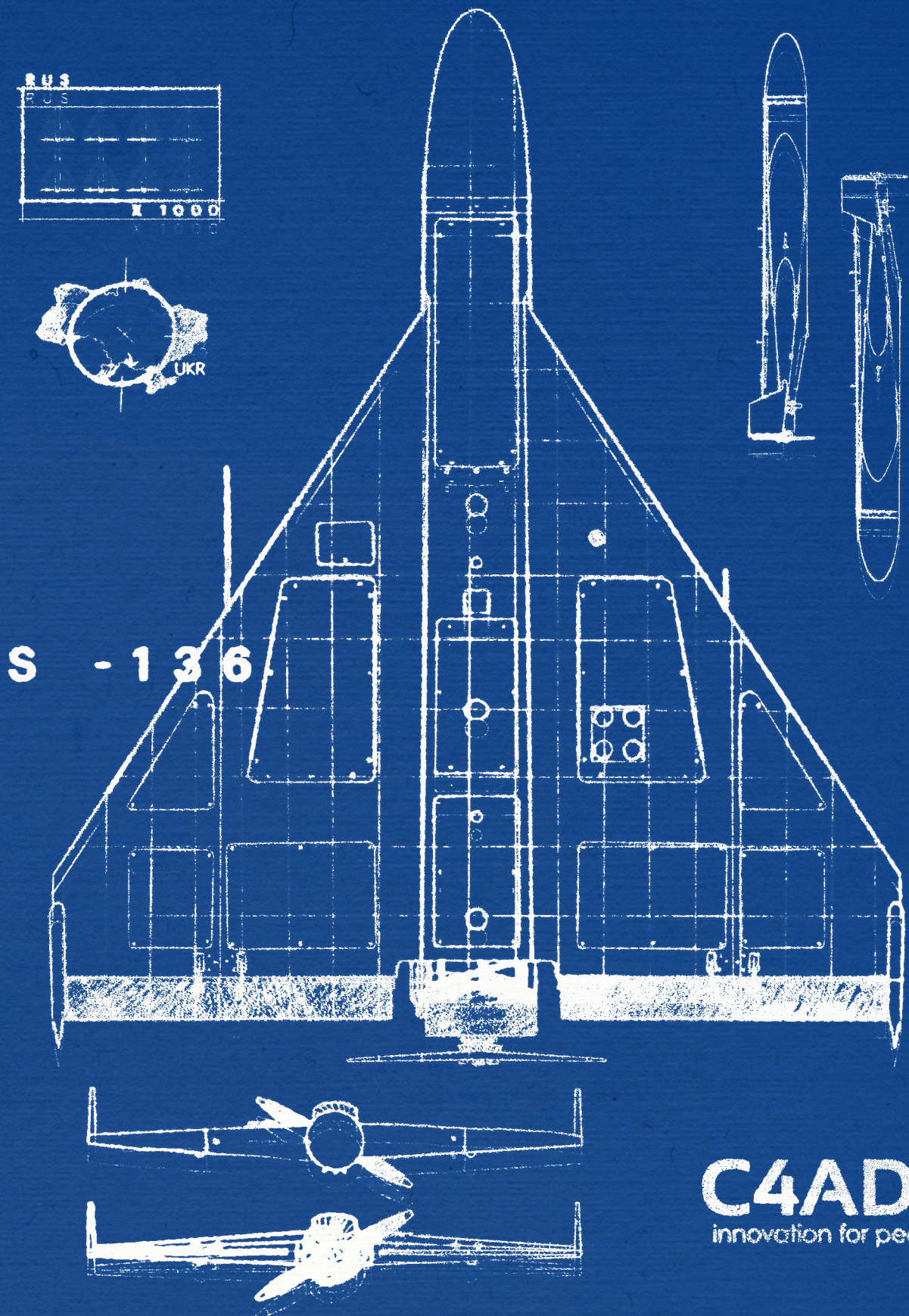


# AIRBORNE AXIS:

INSIDE THE DEAL THAT BROUGHT IRANIAN DRONE  
PRODUCTION TO RUSSIA



**C4ADS**  
innovation for peace



# About C4ADS

C4ADS (www.c4ads.org) is a 501(c)(3) nonprofit organization dedicated to data-driven analysis and evidence-based reporting of conflict and security issues worldwide. Our approach leverages nontraditional investigative techniques and emerging analytical technologies. We recognize the value of working on the ground, capturing local knowledge, and collecting original data to inform our analysis. At the same time, we employ cutting-edge technology to manage and analyze that data. The result is an innovative analytical approach to conflict prevention and mitigation.

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# About the Author

Omar Al-Ghusbi is a graduate of American University with a dual bachelor’s in International Affairs and Arabic. Since graduating, Omar has worked for a variety of organizations including think tanks, industry, military, and U.S. government. At C4ADS, his work has focused on the intersection of grey-zone competition, transnational networks, and the impacts of emerging defense technologies.

# Legal Disclaimer

The mention of any individual, company, organization, or other entity in this report does not imply the violation of any law or international agreement, and should not be construed to so imply.

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# Executive Summary

Iran and Russia are deepening their political and military relationship through intermediary companies that facilitate their defense collaborations and flout global sanctions regimes. This report examines the case of Iran’s role in developing Russian unmanned aerial vehicle (UAV or drone) production capability, which Russia is using to wage its war in Ukraine. Leaked records indicate that the Iranian company Sahara Thunder led an extensive collaboration with the Russian company Alabuga JSC to provide the latter with the technology and know-how to produce a variant of the S-136 UAV, which Russia has since used widely in military operations against Ukraine.

This collaboration has spanned multiple years and persisted in the face of global censure and sanctions against both countries. Key aspects of the partnership include the following:

**Close Ties to the State:** Both Sahara Thunder and Alabuga JSC are economic actors with long-term ties to the state. Sahara Thunder is deeply embedded in state defense networks. It is a prime example of Iran’s use of middlemen to carry out its activities while the Russian state is leveraging Alabuga JSC for defense industrial use.

**UAE Intermediaries:** Sahara Thunder and Alabuga JSC used a UAE-based company to carry out aspects of their partnership, which allowed the two companies to minimize evidence of direct contact in the UAE’s low-barrier business environment.

**Mixed Payment Systems:** Alabuga JSC paid for equipment and services through wire transfers via the UAE and gold shipments. The two payment methods offer different advantages, and the combination of the two offers agility in circumventing sanctions.

**Relationship Development:** The outcome of this collaboration has outlived the UAV project. Reciprocal visits by both parties served not only to expand UAV localization but also focused on other defense industrial domains, indicating a growing Russian-Iranian military partnership.

