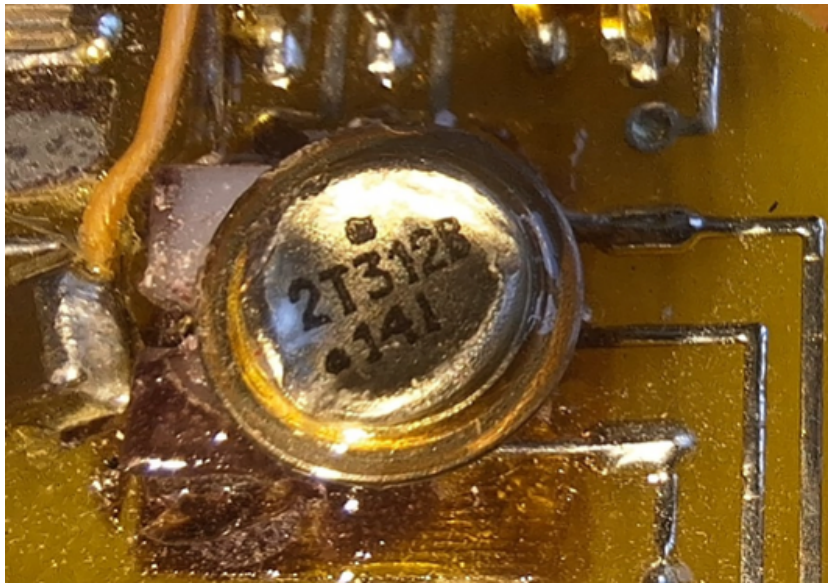
JSC VORONEZH-SBORKA

JSC Voronezh Semiconductor Plant-Sborka	Location	TIN	Owner	Sanctioned by
	Voronezh	3661033635	Unknown	

Sborka specializes in the manufacture of electronic. components for industrial applications. Its core product portfolio includes discrete semiconductor devices, integrated circuits, transistors, power modules, and other components for electronic and radio-electronic equipment.

It supplies transistor arrays, transistor matrices, and semiconductor matrices for the Kh-101 and Iskander-K cruise missiles, where they are integrated into the UVK-208 module and the Zarya-61M onboard digital computer.

The company also manufactures diodes and transistor arrays used in the TVK-2 television channel of the Pantsir-S1 air defense system.



