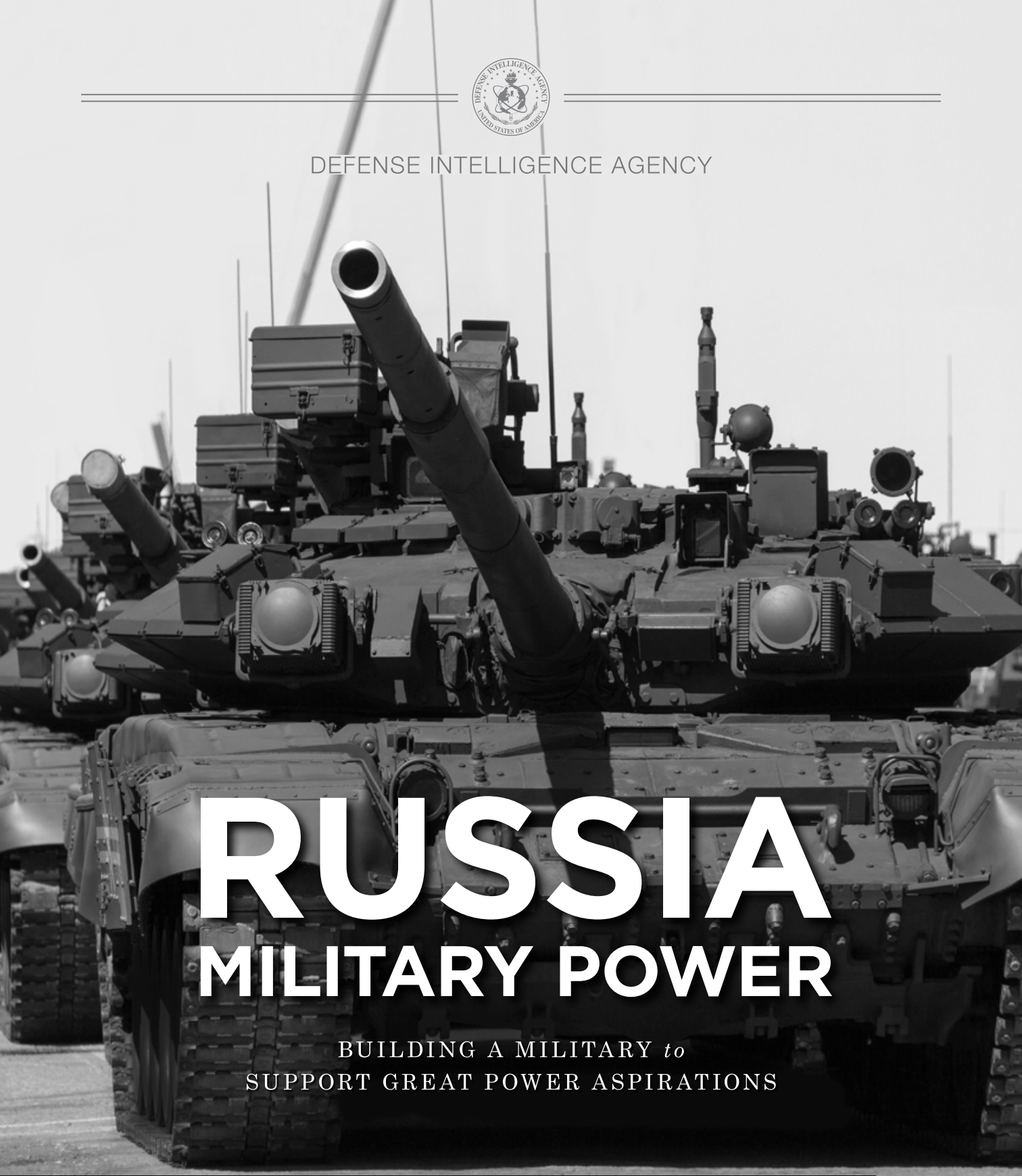
DEFENSE INTELLIGENCE AGENCY



RUSSIA
MILITARY POWER

BUILDING A MILITARY *to*
SUPPORT GREAT POWER ASPIRATIONS

Committed to Excellence In Defense of the Nation

2017

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PREFACE

For more than 50 years, DIA officers have met the full range of security challenges facing our great nation. Our intelligence professionals operate across the globe, and our work supports customers from the forward-deployed warfighter to the national policymaker. DIA is united in a common vision—to be the indispensable source of defense intelligence expertise—and for the past five decades we have done just that.

As part of this vision, DIA has a long history of producing comprehensive and authoritative defense intelligence overviews. In September 1981, Secretary of Defense Caspar Weinberger asked the Defense Intelligence Agency to produce an unclassified overview of the Soviet Union's military strength. The purpose was to provide America's leaders, the national security community, and the public a complete and accurate view of the threat. The result: the first edition of *Soviet Military Power*. DIA produced over 250,000 copies, and it soon became an annual publication that was translated into eight languages and distributed around the world. In many cases, this report conveyed the scope and breadth of Soviet military strength to U.S. policymakers and the public for the first time.

Today, we are faced with a complexity of intelligence challenges from multiple threats that we cannot afford to misunderstand. In the spirit of Soviet Military Power, DIA is proud to produce an unclassified defense intelligence overview of the military capabilities associated with the challenges we face—beginning with Russia. This product is intended to foster a dialogue between U.S. leaders, the national security community, partner nations, and the public about the challenges we face in the 21st century.

Vladimir Putin's address to the Russian Federal Assembly following the referendum on annexation of Crimea, 18 March, 2014:

"The USA prefers to follow the rule of the strongest and not by the international law. They are convinced that they have been chosen and they are exceptional, that they are allowed to shape the destiny of the world, that it is only them that can be right. They act as they please. Here and there they use force against sovereign states, set up coalitions in accordance with the principle: who is not with us is against us."

The international order established after the Second World War and developed throughout the Cold War largely ensured widespread peace and stability even as it saw new conflicts—large and small—take place in different regions of the world. This post-war era, underwritten primarily by the strength of the United States, also gave rise to the greatest period of prosperity in history, witnessing countries rebuild from war and emerge from colonialism to become vibrant and valuable members of the international community. Following the collapse of the Soviet Union, the United States emerged as a world leader militarily, economically and diplomatically. Today, however, the United States faces an increasingly complex array of challenges to our national security.

The resurgence of Russia on the world stage—seizing the Crimean Peninsula, destabilizing eastern Ukraine, intervening on behalf of Syrian President Bashar al-Assad, and shaping the information environment to suit its interests—poses a major challenge to the United States. Moscow will continue to aggressively pursue its foreign policy and security objectives by employing the full spectrum of the state's capabilities. Its powerful military, coupled with the actual or perceived threat of intervention, allows its whole-of-government efforts to resonate widely.

Russia continues to modernize its extensive nuclear forces and is developing long range precision-guided conventional weapons systems. It is manipulating the global information environment, employing tools of indirect action against countries on its periphery and using its military for power projection and expeditionary force deployments far outside its borders. Its ultimate deterrent is a robust nuclear force capable of conducting a massed nuclear strike on targets in the United States within minutes.