Ultimately, the collaboration outlined in leaked data is borne out by evidence on the battlefield. The Russian military has deployed thousands of Geran-2 UAVs—the Russian-produced variant of the S-136—against military, civilian, and economic targets across Ukraine.<sup>1</sup> Sahara Thunder and Alabuga JSC’s project may also have broader implications for global security. As the United States and other countries seek peace in Ukraine and consider their strategies, policymakers should not consider Russia or Iran within a vacuum but instead as interdependent actors.

# Introduction

Iranian unmanned aerial vehicles (UAVs, or “drones”) are helping transform the battlefield in Ukraine for Russia. These UAVs are cheap and expendable, and the Russian military has launched over 8,000 of them against military and civilian facilities across Ukraine since the start of the conflict.<sup>2</sup> The logistics behind their deployment—a multi-billion-dollar effort to localize Iranian UAV production in Russia—tells the story of a new era in Russian-Iranian military collaboration and provides an unprecedented glimpse into rogue state operations.

Iran and Russia have an extensive history of military collaboration, but until recently, this relationship has largely consisted of Russia sending military goods to Iran. Major military sales from Russia to Iran began in 1989 during the Soviet era, and Russia sold tanks, aircraft, and missiles to Iran throughout the 1990s.<sup>3 4</sup> Since Russia invaded Ukraine in 2022, military goods and technology, including UAVs, have now begun flowing in the other direction.<sup>5 6 7</sup> UAVs are a particularly important focus of collaboration between Russia and Iran: Russia had a comparatively limited UAV production base prior to its invasion of Ukraine, and the Russian government has sought to develop this capability as the United States and the European Union (EU) moved to close key supply chains.<sup>8</sup>

This collaboration takes place in the face of—and is perhaps spurred by—the global sanctions regimes against Russia and Iran. Since the 1979 Islamic Revolution, Iran has faced extensive sanctions from the United States and its allies in response to Iran’s destabilizing actions across the world.<sup>9</sup> These sanctions have targeted various sectors of the Iranian economy, including energy, infrastructure, defense, research, and finance. For its part, since its 2022 invasion of Ukraine, Russia has been subject to sanctions and trade restrictions implemented by the United States,<sup>10</sup> the EU,<sup>11</sup> the United Kingdom, and others.<sup>12</sup>

The ongoing transfer of UAV technology and manufacturing capability provides important insight into how Russia and Iran are continuing to develop their military collaboration while pursuing their economic, security, and foreign policy goals. It demonstrates how Iran repurposes tactics once used to acquire sensitive materials and support proxies to now export UAV models and production capabilities.

# Methodology

This report uses leaked data supplemented by other forms of publicly available information to map the actors involved in the transfer of UAV production technology from Iran to Russia.

On February 4, 2024, a hacking collective called Prana Network leaked 10 gigabytes of data from the little-known Iranian company Sahara Thunder.<sup>13</sup> These documents included 10,685 emails and attachments covering Sahara Thunder’s oil shipping network, as well as 45 PDFs related to its engagement with the Russian company Alabuga JSC. This material is supplemented by leaked data from Safiran Airport Services (SAS), an Iranian company that the United States sanctioned in September 2022 for its role in coordinating supplier-related flights between Russia and Iran.<sup>14 15</sup>

However, leaked data cannot always be taken at face value as reliable or complete. This data may reflect biases from the source, the hackers, or other involved parties. Several groups inside and outside Iran have motivations to conduct such hacks, including domestic opposition groups, regional rivals, or international powers. As of the date of this publication, we have been unable to verify which among these groups, if any, was responsible for leaking the data we used. **It is important to note, C4ADS is not confirming the accuracy of the leaked data, and any reference to it is clearly referenced in the footnotes.**

As such, this report uses additional publicly available information and analytical methods to corroborate, analyze, and expand upon information sourced from the leaked data. Key sources and methods include:

- **Data Processing and Machine Learning:** Analysts developed a large language model from a database of over 10,000 email records found in the Sahara Thunder leaks. This allowed for quicker and more reliable lead generation, cross-referencing, and visibility into the company’s activities. We also indexed all emails related to the SAS leaks in an in-house data lake, facilitating quicker searches for relevant terms, documents, and entities of interest.
- **UAV Component Analysis:** C4ADS conducted visual and technical analyses of S-136 subsystems recovered from the battlefield in Ukraine to verify information in the leaks and assess developing capabilities.
- **Corporate Data:** Analysts used the Iranian Gazette, along with preexisting data on high-risk Iranian entities, to map corporate networks and source personally identifiable information for individuals and companies named in the leaks.
- **Other Public Sources:** C4ADS used vessel flag registries, signals data, and public reporting to verify and complement leaked data. Automatic Identification System data allowed for the tracking of vessels’ historical paths, while aircraft positioning data corroborated travel activities, such as Russian delegation visits to Iran.

# The Players

The leaked documents indicate that Sahara Thunder and Alabuga JSC facilitated a deal to bring Iranian UAV production to Russia. A deeper look into both entities indicates their ties to the state—Sahara Thunder is deeply embedded in state defense networks and is a prime example of Iran’s use of middlemen to carry out its activities, while Alabuga JSC has direct ties to the Russian government and defense sector.

## Sahara Thunder

Sahara Thunder (شرکت تندر صحرا) is a Tehran-based private limited company founded in 1992.<sup>16</sup> Sahara Thunder’s activities cover a range of economic sectors, including oil shipping and defense procurement. Data found in the Sahara Thunder leaks indicates that the company has facilitated Iranian cooperation with international military manufacturers in Russia and China since at least 2016.<sup>17 18 19</sup> For example, Sahara Thunder’s email archives provide evidence that between 2016 and 2022, the company brokered Iran’s purchase and import of Russian military aerostats—lighter-than-air balloons and airships used for surveillance—from the state-owned Russian defense company Dolgoprudny Design Bureau of Automatics (DKBA).<sup>20 21</sup> Additional emails show that Sahara Thunder had an agreement with the Chinese entity CAMA (Luoyang) Electromechanic CO., LTD to purchase dynamometers, used to test engines and aerospace components in 2019.<sup>22 23</sup> CAMA (Luoyang) Electromechanic is partially owned by the China Air-to-Air Missile Research Institute, itself a subsidiary of the key state-owned defense enterprise Aviation Industry Corporation of China.<sup>24</sup> In addition to its defense activities, Sahara Thunder’s oil smuggling operations have continued to act as a significant revenue stream that financially supports the Iranian regime.<sup>25</sup>