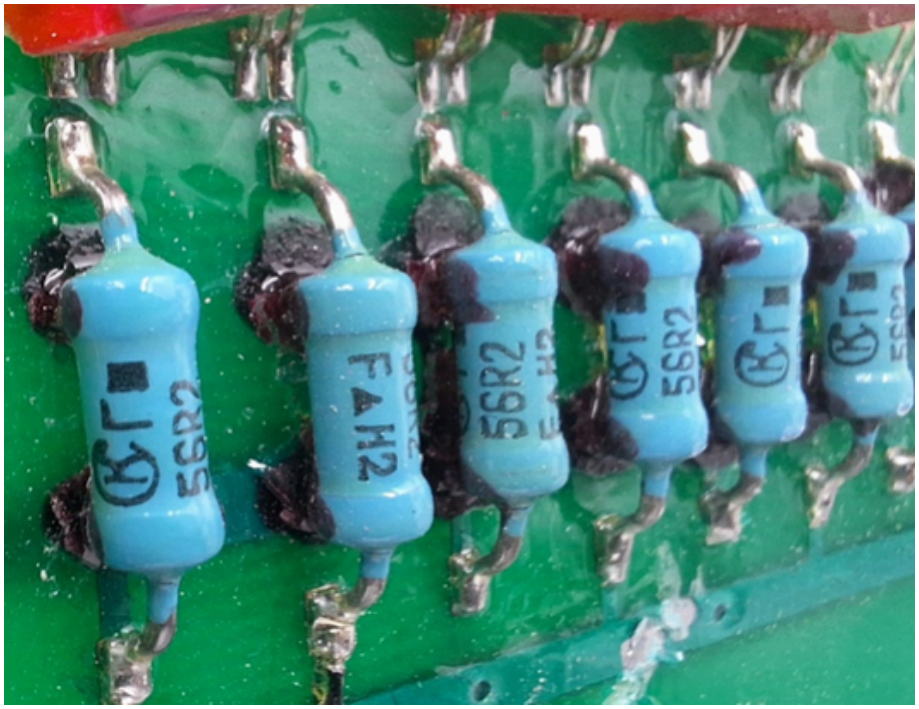
Silicon NPN bipolar junction transistor

NPO ERKON

JSC Scientific and Production Association “Erkon”	**Location** Nizhniy Novgorod	**TIN** 5262073044	**Owner** JSC FPK “Energiya”	**Sanctioned by**

Erkon manufactures resistors, attenuators, and chip inductors. Its product portfolio includes precision, RF and microwave, high-resistance, high-voltage, low-resistance foil, high-power, and general-purpose resistors, as well as microwave attenuators and absorbers, resistor networks, voltage dividers, chip inductors, and jumper components.

The company specializes in developing and manufacturing industrial- and defense-grade passive electronic components for high-frequency, microwave, and other demanding electronic applications.



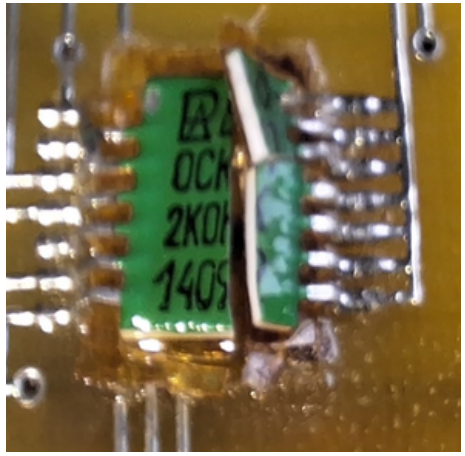
High-precision stable resistors

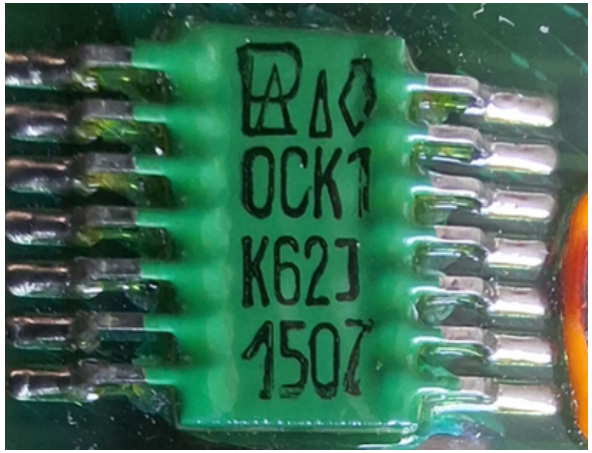
JSC KONTAKT

Location	TIN	Owner	Sanctioned by
Yoshkar-Ola, Republic of Mary El	1215013114	Unknown	

Kontakt is a Russian manufacturer of fixed and variable resistors. The company produces general-purpose and military-grade resistors, as well as automotive electronic components and industrial electrical equipment.

Kontakt maintains in-house capabilities for the development and production of new resistor technologies and remains a supplier of passive electronic components for industrial and defense applications.