Within the next decade, an even more confident and capable Russia could emerge. The United States needs to anticipate, rather than react, to Russian actions and pursue a greater awareness of Russian goals and capabilities to prevent potential conflicts. Our policymakers and commanders must have a complete understanding of Russia's military capabilities, especially as U.S. and Russian forces may increasingly encounter each other around the globe. DIA will continue to provide our leaders decision-space, ensuring they have the time and information necessary to protect our nation. The wrong decisions—or the right ones made too late—could have dire consequences.

This report examines a resurgent Russia's military power to foster a deeper understanding of its core capabilities, goals, and aspirations in the 21st Century.

Vincent R. Stewart
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Director
Defense Intelligence Agency

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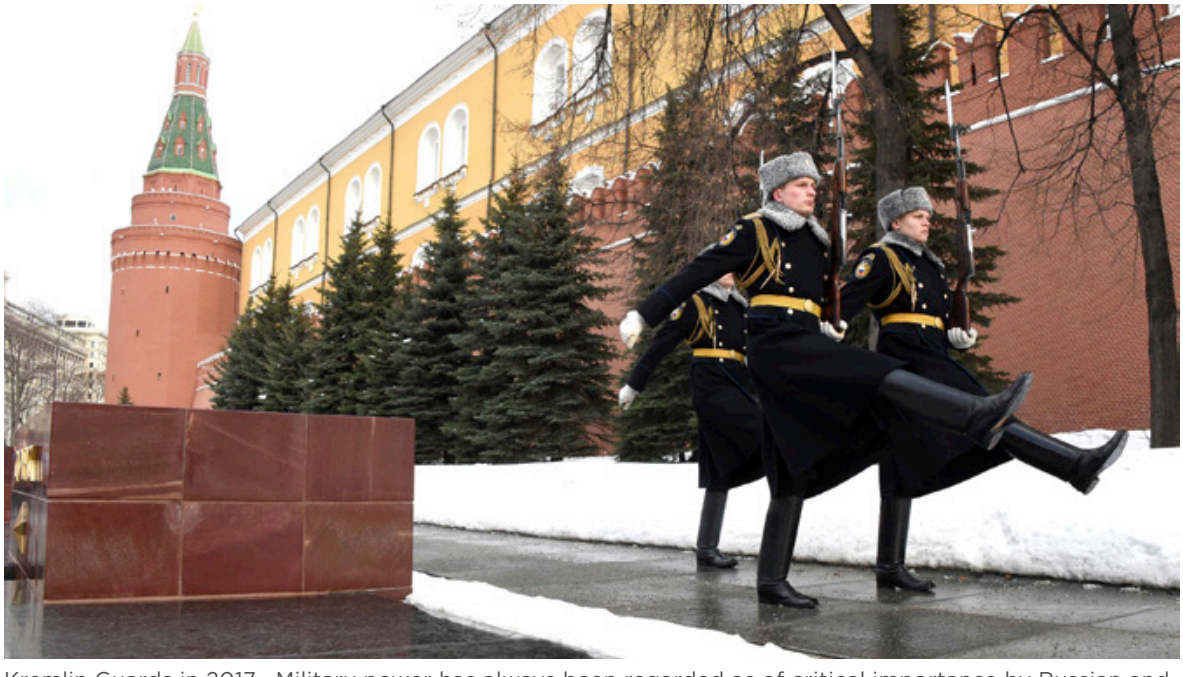

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Kremlin Guards in 2017. Military power has always been regarded as of critical importance by Russian and Soviet leaders, but after the collapse of the USSR, Moscow was left with a dramatically weakened military.

Introduction/Historical Overview

1991-Present: Fall and Rise of the Russian Military

Following the collapse of the USSR in 1991, the Russian Federation inherited several formidable tasks and challenges from its Soviet predecessor. For the newly-formed Russian Ministry of Defense, the most immediate challenge was to relocate military equipment and personnel from the newly independent states of the former USSR and countries of the disbanded Warsaw Pact into a new Russian state.[1] The assets of the Soviet Union's nuclear arsenal were of particular importance. Russia, Ukraine, Belarus, and Kazakhstan, the four states with nuclear weapons in their territory, eventually reached an agreement to dismantle all tactical and strategic nuclear weapons in the non-Russian republics or return them to Russia.[2] The issue of conventional military forces was much more problematic. Forces returning from Eastern Europe had to be reintegrated into the new Russian military, while

those in the newly independent states were viewed as the basis for building national militaries for new sovereign countries.[3]

Returning military forces from Eastern Europe were often shipped piecemeal back to unprepared bases in the Russian Federation.[4] Other units located in the territory of the former Soviet Union were absorbed by the newly independent states. In certain cases, units such as the Black Sea Fleet in Ukraine or the 14th Army in Moldova actively resisted the attempts by the Soviet successor states to absorb these forces. Some of these stranded units became embroiled in ethnic conflicts in Moldova, Georgia, and Tajikistan.[5] Most significantly for the new Russian military, interior military districts, which under the Soviet Union contained low-readiness mobilization forces such as the Moscow and North Caucasus Military Districts, now became "front-line" districts bordering foreign states.[6] The Russian Federation emerged from the collapse of the Soviet Union with a much smaller military and an entirely new set of security challenges.[7]

Russia's new military faced dramatic budgetary, readiness, and personnel shortfalls, as well as uncertainty of its role as Moscow struggled to determine its place in the post-Cold War world.[8,9] Russia cut military spending drastically during the decade of post-Soviet economic turbulence. Fielding of new weapons systems slowed to a trickle and eventually halted; the huge former Soviet arms industry struggled, focusing on gaining hard currency by selling its most modern weapons to foreign buyers.[10] At the same time, Russian military units lacked

Troops gathered around a fire for warmth during the Chechen conflict; the difficulties Moscow's weakened military faced during its operations against the separatist republic underscored its deterioration during the 1990s.

Image Source: Shutterstock

funding and fuel to train and exercise, and pay was often months in arrears. The readiness of the force was minimal, and the popular image of the Russian military of the 1990s remains ships rusting at pier side, pilots unable to fly, and Russian officers moonlighting with second jobs to make ends meet.[11]

Moscow also had difficulty manning its military. Press reports on military life that began to appear during the *glasnost* (openness) era of the late 1980s highlighted the harshness of the conscript's lot, and in particular the brutal and sometimes deadly *dedovschina* hazing of new draftees. Draft evasion became endemic, with many young Russian men using any and all legal or illegal measures to avoid military service.[12,13]

Russian generals voiced complaints about the poor quality of the conscripts they actually received, as they were often unhealthy, poorly educated, and sometimes arrived with criminal records.[14] The military's most painful trial, however, was caused by insurgency within the borders of the Russian Federation. From 1994 to 1995, undermanned and poorly trained Russian forces struggled to take and secure the breakaway Chechen Republic in the North Caucasus.[15] The military's problems and limitations were widely publicized by the Russian and international press, further undermining its reputation and reinforcing the desire of young Russians to avoid service.