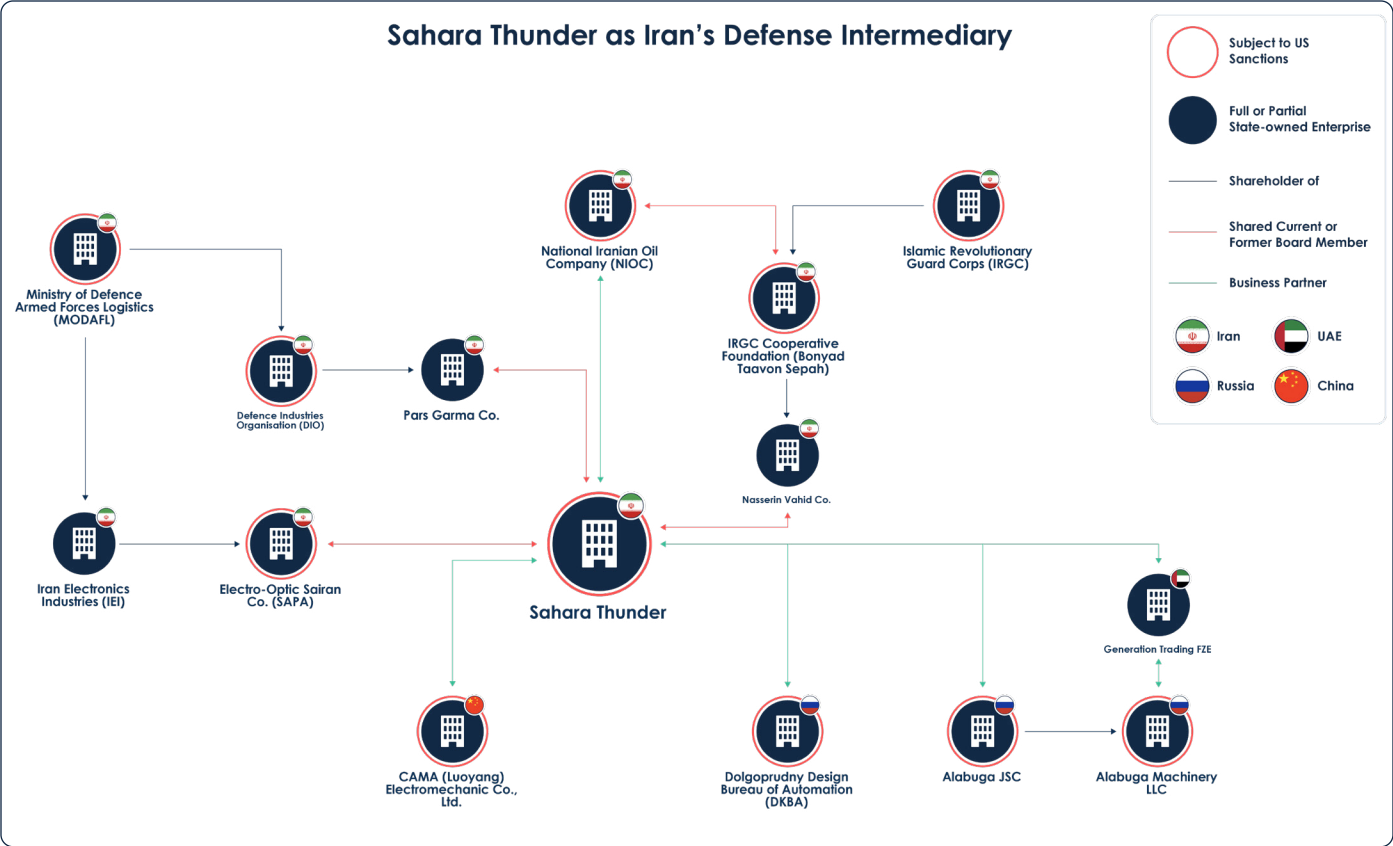
Both Sahara Thunder and its subsidiary, Etemad Tejarat Misagh, were sanctioned by the U.S. Department of the Treasury’s Office of Foreign Assets Control (OFAC) on April 25, 2024.<sup>26</sup> In the designation, Sahara Thunder is cited as being the main front company “facilitating and financing the clandestine sale of Iranian UAVs for Iran’s Ministry of Defense and Armed Forces Logistics (MODAFL)” to Russia.

## Ties to the Iranian Government

Sahara Thunder appears to have a pattern of representing Iran in its dealings with the Russian defense sector. For example, the agreements between Sahara Thunder and DKBA—the Russian entity that sold Sahara Thunder aerostats—were conducted via the Iranian attaché in Moscow in 2016, according to leaked data.<sup>27 28</sup> According to leaked emails, Sahara Thunder states a person with the last name “Famerini” was the company’s representative in dealing with DKBA in 2022.<sup>29</sup> Meanwhile, an individual named Rohollah Famerini is listed as the attaché at the Iranian Embassy in Moscow during the same timeframe.<sup>30 31</sup> This is not the only time this name has appeared in connection with Russia on aerospace topics. According to the Russia-based Aviation and Space News, an individual named Rohollah Famerini represented the Iranian Helicopter Research and Development Company (IHSRC) as its deputy managing director for Commercial and Economic Affairs at Russia’s 2017 MAKS Air Show.<sup>32</sup> During the air show, Famerini presented a new Iranian helicopter, the Saba-248, designed by IHSRC.<sup>33</sup>

Sahara Thunder appears to be at the center of a dense network intersecting Iran’s Ministry of Defense and Armed Forces Logistics (MODAFL), the Islamic Revolutionary Guard Corps (IRGC), and commercial entities in the broader defense sector. Its corporate network is deeply entangled with other key defense entities. Current or former members of Sahara Thunder’s board also sit on the boards of MODAFL subsidiary Pars Garma, OFAC-sanctioned UAV subsystem producer Electro-Optic Sairan Co., and Acme Tower Kish, which is closely tied to companies affiliated with sanctioned IRGC Brigadier General Hojatollah Ghoreishi.<sup>34 35</sup> Ghoreishi is reportedly the head of logistics for MODAFL and allegedly negotiated the sale of Iranian UAVs to Russia through the summer of 2022.<sup>36 37 38</sup> Additionally, the chairman of Sahara Thunder’s board of directors, Kazem Mirza Kondori, was once an attaché of the Iranian embassy in China.<sup>39</sup> Leaked emails indicate that, outside of its ties to defense and diplomacy, Sahara Thunder has conducted oil smuggling for the National Iranian Oil Company since at least 2022, although it is believed that its oil smuggling activities likely started before this date.<sup>40 41</sup>