Multi-channel resistor network
Manufacturing dates: January 2014 and March 2015

OKB EKSITON

Location	TIN	Owner	Sanctioned by
Pavlovskiy Posad, Moscow Oblast	5035025460	Unknown	

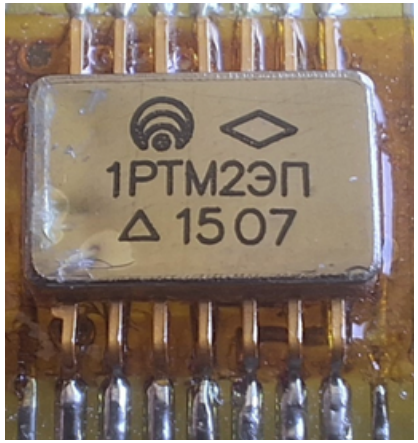
Eksiton is a manufacturer of semiconductor devices and integrated circuits. The company specializes in the production of analog and digital integrated circuits, bipolar and CMOS logic devices, transistor arrays, voltage regulators, operational amplifiers, comparators, interface ICs, and other semiconductor components for industrial, telecommunications, aerospace, and defense applications.

As one of Russia's long-established microelectronics enterprises, Eksiton supplies electronic components for high-reliability military and space systems and remains an important part of the country's defense-industrial complex.

It supplies digital logic ICs, level converters, logic gates, and semiconductor matrices for the Kh-101 and Iskander-K cruise missiles.

Eksiton also supplies integrated circuits for the Kh-59M2/M2A guided missile, where they are incorporated into the T1A-02 television seeker and the T1B-02 guidance system installed in the APK-9M2 airborne targeting pod.

CMOS logic integrated circuit
Manufacturing date: May 2015



Dual CMOS D-type flip-flop with logic-level and clock inputs
Manufacturing date: February 2015

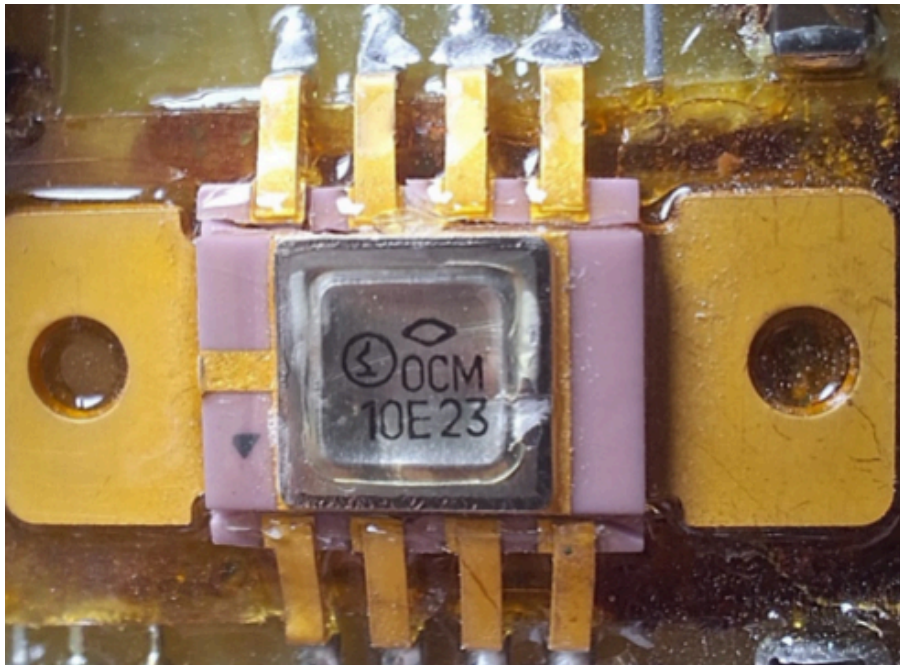
NPP TEZ LLC

	Location	TIN	Owners	Sanctioned by
Tomilino Electronic Plant Research and Production Enterprise LLC	Tomilino, Moscow Oblast	5027095560	***Radkevich*** Stanislav Dmitrievich, ***Sakulin*** Leonid Gennadievich	

NPP TEZ is a developer and manufacturer of semiconductor devices and integrated circuits. The company specializes in the design and serial production of general-purpose silicon rectifier diodes, silicon and gallium arsenide (GaAs) microwave diodes, high-voltage rectifier diode stacks, integrated circuits for secondary power supplies, metal-ceramic packages, and electronic modules.