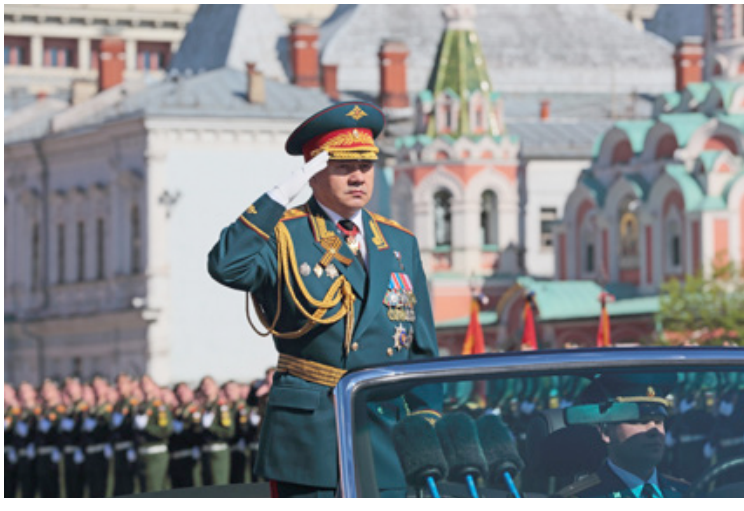
Throughout the post-Soviet era, there was a recognized need to reform and modernize the military.[16] Not only did the Russian military suffer from the readiness and manpower shortfalls outlined above, but Moscow's forces retained their cumbersome Soviet-era organization, designed for the mobilization of massive numbers of reservists to conduct deep mechanized theater operations in the context of a major war.[17] The 1990s and first decade of the 21st century saw a series of military reform efforts announced, discussed, and only abortively implemented. Russia's first Minister of Defense, General Pavel Grachev, (1992–1996) posited the creation of a fully manned and equipped small "mobile force" component that could rapidly move to a conflict area and hold the line until additional forces mobilized;[18, 19, 20] Minister of Defense Igor Sergeyev (1997–2001) created a new strategic nuclear deterrence force based on his previous service, the Strategic Rocket Forces;[21, 22] and Minister of Defense Sergey Ivanov (2001–2007) and Chief of the General Staff Yuriy Baluyevsky (2004–2008) pushed for the establishment of new regional theater commands and filling the military's ranks with professional "contract" personnel.[23, 24] By the late 2000s, these reform plans remained largely unimplemented, unsuccessful, or abandoned.

Russian SS-25 ICBM launcher; given the weakened state of its conventional forces in the years after the collapse of the USSR, Moscow prioritized the maintenance of its nuclear capabilities.

Image Source: Shutterstock

One arguable exception to this series of military reform failures was the effort during the late 1990s to create "permanently ready forces," a subset of the Russian force structure made up of units with better manning and equipment levels.[25, 26] These units were created and used during the second Chechen conflict (1999–2004) and enabled Moscow to intervene more rapidly and with more capable forces than during the first Chechen War (1994–1995).[27]

Despite modest improvements and a measure of success in the second Chechen conflict, the Russian military still entered the first decade of the 21st century with a Soviet-era mobilization force structure almost completely equipped with dated Soviet-era equipment. Shortfalls in modern command, control, communications, computers, and intelligence, surveillance, and reconnaissance (C4ISR) equipment and capabilities were particularly notable. Russian military limitations were fully on display during the August 2008 "five-day war" with Georgia.[28] Russian forces prevailed and defeated their relatively weak Georgian opponents, but after-action analysis by the Russian military highlighted many failings. Air and artillery strikes missed their targets, an army commander had to resort to a cell phone to contact a higher headquarters,[29] and several aircraft were lost to Georgian air defenses. While internationally



Minister of Defense Shoygu at the 2014 Victory Day Parade; since 2012, Shoygu has presided over the continued modernization of the Russian military as well as its operations in Ukraine and Syria.

Image Source: Shutterstock

Transition to the New Look Program

Moscow's limitations in modernizing its military had led to heavy dependence on its aging nuclear forces to defend the state. But while the presence of a robust nuclear deterrent dissuaded potential aggressors from directly attacking the Russian Federation, it was not flexible enough for Moscow to use in small, local conflicts such as Georgia or as a tool of power projection. The New Look program was a comprehensive and massive effort, aimed to change the Russian military from a Cold War-style mobilization force to a more ready, modern, and professional military able to respond to 21st century conflicts.[30] Partially-manned Soviet-style divisions were reorganized into what were planned to be fully-manned brigades; officer ranks were trimmed from 350,000 billets to initially 150,000, although later the number rose to 220,000; the contract manning effort was reshaped and reinvigorated, with a goal of 425,000 professional enlisted personnel in the force by 2017;[31] the six extant military districts were reshaped initially into four joint strategic commands, which controlled all military assets in their areas in peace and war; and lastly, a massive state armaments program was initiated, allocating 1.1 trillion rubles over 10 years, aiming at fielding a Russian military with 70% new or modernized equipment by 2020.[32, 33, 34, 35, 36, 37]

many were impressed by the ability of the Russian military, so derelict in the 1990s, to accomplish its mission, Moscow was spurred by what it viewed as critical shortfalls in Georgia to rapidly push forward a whole new set of reforms—known as the "New Look"—which had been under discussion before the conflict.[38]

The New Look was controversial and painful for many in or associated with the Russian military establishment.[39, 40, 41] Even military education and medical support organizations became targets for major reductions. In late 2012, the unpopular Minister of Defense associated with the reform effort, Anatoliy Serdyukov, left office and the former head of the Emergency Situations Ministry, Sergey Shoygu, took over.[42] Shoygu proved adept at easing some of the most unpopular aspects of the New Look while largely retaining and refining the essence of the reform program.[43]

The years of Shoygu's tenure have seen the New Look military engaged in a series of active operations. In early 2014, Russian naval infantry, special forces, and airborne troops rapidly seized control of the Crimean Peninsula.[44] While they faced almost no opposition, the operation gave the world its first look at a military that appeared surprisingly disciplined and well-equipped for those whose image of Russian forces was formed during the years of decay in the 1990s. Although their presence was denied by Moscow, Russian special forces and troops operated to mobilize, lead, equip, and support separatist militias in the Donbas region of eastern Ukraine from spring 2014 to the present. Ukrainian forces have stressed the capabilities of the Russian-enabled separatist units, especially with respect to C4ISR, artillery firepower, and air defense.[45, 46] In September 2015, Moscow launched its first expeditionary operation since the Soviet era, deploying fixed-wing and helicopter aviation assets to Syria. Combined with other military support to the Asad regime such as intelligence information, advisors, ammunition, and artillery, Russian action arrested the decline in the Syrian regime's military position.[47]

The Russian military today is on the rise—not as the same Soviet force that faced the West in the Cold War, dependent on large units with heavy equipment, but as a smaller, more mobile, balanced force rapidly becoming capable of conducting the full range of modern warfare. It is a military that can intervene in countries along Russia's periphery or as far away as the Middle East. The new Russian military is a tool that can be used to underpin Moscow's stated ambitions of being a leading force in a multipolar world.