Sahara Thunder is one of many examples of Iran using intermediary entities to achieve its defense goals while evading sanctions.<sup>42</sup> Once global actors and sanctioning bodies identify these intermediaries, Iran can adapt or retire its intermediaries and move on to new supporting actors. This agility is present in the case of Sahara Thunder: Iranian corporate data indicates that after the U.S. Department of the Treasury sanctioned the company in 2024, Sahara Thunder changed its name to Bani Tejarat Kousha (بانی تجارت کوشا).<sup>43</sup> As of April 2025, Sahara Thunder is in the process of liquidation, potentially clearing the way for another company to take its place.<sup>44</sup>

Alabuga JSC

Alabuga JSC is the management company of the Alabuga Special Economic Zone (SEZ), which is located in Tatarstan, a region of Russia.<sup>45</sup> The company is owned by the Ministry of Land and Property Relations of the Republic of Tatarstan.<sup>46</sup> Alabuga SEZ is host to several other companies alleged to support Russian UAV production, including the Alabuga JSC subsidiaries Alabuga Development LLC and Alabuga Machinery LLC, as well as other companies, like Albatross LLC, which also produce UAVs used by Russia in Ukraine.<sup>47 48 49</sup> The Alabuga-branded companies' operations are not completely distinct from each other: Alabuga Machinery is directly mentioned in leaked documents as having received materials from Sahara Thunder.<sup>50</sup> Meanwhile, Alabuga SEZ resident Tatneft Alabuga Fiberglass is the alleged producer of fiberglass and other materials used to support Alabuga JSC's UAV production.<sup>51</sup> Alabuga JSC was sanctioned by the U.S. Department of the Treasury on January 15, 2025, for its role in making UAVs.<sup>52</sup>

The leaked Sahara Thunder documents do not provide a clear picture of the direct mechanisms through which Alabuga JSC may be producing and providing UAVs to the Russian military. However, media reports indicate that at least one Alabuga JSC subsidiary received a contract from the Russian Ministry of Defense and in 2023, the Alabuga SEZ received an award for implementing state defense orders.<sup>53 54</sup>



June 5, 2021



November 11, 2021



April 4, 2023



September 28, 2024

Shahed 136

According to leaked records, Sahara Thunder contracted with Alabuga JSC to localize production of Iranian UAVs—most notably, the Shahed-136 at the Alabuga SEZ in Tatarstan. The Shahed (“Witness”)-136 or “S-136” UAV is a flying wing loitering munition, also known as a “suicide drone” due to its single-use nature. The Iranian state-owned corporation Iran Aircraft Manufacturing Industries (HESA) produces the UAV in association with the Iranian aerospace company Shahed Aviation Industries.<sup>55</sup> The S-136



S-136 in flight.

is purportedly inexpensive to produce but offers sizable capabilities, including an operational range of 2,000 kilometers and a payload of 40 kilograms.<sup>56 57</sup> The S-136 is widely used by Iranian military forces, such as the IRGC, which has deployed or proliferated it in conflict zones such as Yemen.<sup>58 59</sup> In addition to its relatively low price and long range, the S-136 as a platform does not require costly aerospace infrastructure like a runway. The S-136 can be launched using a rocket-assisted takeoff method, which can be conducted from the back of converted civilian vehicles.<sup>60</sup> This gives the user flexibility to launch from various locations and increases the difficulty of detection and interception.



The Deal

Leaked data indicates that Sahara Thunder acted as a middleman to facilitate a sprawling, high-level deal between Iranian and Russian defense industrial entities. In particular, the agreement was intended to indigenize Russian UAV production to support its war in Ukraine while strengthening Russian-Iranian defense ties. In November 2022, Alabuga JSC and Sahara Thunder had signed an agreement to provide Russia with the ability to localize at least 90% of its production for 2,400 S-136 UAVs per year, with the goal of producing 6,000 UAVs within the first two and a half years of cooperation.<sup>61</sup>

To achieve these goals, Sahara Thunder initially agreed to provide Alabuga JSC with the following for S-136 production:

- 6,000 UAV kits;<sup>62</sup>
- The transfer of various technologies, blueprints, and source codes for several S-136 components, including the MD-550 engines, avionics systems, rocket-assisted takeoff method rocket boosters, and explosive warheads;<sup>63</sup> and
- 300,000 hours of training in Iran and 300,000 hours of training in Alabuga SEZ to assist with indigenizing S-136 production there.<sup>64</sup>

The total contract price for technology, equipment, source code, and 6,000 units was 108.5 billion rubles (approximately US\$1.75 billion per the contemporary exchange rate).<sup>65</sup> The initial investment from Alabuga JSC is listed as 48 billion rubles (US\$782.6 million), of which 36 billion rubles were advanced to Iran and the remaining 12 billion rubles were allocated to the development of buildings and structures at the Alabuga SEZ site.<sup>66</sup> Iran has historically quoted the production cost for each unit at US\$30,000-US\$50,000.<sup>67</sup> In the November 2022 agreement, the price for the 6,000 UAV kits was listed as 12 million rubles/US\$193,000 per unit, with lower-volume purchases priced significantly higher (8 million rubles/US\$290,000 per unit for 2,000 units).<sup>68</sup> These quotes likely factor in costs such as infrastructure, training, licenses, and other services.

Between April and July 2023, the parties signed and carried out subsequent contracts for Sahara Thunder to provide additional materials (including rolled stainless steel, stainless steel wires, and other equipment) to Alabuga JSC and its subsidiary Alabuga Machinery.<sup>69 70</sup>