As part of a group focused on automotive electronics, NPP TEZ also supplies high-reliability semiconductor components for industrial and defense applications.

In particular, TEZ's voltage regulator integrated circuits can be found in the 72V6 combat vehicle of the Pantsir-S1 air defense system (and its variants).



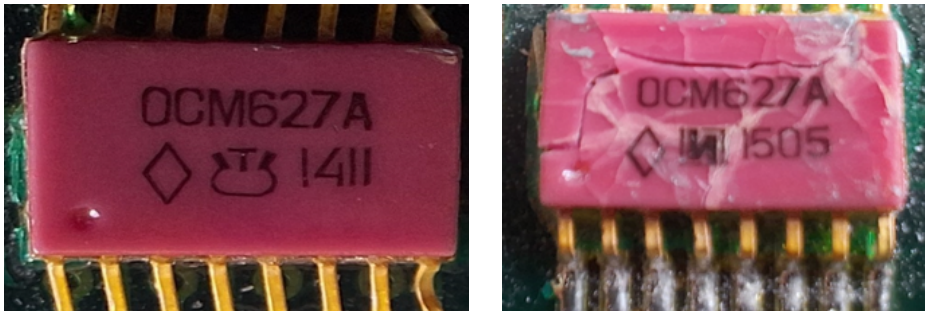
Voltage regulator

INTEGRAL HOLDING

Location	TIN	Owner	Sanctioned by
Minsk, Belarus	6319122290 100141154	Ministry of Industry of the Republic of Belarus	

Integral Holding is Belarus's largest manufacturer of integrated circuits, semiconductor devices, and liquid crystal displays. It has maintained a full-cycle microelectronics production capability, manufacturing digital, analog, and mixed-signal integrated circuits, microprocessors, microcontrollers, memory and interface ICs, programmable logic devices, power management ICs, ADCs, DACs, operational amplifiers, comparators, voltage regulators, discrete semiconductor devices (diodes, transistors, thyristors), and radiation-hardened components.

As part of Integral Holding, Transistor Plant specializes in the production of discrete semiconductor devices, integrated circuits, and radiation-hardened electronic components for industrial applications, including defense and space systems. It is one of Belarus's principal suppliers of semiconductor components for high-reliability military and aerospace electronics.



OSM-grade diode arrays
Manufacturing dates: March 2014 (Transistor Plant) and January 2015 (Integral)

CMOS integrated circuit
Manufacturing date: October 2015 (Integral)

CONCLUSION

Extensive reliance on Western commercial microelectronics is the defining feature of most Russian precision weapons documented since 2022.

Compared with previously documented Russian precision weapons, **the recovered Oreshnik electronics exhibit a much greater reliance on domestically produced foundational electronic components.** Most identified components are based on mature manufacturing processes that have been in industrial use for decades.

This architecture appears to **reduce the system's dependence on Western semiconductor supply chains**, reflecting, at least in part, Russia's long-standing efforts to substitute imported electronics with domestically produced alternatives.

However, because the analyzed components were manufactured primarily between 2014 and 2018 and represent only the recovered and identifiable debris, these findings **should not be interpreted as evidence that Russia has achieved complete technological self-sufficiency.**

Instead, the analysis highlights **how the boundary between civilian and military microelectronics has become increasingly blurred.** Oreshnik incorporates components manufactured not only by subsidiaries of Rostec and Roscosmos but also by numerous companies with no obvious or direct affiliation to the military-industrial sector. This underscores the need for sanctions policy to extend beyond missile manufacturers and traditional defense enterprises to encompass the broader semiconductor ecosystem.

Restricting this broader industrial base would help limit Moscow's ability to upgrade its domestic semiconductor industry, thereby constraining the long-term development of its defense technological capabilities.

WHAT IS ORESHNIK MADE OF?

Russia's Most Domestic Missile Yet

INDEPENDENT ANTI-CORRUPTION COMMISSION (NAKO)

Skoropadskoho Str., 3, first floor, Kyiv, Ukraine

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