Russian Joint Strategic Commands

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Image Source: DIA, DJ Design

Russia has established five Joint Strategic Commands (Obyedinennoye Strategicheskoye Komandovaniye – OSK) to deal with perceived threats from the west, south, east, and Arctic.[48]

Russia National Military Overview

Russia's Threat Perceptions

Since returning to power in 2012, Russian President Putin has sought to reassert Russia as a great power on the global stage and to restructure an international order that the Kremlin believes is tilted too heavily in favor of the United States at Russia's expense.[49] Moscow seeks to promote a multi-polar world predicated on the principles of respect for state sovereignty and non-interference in other states' internal affairs, the

primacy of the United Nations, and a careful balance of power preventing one state or group of states from dominating the international order.[50] To support these great power ambitions, Moscow has sought to build a robust military able to project power, add credibility to Russian diplomacy, and ensure that Russian interests can no longer be summarily dismissed without consequence.[51]

Russia's assertive promotion of its national interests, punctuated by its military actions in Ukraine and Syria, demonstrates a more confident and somewhat less risk averse Kremlin, but it also has revived international concerns about the re-emergence of a more militaristic Russia. Russian military forces played a key role in the seizure of Crimea and fomenting an artificial separatist revolt in eastern Ukraine, blunting Kyiv's aspirations to join NATO, at least for the foreseeable future.[52] Additionally, Russia's military intervention in Syria has changed the entire dynamic of the conflict, bolstering the Asad regime and ensuring that no resolution to the conflict is possible without Moscow's agreement. Nevertheless, these actions also belie a deeply entrenched sense of insecurity regarding a United States that Moscow believes is intent on undermining Russia at home and abroad.[53]

Moscow undoubtedly views the United States and its NATO partners as the principle threat to Russian security, its geo-political ambitions, and most importantly, the Kremlin's continued hold on power. This perception of vulnerability vis-à-vis the United States is most clearly evident in the latest Russian National Security Strategy published in December 2015. The document identifies the United States and its NATO allies as Russia's main threat, and accuses the West of pursuing a deliberate policy of containment against Russia to sustain its domination of the post-Cold War international order and deprive Moscow of its rightful place on the world stage.[54, 55] It explicitly states, "the Russian Federation's implementation of an independent foreign and domestic policy is giving rise to opposition from the United States and its allies, who are seeking to retain their dominance in world affairs." The security strategy also cites the buildup of NATO military capabilities closer to the Russian border, the deployment of U.S. missile defense capabilities in Europe, and the ongoing U.S. pursuit of strategic non-nuclear precision weapon systems as a serious threat to Russian security.[56]

Russia also has a deep and abiding distrust of U.S. efforts to promote democracy around the world and what it perceives as a U.S. campaign to impose a single set of global values. Moscow worries that U.S. attempts to dictate a set of acceptable international norms threatens the foundations of Kremlin power by giving license for foreign meddling in Russia's internal affairs. The December 2015 National Security Strategy warns of the importance of preserving traditional Russian spiritual and cultural values against foreign Western ideas and influences aimed at undermining Russia from within.[57] The Kremlin is convinced the United States is laying the groundwork for regime change in Russia, a conviction further reinforced by the events in Ukraine. Moscow views the United States as the critical driver behind the crisis in

Ukraine and the Arab Spring and believes that the overthrow of former Ukrainian President Yanukovych is the latest move in a long-established pattern of U.S.-orchestrated regime change efforts, including the Kosovo campaign, Iraq, Libya, and the 2003–05 "color revolutions" in Georgia, Ukraine, and Kyrgyzstan.[58]

Russian threat perceptions are not limited to the United States, and Moscow views the danger posed by Islamic militants and terrorists with grave concern.[59] The Kremlin is particularly sensitive to the growth and spread of these ideologies and their potential to further radicalize Russian Muslims in the turbulent North Caucasus and other Muslim areas of central Russia. Russian military operations in Syria are also intended to eliminate jihadist elements operating there that originated in the territory of the former Soviet Union, to prevent them from returning home and posing a threat to Russia. At the same time, Moscow remains anxious about the deteriorating situation in Afghanistan and the potential for Afghan-based Islamic extremists to spill over into the Central Asian states of the former Soviet Union and ultimately into Russia.[60]

Russian threat perceptions with regard to China are more divided and nuanced. Russian officials regularly praise the cooperative nature of the bilateral relationship, and Putin himself has declared that the current Russian-Chinese relationship is the best it has been in decades. In fact, the Russian National Security Strategy lists developing a strategic partnership with China as one of Russia's most important goals.[61] Moscow and Beijing share a common interest in weakening U.S. global influence and are actively cooperating in that regard.[62, 63] Military cooperation between the two countries is slowly expanding, as are economic ties.[64] Nevertheless, some Russians are keenly aware of the growing power disparity between Russia and an ascendant China and worry that Moscow is at risk of becoming Beijing's junior partner.[65] Others continue to harbor suspicions that China over the longer term will once again become a military threat to Russia.[66, 67]

National Security Strategy

Russia's current National Security Strategy was signed by President Vladimir Putin on 31 December 2015 as an update to the previous National Security Strategy published in 2009. The National Security Strategy is the Kremlin's foundational planning document and is intended for domestic and external audiences.[68] It codifies Moscow's strategic interests and national priorities for at least the next 6 years. The national priorities were consistent with those identified in previous strategies; however, the tone of this update was harsher than the 2009 strategy, reflecting Moscow's view of worsening relations with the West.

The 2015 strategy identifies Russian national interests as strengthening the country's defense, ensuring political and social stability, raising the living standard, preserving and developing culture, improving the economy, and strengthening Russia's status as a leading world power. These national interests are to be achieved through concentration on eight strategic national priorities:

- National defense
- State and public security

- Economic growth
- Science, technology, and education
- Healthcare
- Culture
- Ecology of living systems and rational use of natural resources
- Strategic stability and equal strategic partnership

In the 2015 document, the sections on national defense, internal stability, economy, and culture were significantly expanded.[69] Moscow identified new threats to state and public security posed by foreign nongovernmental organizations (NGOs), "color revolutions," and the use of social media to foment unrest and undermine political and social stability,[70] reflecting Russian officials' allegations that Western powers seek to provoke regime change in Russia.[71] The culture priority contains some of the strategy's most significant revisions, emphasizing the need to preserve and strengthen "traditional Russian spiritual and moral values," and indicating that Moscow views culture, language, and history as a tool for influence.

Unlike the 2009 version, the new National Security Strategy directly accuses the United States and NATO of pursuing actions that cause instability and threaten Russian national security.[72] The importance of a strong military for a leading world power is acknowledged; the strategy states that "the role of force as a factor in international relations is not declining." The new strategy reiterated key concepts outlined in Russia's 2014 military doctrine on the importance of deterrence and conflict prevention, nuclear and nonnuclear deterrence, and the need to improve Russia's mobilization process.[73] The National Security Strategy reflects a Russia more confident of its ability to defend its sovereignty, resist Western pressure, and contribute to the resolution of conflicts abroad (or insecurity).