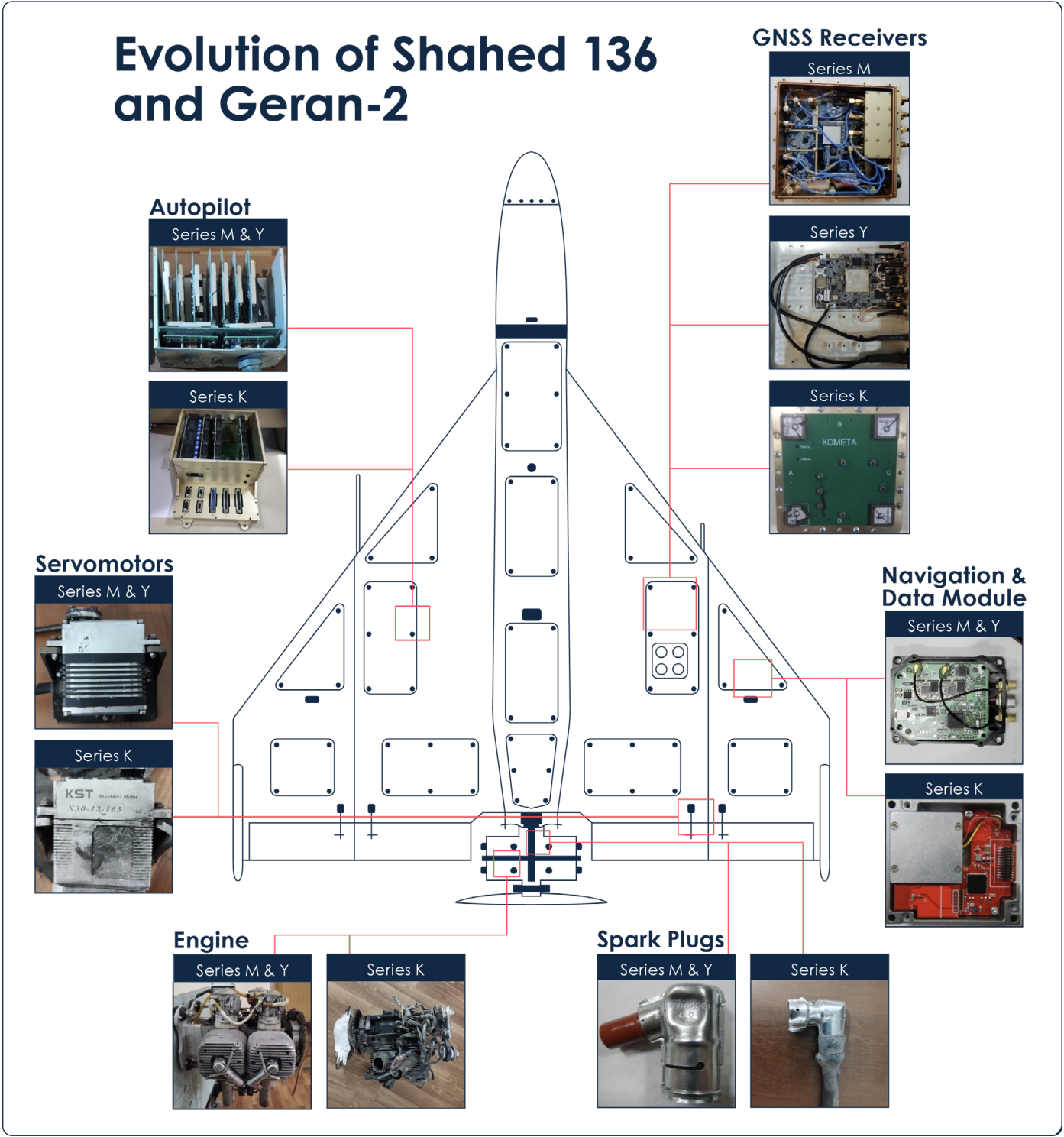
Use in Ukraine

The collaboration between Sahara Thunder and Alabuga JSC has borne fruit, as seen across the battlefield of Ukraine. Analysis of UAV imagery from Ukraine corroborates Russia’s shift from imported Iranian S-136 UAVs to a domestically produced S-136 analog deployed under the name Geran-2 (Geranium-2). During the early stages of the Russian-Iranian agreement, and before Russia was able to establish its production facilities, Iran likely delivered S-136 UAVs produced directly by HESA or its affiliates. In early September 2022, the Armed Forces of Ukraine shot down the first Iranian S-136 kamikaze UAV in the Kupiansk sector of the frontline.<sup>71</sup> This first generation, denoted by the letter “M,” is assumed to be almost an exact copy of the model used by Iran’s armed forces.<sup>72</sup>

After several months, a new version of the Russian Geran-2 began to appear in Ukraine, marked with the Cyrillic character “БІ.” This second generation, although sharing many similarities with the “M” variant, exhibits minor changes to its internal subsystems.<sup>73</sup> The third observed variant is marked with the letter “K.” This model has the most variance in its subsystems when compared to the original Series M and subsequent Series БІ.<sup>74</sup> Based on a comparison of the subsystems across these various generations, the K variant appears to diverge significantly from earlier M and БІ models.<sup>75</sup> This suggests that, although at one point Iran exported S-136 UAVs to Russia, the relationship has since localized at least a portion of production within Russia.

The switch from UAV imports to localized UAV manufacturing has played a significant role in supporting Russia’s war in Ukraine.

As of September 2024, Russia had reportedly launched as many as 8,060 Geran-2 UAVs against military, civilian, and economic targets across Ukraine.<sup>76</sup> By indigenizing UAV production, Russia has been able to quickly maintain and expand its long-range strike capability. To accommodate shifting mission requirements, Russia can allocate additional resources to produce or modify the Geran-2 without additional Iranian support. While benefiting from increased autonomy, Russia can still take advantage of any improvements that Iran might make to the S-136, as the countries’ shared production methods facilitate Russia’s adoption of innovations to Iranian UAV designs.



Locations of various subsystems found in the Shahed-136/Geran 2, including the variations found in each production series. The three series’ subsystem variations align with documented efforts to localize UAV production within Russia.



# Network Characteristics

The window provided by leaked data into Sahara Thunder and Alabuga JSC’s relationship reveals how the companies approached the many facets of cooperation necessary to successfully localize UAV production in Russia. While, in some ways, the collaboration is like any other international defense partnership, several aspects of the engagement show how the companies are operating within and adapting to a constrained global environment. The following are key methods of collaboration identified in the leaks.

## UAE Intermediaries

The leaked documents indicate that Sahara Thunder and Alabuga JSC made use of a UAE-based company to carry out their partnership, which allowed the two networks to interface without direct contact. According to leaked documents, in May 2023, the UAE-based Generation Trading FZE sent 100 million UAE dirhams (US\$27.2 million) worth of rolled stainless steel and stainless steel wires to Alabuga Machinery LLC, a subsidiary of Alabuga JSC.<sup>77</sup> Documents show that Generation Trading processed numerous transactions with Alabuga Machinery LLC via the Dubai Branch of Bank Melli Iran, including the previously mentioned agreements for equipment, tools, and raw materials.<sup>78</sup> <sup>79</sup> Sahara Thunder appears to have frequently used the UAE to process payments for its maritime activities, with financial institutions such as the National Bank of Fujairah PSC and the Emirates Islamic Bank appearing to have processed hundreds of thousands of dollars in transactions on behalf of Sahara Thunder and other subsidiaries for port charges and bunkering operations.<sup>80</sup> <sup>81</sup> <sup>82</sup>