Stability Issues

The Kremlin views internal political stability as a critical component of national strength and projecting power abroad, as evidenced by the emphasis placed on it in the National Security Strategy. Since returning to the presidency in 2012, Russian President Putin has worked to consolidate power. His efforts to further centralize control have been challenged by a slowing economy, lower energy prices, and growing public discontent with a system that lacks any genuine pluralism.[74] Putin has tried to deflect from these concerns by promising to restore Russia to great power status, on par with the United States, to mobilize public support and secure his legitimacy.[75, 76]

The Kremlin has taken steps to neutralize political opposition by expanding laws to impose harsh sentences that discourage public protests and encourage self-censorship.[77] It has also restructured its internal security forces to ensure a more loyal and responsive apparatus. Russia maintains security forces that are not subordinate to the military to conduct a range of internal security and policing functions. Nonetheless, the Kremlin will likely face continuing challenges to its rule from democracy and anti-corruption activists, labor unrest, as well the ever present threat of terrorism emanating from Russia's restive North Caucasus region.

Ministries with Internal Security Missions

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Ministry/Agency	Mission	Personnel *(Number of Troops)*
National Guard	Regime and internal security, federal law enforcement	(200,000)[78]
Ministry of Internal Affairs (MVD)	Civil policing and local law enforcement	904,800[79]
Federal Security Services (FSB) Border Troops	Border security: ground and maritime	(170,000)*[80]
Ministry of Justice (UIN)	Civil judicial system, prison guarding	32,000*[81]
Ministry of Emergency Situations (EMERCOM)	Civil defense, disaster response, humanitarian relief, firefighting	289,000 (7,500)[82]
Federal Protection Service (FSO)	Presidential, VIP, and regime protection	20,000[83]

**Estimate*

Insurgency in the South

Russia's enduring insurgency in its restive North Caucasus region continues at a consistent but low level. Stemming directly from its two conflicts in Chechnya in 1994–96 and then reigniting in 1999, Moscow largely declared an end to major operations by 2009, although it still retains a sizeable military and security force structure and counterterrorism regime in the region.[84] Still a volatile region, a general level of order is maintained via a mix of local and federal-level Russian forces, including Chechen forces loyal to Moscow headed by Chechen President Ramzan Kadyrov.[85]

Once the center of insurgent activity, levels of instability in Chechnya gradually have plateaued over the years, while those in its neighboring Muslim provinces such as Dagestan and Ingushetia have experienced sporadic upswings in activity over time. Although large groups of insurgents are now primarily a thing of the past, smaller bands still exist with affiliations to various nationalist and extremist groups such as ISIS-Caucasus and the Imarat Kavkaz. These groups and their members conduct small-scale operations and bombings against Russian forces—primarily from the Ministry of Internal Affairs (MVD) police or the National Guard. Although daily attacks have largely abated since late 2013, pervasive socio-economic issues, corruption, and heavy-handedness (real or perceived) by Russian authorities will continue drive feelings of disenfranchisement amongst the populace, providing a steady source for radicalization in the region.

External Defense Relations

The Commonwealth of Independent States (CIS) was a regional coordination body created among a number of the former Soviet states in the wake of the dissolution of the former Soviet Union. Nine states remain members, with Ukraine and Turkmenistan retaining associate member status. Russia's most important defense and security relationships are with its allies in the CIS Collective Security Treaty Organization (CSTO)—Belarus, Armenia, Kazakhstan, Kyrgyzstan, and Tajikistan. Based on the 1992 Tashkent Collective Security Agreement, the CSTO was established in 2002 as part of a larger Russian effort in the post-Soviet environment to create a more structured military organization capable of implementing the security guarantees stipulated in the agreement. Since then, the CSTO has developed a bureaucratic staff under the organization's secretary general and a rapid reaction force to respond to various contingencies that might impact the security of the member states. The CSTO conducts yearly joint military exercises addressing various scenarios such as peacekeeping or counterterrorism operations.[86] Russia also maintains an airbase at Kant, Kyrgyzstan, under the auspices of the CSTO.

Nonetheless, Russian efforts to build the CSTO into a more structured and capable organization on par with NATO largely have floundered. Some of the non-Russian member states worry that Moscow is using the organization to undermine their sovereignty and independence and are cautious of deepening military cooperation with Russia, as evidenced by Uzbekistan's withdrawal in 2007. Differing threat perceptions, an absence of trust amongst the members, and funding shortfalls have further plagued the organization.[87, 88, 89, 90]

Russia also is building cooperative defense relationships with other various countries throughout the Middle East, Latin America, Africa, and Asia, but its engagement is far less robust than in the former Soviet Union. Moscow appears to no longer be interested in funding Soviet-style patronage relationships, and Russian policy remains largely transactional aimed at expanding arms sales and other Russian economic interests, which has contributed to the limited nature of these ties.[91, 92] Nevertheless, the Kremlin continues to view its military outreach to these countries as important to enhancing its global stature and strengthening its regional influence.

Defense Budget

Russian government spending on national defense has generally grown over the last decade and in 2016 reached a post-Soviet record. This increase in defense spending was enabled by both a general increase in the size of Russia's GDP and a political decision to increase the defense burden—the share of national wealth devoted to defense.

In 2015, Russian defense spending reached a then-record $52 billion (in 2017 dollars) and the defense burden was nearly 4% of GDP.

The 2016 budget, which was initially to decrease defense spending, was amended late in the year to increase defense spending to $61 billion, a 4.5% defense burden on GDP.[93, 94, 95] By contrast, in 2006 defense spending was $27 billion, and the defense burden was 2.4%.[96, 97]

Moscow's ambitious rearmament program has driven the increase in defense spending. The Strategic Armament Program (SAP) called for spending 19.4 trillion rubles (equivalent to $285 billion) to rearm Ministry of Defense forces from 2011 through 2020. Each year the SAP is implemented through the State Defense Order (SDO), Moscow's purchase of new weaponry, investment in weapons-related research and design, and expenditure on modernization and repair of existing weaponry.[101] Funding for the 10 year program was heavily back-loaded such that just 31% was to be spent in the first 5 years (2011–2015) and nearly 70% was to be spent from 2016 to 2020.[102] In order for Moscow to meet its original target for SAP spending and maintain its operational spending at current levels, defense spending from 2016 through 2020 will have to increase substantially over 2011–2015 levels.

Russian defense spending, however, is poised to decrease in 2017.[103] The 2017 budget calls for 2.8 trillion rubles to be spent on national defense, equivalent to $42 billion.[104] This constitutes a 30% real cut in defense spending

Russia's Official Defense Spending 2006-2017 (billions of 2017 dollars)[98, 99, 100]

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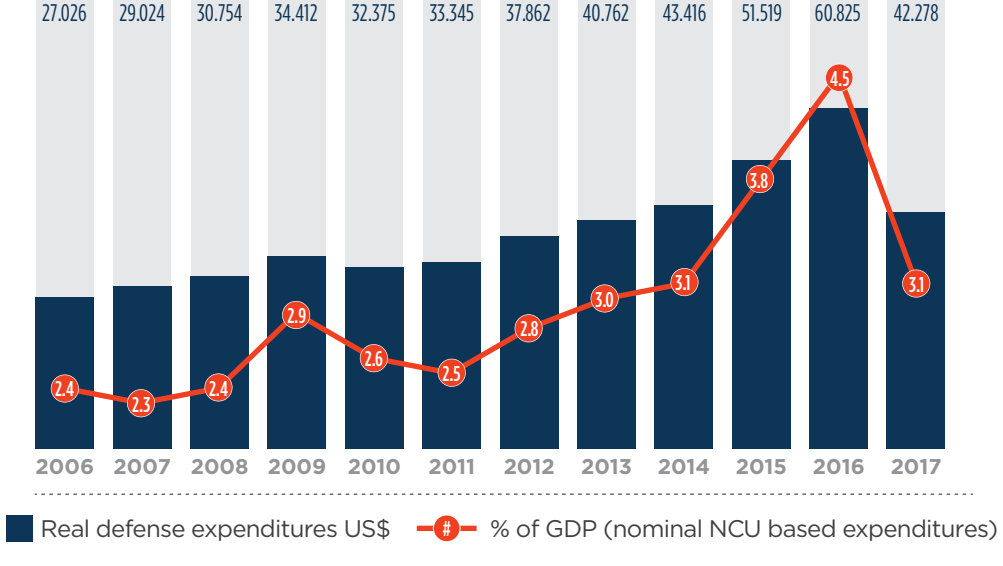


from 2016 levels, and if it is not amended to increase funds mid-year, it would be the lowest budget for national defense since 2013.[105, 106, 107] According to Russian press and Ministry of Finance announcements, from 2017 through 2019 Russian defense spending will be essentially frozen in nominal terms—and therefore declining in real terms.[108, 109]

Russian government revenues are highly dependent on oil prices, and Moscow's decision to base its budget for 2017–2019 on low projected oil prices in 2017–2019 is largely responsible for the glum outlook for government revenue and low projected GDP growth rates.[110] According to the International Monetary Fund and a number of prominent economists, Russia faces a growth ceiling; absent structural reforms, Russian GDP growth would probably reach only 1 to 2 percent per year, even were oil prices to increase significantly.[111, 112]

Military Doctrine And Strategy

Russian Perceptions of Modern Conflict

Since at least 1991, the Russian perception of the nature of modern conflict has evolved. Russia views wars as often undeclared, fought for relatively limited political objectives, and occurring across all domains, including outer space and the information space.[113] Russian leaders have noted the tendency for crises to arise quickly and develop impetuously, and to potentially escalate from local wars into global ones.[114, 115] In addition, Moscow judges that modern conflicts are characterized by a destructive and rapid "initial period of war"—a subject on which Russian military leaders and theorists have written extensively since the 1920s—which is becoming more decisive than ever before. In modern cyber-enabled information and battlefield spaces, this destructive non-kinetic initial period can be reduced to milliseconds, and kinetically to hours.[116]

Moscow fears that the speed, accuracy, and quantity of non-nuclear strategic precision-guided weapons can achieve strategic effects on par with nuclear weapons,[117] one of the primary reasons that since at least 1993 (and most recently codified in the 2014 Military Doctrine) Russia has reserved the right to a nuclear response to a non-nuclear attack that threatens the existence of the state.[118, 119, 120] In addition to rejecting no-first-use, Moscow has discussed using nuclear weapons to de-escalate a conflict.[121, 122] While most military theorists and leaders believe great-power conflict is unlikely, they nevertheless express concern about the usability of the information space to achieve state goals.[123] Russia has tied this decisive and shortened initial period to the idea that only more proactive or even preemptive action is required to counter it.[124, 125, 126] Russian developments in precision-guided munitions indicate a desire for "deep strike" capability to preempt attacks from an adversary.

Russia's Military Doctrine, last updated in December 2014, contained several new elements not in the 2010 Doctrine, which reflect Moscow's military focus and threat perceptions. First codified in the doctrine was the concept of non-nuclear deterrence, an idea that has been evolving since the Soviet period. The doctrine also underscored perceived threats to Russia's domestic security and described the military's requirement to inflict unacceptable damage on any adversary at any time. This requires the military to calculate or understand what level of damage would constitute unacceptable damage to an adversary.[127, 128, 129] Mobilization readiness of the state was stressed, as were measures to unify state, societal, and individual efforts to protect Russia and increase the effectiveness of military-patriotic indoctrination of citizens and their preparation for military service.[130]

The concepts of readiness, non-nuclear deterrence, and unacceptable damage are closely linked in Russian thinking; Russian military leaders judge that a highly ready non-nuclear force, able to inflict unacceptable damage on an aggressor—including against its economy—at any moment, is its own deterrent.[131, 132, 133, 134] For Moscow, the word translated as "deterrence" (сдерживание) is more closely linked to a concept of active restraint, or literally to hold back something moving with force.[135] In the West, deterrence is often seen as an established condition, whereas in Moscow it is an active, flexible process that continues throughout the conflict spectrum.

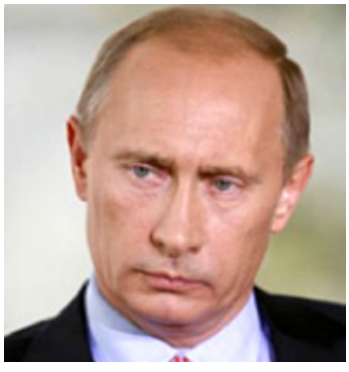
The Russians define *strategic deterrence* as a package of coordinated political, diplomatic, economic, ideological, moral, spiritual, informational, scientific, technological, military, and other actions taken by a country to demonstrate the decisiveness of the political leadership to tap all instruments of state power consecutively or simultaneously—to stabilize the military, political, and strategic environment, to anticipate aggression, and to deescalate military conflict.[136, 137, 138, 139, 140] Some Russian theorists break deterrence down further into non-forceful and forceful means and even into deterrence by "type" (economic, military, nuclear, non-nuclear, etc.).[141]

Closely linked to strategic deterrence is the concept of strategic stability. At its basic level, Russia's concept of deterrence, appropriately applied in its view, assures strategic stability. Strategic stability is the sum total of political, economic, military, and other measures (e.g., force) retained by states in a stable balance whereby neither side has the opportunity, interest, or intent to carry out military aggression.[142]

Russia has observed modern conflicts and incorporated aspects of these observations into its deterrence and warfighting strategies. Russia seeks to shape the environment in peacetime to avoid or deter conflict and, if war does occur, will use its military force to establish a favorable outcome for Moscow.[143, 144] Moscow's warfighting strategy includes use of indirect action and asymmetric responses, including using technical and psychological operations to disrupt technical systems, influence public opinion, and "erode the opponent's resolve."[145, 146, 147] The modernization of its nuclear and conventional forces to include precision-guided strike weapons provide it a major military force to shape the outcome of war along the entire spectrum of modern conflict.