Подписи сторон:	Signatures of the parties:
<p><b>Покупатель</b> <b>ООО «Алабуга Машинери»</b> Юридический адрес: 423601, Республика Татарстан, Елабужский м.р-н, город Елабуга, г.п., тер. ОЗЗ Алабуга, ул. Ш-2, стр. 5/12, помещ. 110 ИНН / КПП 1674003000/ 167401001 ОГРН 1221600079623</p> <p>Генеральный директор:  /Н.Н. Афтапов/</p> <p><b>Получатель платежа</b> <b>GENERATION TRADING FZE. (ОАЭ)</b> Адрес: SMBA0186 Compass Building, Al Shohada Road, AL Hamra Industrial Zone-FZ, Real Al Khaimah, United Arab Emirates</p> <p>Директор _____/ Hans Crispin Punay De Paz</p> <p><b>Поставщик</b> <b>Компания «Сахара Тандер»</b> Юридический адрес: № 2 - Аллея Могадас (4) - ул. Гасир - ул. Бехешти- Тегеран – Иран BOX: 1514637131</p> <p>Генеральный директор _____/Хоссейн Бахшайеш</p>	<p><b>The Buyer</b> <b>Alabuga Machinery LLC</b> Registered address: 5/12 Sh-2 St., room 110, Alabuga Special Economic Zone, municipal settlement, Elabuga, Elabuga municipal district, Republic of Tatarstan, 423601 INN (taxpayer ID)/ KPP (tax registration reason code) 1674003000/ 167401001 OGRN (primary state registration number) 1221600079623</p> <p>General Director:  /N.N. Aftapov/</p> <p><b>The Payee</b> <b>GENERATION TRADING FZE. (UAE)</b> Address: SMBA0186 Compass Building, Al Shohada Road, AL Hamra Industrial Zone-FZ, Real Al Khaimah, United Arab Emirates</p> <p>Director _____/ Hans Crispin Punay De Paz</p> <p><b>The Supplier</b> <b>Sakhara Thunder</b> Registered address: No. 2 Mogadas Alley (4), Gasir St., Beheshti Ave, Tehran, Iran BOX: 1514637131</p> <p>General Director _____/Hossein Bakhshayesh</p>

Contract between Alabuga Machinery (Russia), Generation Trading FZE (UAE), and Sahara Thunder (Iran ).<sup>83</sup>

The UAE provides numerous advantages to Iranian and Russian companies conducting business. The UAE allows Free Zone Establishments (FZEs) like Generation Trading FZE to have 100% foreign ownership, tax exemptions, the ability to freely repatriate profits and capital, and limited liability for the capital shareholders invested in the company.<sup>84</sup> These characteristics allow sanctioned entities in Iran and Russia to access otherwise-blocked infrastructure for communications, transport, and finance.

## Caspian Sea Logistics

The leaked documents indicate that Sahara Thunder and Alabuga JSC took care to ensure that the transfer of equipment from Iran to Russia took place through secure routes and in coordination with trusted partners.



Key transit location between Iran and Russia as specified in the Sahara Thunder leaks

that Alabuga Machinery agreed to wire the agreed-upon funds in UAE dirham to Generation Trading’s bank account with the Dubai branch of Bank Melli.<sup>90</sup> Generation Trading would then be able to transfer the funds from their Bank Melli account to Sahara Thunder’s account in Iran.

However, the companies did not limit themselves to wire transfers and, on multiple occasions, apparently used gold bars instead. Evidence of the transfers included a handwritten form dated March 16, 2023, for the delivery of 1,788,402.2 grams of gold at a price of US\$58.32/gram, for a total price of US\$104.29 million.<sup>91</sup> In addition or revision to that agreement, a contract dated April 5, 2023, between Sahara Thunder and Alabuga Machinery (represented by director Nikolai Nikolaevich Aftapov) references a delivery of 2,067,795.9 grams of gold to the Iranian party.<sup>92</sup> <sup>93</sup>

An undated document indicates that Alabuga JSC used Eurasia Shipping LLC to transfer 50 containers of cargo across the Caspian Sea, from Amirabad Port, Iran to Makhachkala, Russia.<sup>85</sup> Eurasia Shipping is not a generic shipping company: it is closely linked to Russia’s Ministry of Defense through its leadership and operational oversight, including ties to a military-aligned logistics firm and a research institute controlled by a defense-focused conglomerate sanctioned for its work in electronic warfare.<sup>86</sup> <sup>87</sup> As such, Eurasia Shipping likely has both the technical expertise to ship military goods as well as the personal network to warrant Alabuga JSC’s trust.

Eurasia Shipping may represent only one of several firms involved in Sahara Thunder and Alabuga JSC’s UAV logistics. The leaks separately noted other candidates considered for coordinating shipment logistics, including the Russian companies Sarmat LLC, GC “Advance Shipping,” and LLC TF “VTS-Forwarding.”<sup>88</sup> Once the shipments arrived in Russia, other logistics firms were likely involved in moving the materials to Alabuga SEZ from the port by truck or train.<sup>89</sup>

## Mixed Payment Systems

In addition to figuring out how to move the goods, Alabuga JSC and Sahara Thunder needed secure means to transfer and receive payments. Over the course of their relationship, they used multiple methods to transfer funds. In one instance, leaked documents show

№	Наименование Товара عنوان کالا	Товар کالا		Цена за единицу Товара, USD/грамм بها به ازای هر واحد کالا، دلار	Общая стоимость Товара USD بهای کل کالا، دلار
		ед. измерения واحد	кол-во تعداد		
1	Золото в слитках с массовой долей драгоценного металла в сплаве 99,99 процентов (код ТН ВЭД ЕАЭС 7108 12 000 1 «Золото в слитках с содержанием не менее 995 частей золота на 1000 частей сплава») همش طلا با کسر جرمی فلز گرانبها در آلیاژ 99.99 درصد (کد 1 7108 12 000 HS EAEU "طلا در همش های حاوی حداقل 995 قسمت طلا در هر 1000 قسمت آلیاژ")	Грамм گرام	1 788 402,2	58,317339	104 294 857

Excerpt from a March 2023 contract between Alabuga JSC and Sahara Thunder, detailing the quantity of gold to be paid to Sahara Thunder<sup>95</sup>

By using gold, the parties avoided using the U.S. dollar, which could be in short supply or subject to enforcement action by the U.S. Department of the Treasury. The transfer of gold also provides additional anonymity as it circumvents traditional financial systems while leaving a limited digital footprint. These characteristics make precious metals like gold an excellent medium for the payment of goods or services that require heightened discretion.