Military and Security Leadership

Decisionmaking in Russia is highly centralized, and President Vladimir Putin dominates Russia's decisionmaking, including for military and security issues. His constitutional responsibilities include appointing the prime minister, chairman of the Central Bank, government ministers, and judges; he may announce State Duma elections or dissolve it. His annual address to the Federal Assembly sets guidelines for national internal and foreign policies, and he resolves internal governmental disputes. The Russian president



President Vladimir Putin

Defense Minister Sergey Shoygu

Gen-Army Valeriy Gerasimov

Image Source: Open source

governs foreign policy, signs international treaties, forms and heads the Security Council, and approves military doctrine.[148] The Russian president serves as the Supreme Commander in Chief of the Russian military, and in times of emergency he may introduce martial law.[149]

The Russian Ministry of Defense is subordinate to President Putin as Supreme Commander in Chief and is charged with implementing presidential policy within the military, overseeing all readiness, manpower, and procurement issues.[150, 151, 152] The defense minister has the legal authority to oversee and direct operations of the General Staff.[153]

Defense Minister Sergey Shoygu was appointed Defense Minister on 6 November 2012, after 18 years leading the Ministry of Emergency Situations.[154] Shoygu's introduction of frequent strategic-level, no-notice inspections in Russia's military districts, unprecedented in number and scope for the post-Soviet Russian military, has been critical in assessing and increasing combat readiness in the armed forces, as well in as refining defense reforms.[155]

The General Staff's primary mission is to ensure the military security of the Russian Federation (RF), that is, to protect the vital interests of the state and society from internal and external threats. The General Staff is responsible for monitoring and characterizing the threat environment and developing strategic and operational plans to equip, mobilize, employ, command, and control the armed forces.[156, 157] According to a 2013 presidential edict describing General Staff missions and functions, its range of responsibilities was broadened to include coordination of all activity undertaken by federal executive organizations to ensure defense capability and security.[158]

The chief of the General Staff, Gen-Army Valeriy Gerasimov, serves as the military head of the Russian Armed Forces.[159] Gerasimov previously served as deputy chief of the General Staff from December 2010 until May 2012, when he was appointed commander of the Central Military District.[160] He became chief of the General Staff in November 2012. He is a respected armor officer with substantial combat experience and time in command in Russia's restive North

Caucasus region.[161, 162, 163] Since his appointment, Gerasimov has focused largely on dealing with military readiness, modifying defense reforms carried out by his predecessor, and preparing for security concerns.[164, 165, 166, 167]

Main Operations Directorate

The Main Operations Directorate (GOU) of the General Staff has operational control of the armed forces, organizes strategic and operational force planning; executes military exercises and operational training, and engages with multilateral military-security organizations such as the CSTO, CIS, and Shanghai Cooperation Organization.[168] The GOU shapes the Defense Plan of the Russian Federation, identifies sources of threats to Russia for strategic planning, and works with the General Staff's Military-Scientific Committee (VNK) to draft the State Armament Program.[169, 170, 171, 172, 173]

Gen-Lt Sergey Rudskoy

Image Source: Open source

General Lieutenant (Gen-Lt, two stars) Sergey Rudskoy served as first deputy chief of the GOU for 9 years before becoming its chief in November 2015, Rudskoy has been the General Staff's senior representative at international forums, and he will likely leverage this experience to enhance coordination with other militaries operating in Syria.[174, 175]

National Military Command and Control

At the pinnacle of Russian military command and control is the Russian president, Vladimir Putin, who serves as the Supreme Commander in Chief of the armed forces. As such, he is the primary decisionmaker and is authorized to assume direct command and control during times of crisis and martial law.[176, 177] The minister of defense is appointed by the president and is charged with implementing presidential policy within the Ministry of Defense. This includes overseeing all hiring, equipping, training, care, and feeding of military personnel. With the implementation of Russia's New Look military reforms, the minister of defense now has legal authority to oversee and direct operations of the General Staff.[178] The chief of the General Staff is also appointed by the president and serves as the military head of the armed forces.[179] The General Staff's primary mission is to ensure the military security of the Russian Federation and is responsible for monitoring and characterizing the threat environment and developing strategic and operational plans to equip, mobilize, employ, command, and control the armed forces.[180, 181] The service chiefs

have the responsibility of organizing, training, and equipping their forces to meet current and future national security challenges.[182]

The Russian military has established a redundant and survivable command and control (C2) system to control its forces that serves as a force-enabler. Russia's C4ISR complex uses multiple capabilities ranging from technologically advanced systems to mechanically simple, legacy Soviet devices intended to centralize control of the military while providing intelligence support to speed up decisionmaking cycles and carry out joint operations.[183, 184]

Russia's C2 system has six key characteristics:

- **Centralized.** The president of the Russian Federation is the commander in chief of the armed forces and is authorized to assume direct C2 over the military via the Ministry of Defense and General Staff during times of crisis and martial law.[185]
- **Redundant.** Multiple C2 systems are used at each echelon to disseminate commands and for the transmission of orders.[186]
- **Geographically dispersed.** Russia's key C2 nodes and facilities are distributed throughout the country to increase survivability and limit single points of failure.[187]
- **Secure.** Moscow is upgrading C2 systems to take advantage of modern and secure digital communications networks.[188]
- **Reliable.** Russia routinely conducts snap and other training exercises to test the systems' capabilities to pass information and increase decisionmaking efficiency.[189]
- **Built for the worst case scenario.** Russian C2 systems are designed to enable the dissemination of launch orders while under nuclear attack through several C2 systems, including Perimetr, sometimes referred to as the "Dead Hand."[190]

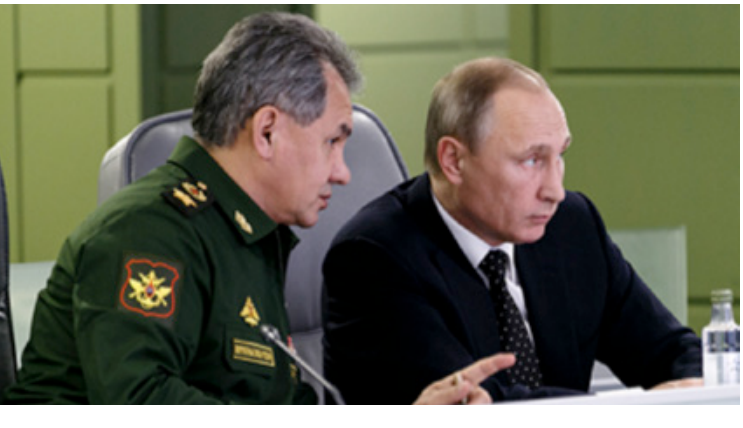
Russian Nuclear Command and Control

Maintaining control of its nuclear arsenal is of critical importance to Moscow. During the Cold War, Russia developed a centralized nuclear C2 system capable of meeting its three primary requirements: reliability, speed, and security.

President Putin with the nuclear briefcase.

To accomplish these goals, strategic planners designed a complex system-of-systems that protects weapons from unauthorized or accidental use and centralizes command authority at the highest echelon, while guaranteeing the ability to quickly launch when necessary.[191]

Russian military doctrine underscores the central role of the Russian president in authorizing the use of nuclear weapons. He uses the nuclear briefcase, which is carried by officers who always remain near the president. The General Staff monitors the status of the weapons of the nuclear triad and will send the direct command to the launch crews following the president's decision to use nuclear weapons. The Russians send this command over multiple C2 systems, which creates a redundant dissemination process to guarantee that they can launch their nuclear weapons. Moscow also maintains the Perimetr system, which is designed to ensure that a retaliatory launch can be ordered when Russia is under nuclear attack.[192, 193, 194]



President Putin and Defense Minister Shoygu at the NTsUO, November 2015.