While the Sahara Thunder leaks only indicate that the companies made payments via gold and wire transfers through the UAE, sanctioned Iranian entities may be leveraging cryptocurrencies as well. Leaked emails from SAS, another Iranian company sanctioned by the United States for its role in coordinating military and UAV-related flights between Russia and Iran, hint at this trend.<sup>95</sup> In a leaked correspondence associated with a March 2023 state trip to Iran by Belarusian President, Alexander Lukashenko, SAS offers the Belarusians to pay for the airport services via the cryptocurrency Tether.<sup>96</sup> As sanctions regimes continue to evolve, hard-to-trace and under-regulated cryptocurrencies may become critical channels for illicit payments used by entities like SAS and Sahara Thunder.

## Relationship Development and Trust-Building

Beyond the hard details of logistics and payments, both Sahara Thunder and Alabuga JSC invested time and effort into building a strong, long-lasting relationship. Both parties hosted the other for extensive tours of their respective countries and facilities. Emails illustrate that, in November 2022, a delegation of Russian engineers from Alabuga JSC traveled to Iran for a 10-day trip to Iranian UAV production facilities and to reach an initial working agreement on localization.<sup>97</sup> The leaked emails show that five months later, in March 2023, Alabuga JSC reciprocated by hosting an Iranian delegation, which was split into two groups and visited a total of eight cities. During the visit, the delegation toured a variety of defense-related factories producing UAVs, grenade launchers, anti-aircraft systems, multiple launch rocket systems, and transport vehicles.<sup>98</sup> Alabuga JSC’s November 2022 trip to Iran appears to have resulted in the primary agreement between Alabuga and Sahara Thunder,<sup>99</sup> while Sahara Thunder’s March 2023 trip to Russia appeared to look at further expanding cooperation and was followed by the companies signing a contract for the delivery of gold to Sahara Thunder.<sup>100</sup>

Дата, день недели	Наименование мероприятия с указанием места проведения	Ответственный	Дата, день недели	Наименование мероприятия с указанием места проведения	Ответственный
5 марта, воскресенье	Прибытие иранской делегации в г. Москву. Трансфер в гостиницу «Ибис».	Отв. Д.Бубнов	10 марта, пятница	1 группа. Посещение АО «ХЗ «Планта» (г. Нижний Тагил). Трансфер от гостиницы и обратно. Обед.	Отв. В.Минаев
6 марта, понедельник	Мультимедийные презентации компетенций холдинга. Презентации предприятий. (демозал АО «Технодинамика», ул. Большая Татарская, д.35, стр.5, 2 этаж). Посещение АО «МПО им. И.Румянцева» (г. Москва). Ужин. Переезд в гостиницу «Ибис».	Отв. В.Минаев		2 группа. Посещение АО ЦНТУ «Динамика» (г. Жуковский). Трансфер от гостиницы и обратно. Обед.	Отв. Д.Бубнов
7 марта, вторник	Посещение АО «НПО «Прибор» им.С.С.Голембиовского» (филиал в г. Ногинске). Трансфер от гостиницы и обратно. Обед.	Отв. Д.Бубнов	11 марта, суббота	1 группа. Посещение АО «НПП «Старт» им. А.И.Яскина» (г. Екатеринбург). Трансфер от гостиницы и обратно. Обед.	Отв. В.Минаев
8 марта, среда	1 группа. Перелет в г. Екатеринбург. Размещение в гостинице «Рамада». Ужин. 2 группа. День отдыха. Культурная программа (г. Москва). Обед.	Отв. В.Минаев		Трансфер от гостиницы в аэропорт. Вылет делегации в г. Москву. Трансфер из аэропорта в гостиницу	Отв. Д.Бубнов
9 марта, четверг	1 группа. Посещение АО «КУЛЗ» (г. Каменск-Уральский). Трансфер от гостиницы и обратно. Обед. 2 группа. Посещение АО «ФНПЦ «НИИПХ» (г. Сергиев Посад). Трансфер от гостиницы и обратно. Обед.	Отв. Д.Бубнов		2 группа. Посещение АО «НПО «СПЛАВ» (г. Тула). Трансфер от гостиницы и обратно. Обед.	Отв. Д.Бубнов
		Отв. Д.Бубнов		Культурная программа (г. Москва) Ужин. 12 марта, воскресенье	Отв. В.Минаев
		Отв. Д.Бубнов	13 марта, понедельник	Подведение итогов работы. Обед. Вылет делегации из г. Москвы.	Отв. Д.Бубнов

Schedule for Sahara Thunder’s nine-day, eight-city visit to Russia in March 2023.<sup>101</sup>

The next month, in April 2023, an Alabuga JSC delegation—including its General Director Timur Shagivaleev and Deputy CEO Sergei Alekseev—visited Iran for technology transfers, source code acquisition, training, and a demonstration of other Iranian UAV systems.<sup>102 103 104</sup> During this trip, Shagivaleev signed a metals contract with Sahara Thunder’s leadership.<sup>105</sup> Besides technology transfers and source code acquisitions for the S-136, the Russian delegation attended a demonstration of three other Iranian UAV platforms.<sup>106</sup> These included a S-136 “Seeker” variant, which is equipped with an optical guidance kit in the nose; a variant of the S-136 powered by a turbofan jet engine (known as the S-238 in Iran but referred to as “S-236 Jet” in the document); and a “reconnaissance/kamikaze” UAV referred to as the 107, which is likely in reference to the Shahed-101 model of drone.<sup>107</sup> The Russian delegation noted that producing these UAV variants could be easily accomplished using the same assembly lines used for producing the Geran-2 at Alabuga SEZ.<sup>108</sup> Ukrainian officials reported Russia first began using these Shahed variants in late 2023, and more recently increased production of the jet-powered UAVs coined under the model Geran-3.<sup>109</sup>

### График поставок исходя из производственных возможностей партнера следующий:

#### 1. 236 Seeker

Месяц	1	2	3	4	5	6	3 кв.	4 кв.	5 кв.	6 кв.	7 кв.	8 кв.	ИТОГО
Количество	10	10	10	100	100	100	300	300	300	300	300	300	2130

#### 2. 236 реактивный

Месяц	1	2	3	4	5	6	3 кв.	4 кв.	5 кв.	6 кв.	7 кв.	8 кв.	ИТОГО
Количество	2	5	10	20	20	20	100	100	100	100	100	100	677

#### 3. 107 разведчик/камикадзе

Месяц	1	2	3	4	5	6	3 кв.	4 кв.	5 кв.	6 кв.	7 кв.	8 кв.	ИТОГО
Количество	10	50	50	75	75	100	500	500	500	500	500	500	3360

Production timelines for additional UAV variants produced after Sahara Thunder demonstrated additional UAVs to the Alabuga JSC delegation during their April 2023 visit to Iran.<sup>110</sup>

Though the details of how the partners engaged with each other during these visits are unknown beyond the resulting agreements and the contents of the leaked documents, the trips appear to be a key factor in allowing Alabuga JSC and Sahara Thunder to develop the trust and shared reference points necessary to carry out such a large endeavor. The visits also emphasize the UAV deal as one instance of Russian-Iranian collaboration that has developed and changed over time.



# Conclusion

The collaboration between Sahara Thunder and Alabuga JSC is significant on multiple levels. Most immediately, it has vastly increased Russia’s domestic UAV production capability, and the people of Ukraine are paying the price. This development helps give Russia the upper hand in firepower and increased control of its UAV production, making it harder for other countries to implement export controls designed to slow or prevent future weapon development and production.

Sahara Thunder and Alabuga JSC exemplify the increasingly close relationship between Russia and Iran. While these types of companies create challenges in identifying and targeting the actors involved in Iran and Russia’s military procurement, they also provide opportunities to leverage investigative and enforcement capabilities. As Russia and Iran employ and discard intermediary companies to pursue their military and diplomatic aims, global stakeholders must prioritize the following:

- **Comprehensively mapping corporate ecosystems.** In the case of Iran, analysts should expand the scope of scrutiny beyond historically major actors such as Iran Aircraft Manufacturing Industries or Iran Electronics Industries to include smaller entities and startups that aid in obfuscation.
- **Comprehensively mapping the involvement of third-party jurisdictions.** Third-party jurisdictions, such as the UAE, have the authority to freeze assets associated with malign activity, but they will not do so unless the threat and their country’s role in its operations are clearly defined and unless they face additional pressure from global stakeholders.
- **Developing systems of monitoring alternative payment methods.** Precious metals and cryptocurrency remain key enablers of illicit activity. If not prioritized, they will continue to be pathways through which illicit actors can finance their activities without fear of disruption.

The collaboration also forces consideration of the natural consequences of sanctions. The language and actions of Sahara Thunder and Alabuga JSC demonstrate they are responding to the global sanctions environment in which they operate. This adaptation indicates the efficacy of the sanctions but also points to their limitations as sanctioned countries deepen mutual collaboration. Sahara Thunder and Alabuga JSC are now both sanctioned and widely recognized for their role in UAV production. However, Russian-Iranian cooperation on UAVs and in other realms will likely continue. Additional intermediary companies will rise to fill their roles, and they will likely employ the same or similar tactics used by Sahara Thunder and Alabuga JSC. Only by understanding and adapting to these tactics can global stakeholders disrupt similar entities, impacting the frontlines of today and the battlefields of tomorrow.

# Full Timeline: Negotiation and Collaboration

Sahara Thunder and Alabuga JSC engaged in extensive negotiations, meetings, and planning throughout 2022 and 2023. This is the timeline of events according to in the leaks and supplemental research. **C4ADS is not confirming the accuracy of the leaked data.**

## November 2022

**November 5-14:** A delegation of Russian engineers from Alabuga JSC visits UAV production facilities in Iran.<sup>111</sup> During this visit, Alabuga JSC and Sahara Thunder reached an initial deal. Sahara Thunder would provide Alabuga JSC with the equipment, blueprints, source codes, and training for Russia to localize 90% of its production for 2,400 UAVs per year, with the goal of producing 6,000 UAVs within two and a half years of cooperation.<sup>112</sup>

## January 2023

**January 19:** Sahara Thunder and Alabuga JSC sign an agreement outlining the terms for the supply of components likely used in the production of UAVs.<sup>113</sup> The previous day, Igor Levitin, secretary of the State Council of the Russian Federation and advisor to President Vladimir Putin, alongside members from Russia’s logistics sector,<sup>114</sup> completed a tour of Iran and met with various senior Iranian government, military, and financial representatives.<sup>115 116 117</sup>

## February 2023

**February 27-28:** Sahara Thunder and Alabuga JSC signed an additional agreement providing for transfers of gold from Alabuga in return for various components, equipment, and metals from Sahara Thunder.<sup>118</sup> This could be either a revision or an addition to the January agreement.

## March 2023

**March 5-13:** An Iranian delegation travels to Russia, visiting a variety of defense-related factories in eight cities across the country.<sup>119</sup>

**March 16:** A contract is signed to deliver over US\$104 million in gold to Sahara Thunder, likely tied to the February 27-28 agreement.<sup>120</sup>

## April 2023

**April 4-8:** A Russian delegation, reportedly including Alabuga JSC’s general director and deputy CEO, Timur Shagivaleev and Sergei Alekseev,<sup>121</sup> respectively, visit Iran for technology transfers, source code acquisition, training, and a demonstration of other Iranian UAV systems.<sup>122 123</sup>

**April 5:** Alabuga JSC’s Shagivaleev signs a metal purchase contract with Sahara Thunder’s leadership.<sup>124</sup>

## July 2023

**July 5:** UAE-based company Generation Trading FZE is listed in a leaked Sahara Thunder document as having sent 100 million UAE dirhams (US\$27.2 million) worth of rolled stainless steel and stainless-steel wires to Alabuga Machinery, a subsidiary of Alabuga JSC.<sup>125</sup>

**July 16:** Sahara Thunder and Alabuga JSC sign an agreement stating that Sahara Thunder will provide various equipment and tools to Alabuga Machinery through Generation Trading.<sup>126</sup> In return, Alabuga Machinery will wire transfer the funds to Generation Trading’s bank account with Bank Melli’s branch in Dubai.<sup>127</sup>

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93 Around the same time, on March 16, 2023, the previously mentioned slide deck “Акты\_Договоры\_2023г” (“Acts\_Agreements\_2023”) included a document that lists the transfer of over US\$104 million in gold to Sahara Thunder. Although the document states the transfer is related to agreement “28.02.2023r,” signed the month prior, the valuation matches the amount Alabuga was stipulated to pay in the agreement “19.01.2023r.” This may indicate that agreement “28.02.2023r” is potentially an expansion or revision of agreement



“19.01.2023г.” “Акты\_Договоры\_2023г,” Sahara Thunder Email Leaks (2023), 2; and “Акты\_Договоры\_2023г,” Sahara Thunder Email Leaks (2023), 4.

94 “Акты\_Договоры\_2023г,” Sahara Thunder Email Leaks (2023), 2.

95 Government of the United States, “Treasury Sanctions Iranian Persons Involved in Production of Unmanned Aerial Vehicles and Weapon Shipment to Russia,” Department of the Treasury, September 08, 2022, <https://home.treasury.gov/news/press-releases/jy0940>.

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108 “Апрель 2023г Исламская Республика Иран командировка,” Sahara Thunder Email Leaks (2023).

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111 “ноябрь\_2022 г. Иран,” Sahara Thunder Email Leaks (2022), 3.

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