Image Source: Russia Ministry of Defense/Creative Commons 4.0 Copyright

National Defense Management Center (NTsUO), November 2015.[195, 196]

Image Source: Russia Ministry of Defense/Creative Commons 4.0 Copyright

Command and Control of Joint Forces

Moscow Implemented a Joint Strategic Command (OSK) structure in 2010 to better facilitate joint military operations. Russia converted its six military districts into four OSKs.[197, 198] In 2015, Russia created a fifth OSK, the OSK Northern Fleet, to improve its capability to project military power into the Arctic and to take advantage of the opening of the Russia's Northern Sea Route.[199]

In contrast to pre-reform military districts that were primarily land force commands, the new OSKs are joint force elements that have control in times of peace and war over all general purpose forces stationed in—or deployed to—their territories. The phrase "military district" still exists and refers to specific geographic boundaries, but an OSK is the command element for that area. For example, the Eastern Military District covers

the geographic territory from eastern Siberia to the Pacific Ocean, but it is commanded by OSK East.[200, 201] These reforms resulted in a reduced command structure, both vertically and horizontally, which is more streamlined, efficient, and flexible.[202, 203]

Moscow's National Defense Management Center (NTsUO), which came online in 2014, is a key component of the overall Russian C2 system. The NTsUO works with subordinate regional and territorial defense management centers to coordinate ministry and department activities among lower echelons in accordance with national defense and security directives while liaising with municipal authorities.[204]

Image Source: AFP

Dolgorukiy Class Nuclear Powered Ballistic Missile Submarine.

Core Russian Military Capabilities

Nuclear Forces and Weapons

Russia is one of the oldest nuclear powers, first detonating a nuclear device in 1949.[205] As heir to the former Soviet Union's nuclear arsenal, Russia has one of the world's two largest inventories of strategic weapons. While participating in strategic arms reduction treaties (START) with the United States, Russia is also committed to maintaining and modernizing its nuclear forces. Land-based intercontinental ballistic missiles are controlled by the Strategic Rocket Forces (SRF), and the sea-based and air strategic systems are managed by the Navy and Aerospace force, respectively. Moscow plans to spend about $28 billion by 2020 to upgrade the capacity of its strategic nuclear triad.[206]

- In the first leg of the triad the SRF operates three older ICBM systems for more than half of their land-based nuclear delivery vehicles. The oldest ICBMs in the arsenal are the silo-based liquid-fueled SS-18 (deployed in 1988–92) and SS-19 (deployed in 1979-84). These missiles carry, respectively, 10 and 6 multiple independently-targeted

reentry vehicles (MIRVs). The solid-propellant, single-warhead SS-25 was deployed in 1985–92 as a road-mobile ICBM. As these aging missiles reach the end of their operational lives, they will be withdrawn from service by 2019–2021 and replaced with newer, modern road-mobile and silo-based ICBMs by 2020. The SRF's missile inventories will be equally split between road-mobile and silo-based ICBMs.[207]

- The second element of the nuclear triad is a fleet of at least 10 nuclear-powered ballistic missile submarines (SSBN) under administrative control of the Naval High Command. The Russian strategic Navy is modernizing, mainly by building and deploying the DOLGORUKIY-class SSBN platform for the new SS-N-32 BULAVA sea-launched ballistic missile (SLBM).[208]
- The third element of the nuclear triad is the Russian Aerospace Force's fleet of strategic bombers, which forms the core of the Long-Range Aviation (LRA) Command. Like other components of the triad, the LRA is modernizing, to continue operating Tu-95 BEAR and Tu-160 BLACKJACK bombers beyond 2030. The last "new" BLACKJACK was added to the fleet in 2005, and all existing Tu-160s will be upgraded to Tu-160M1 or M2. Russia has announced that it will resume production of Tu-160M2 bombers and complete development of a new generation bomber (Russian designation: PAK-DA) within a decade, but timelines for both programs may slip if financial difficulties arise. The new bomber design is expected to have some stealth and short- or rough-runway capabilities, and employ both conventional and nuclear armament.[209, 210]

Russian Tu-160 heavy bomber and Il-78M tanker.

Image Source: AFP

Russian SS-27 Mod 2 road-mobile ICBM.

Image Source: AFP

The main function of strategic forces is effective, reliable deterrence. Scenarios for the use of strategic nuclear forces fall into three main categories: preemptive strike (first strike), counterstrike (launch on warning, prior to impact in-country), and retaliatory strike (response to impacts in-country). Because the retaliation option imposes the most difficult situation on the strategic forces—which must respond even

after an enemy's strategic strike has impacted and disabled elements of the force—strategic forces, weapons, and battle management systems are designed and built to be hardened, stealthy, redundant, and reliable—and trained to function in a WMD-degraded environment.[211]

Russia continues to retain a sizable nuclear stockpile even after several decades of arms reduction treaties. Russia has a large nuclear weapons infrastructure and a production base capable of producing large numbers of new nuclear weapons annually.[212, 213]

The U.S.-Russia New Strategic Arms Reduction Treaty (New START), signed on 8 April 2010, sets for each country a limit of 1,550 warheads on strategic platforms, including one warhead attributed to each heavy bomber. There is also a combined limit of 800 deployed and non-deployed ICBM and SLBM launchers and heavy bombers equipped for nuclear armaments, and a separate limit of 700 deployed strategic systems overall. The treaty will last 10 years, with central limits to be met by 2018 with the option for a single extension of another 5 years. Colonel General Sergey Karakayev, commander of the SRF, has stated that an arsenal of 1,500 nuclear warheads would provide Russia a sufficient deterrent against attack.[214] According to Russia's New START Treaty data provided on 1 April 2017, Russia declared 1,765 warheads on 523 deployed ICBMs, SLBMs, and heavy bombers.[215]

Russia currently has an active stockpile of approximately 2,000 non-strategic nuclear weapons. These include air-to-surface missiles, short-range ballistic missiles, gravity bombs, and depth charges for medium-range bombers, tactical bombers, and naval aviation, as well as anti-ship, anti-submarine, and anti-aircraft missiles, and torpedoes for surface ships and submarines. There may also be warheads remaining for surface-to-air and other aerospace defense missile systems.[216, 217]

Russia's nuclear forces modernization goals include: replace Soviet-legacy systems with modern nuclear weapons, maintain rough parity with the U.S. nuclear arsenal, improve the survivability and efficiency of its nuclear weapons, and maintain prestige on the international stage. Russia's nuclear modernization includes both strategic and non-strategic nuclear weapons.[218, 219, 220, 221]

Biological and Chemical Weapons

In 1992, then-Russian President Boris Yeltsin admitted having an offensive biological weapons program and publicly committed to its termination. Subsequently, the Russian government reversed itself and now claims neither the Soviet Union nor Russia has ever pursued an offensive biological weapons program.[222]

In 1997, Moscow declared the world's largest stockpile of chemical agents and munitions—40,000 metric tons of agents—under the Chemical Weapons Convention (CWC). The declared inventory consisted of a comprehensive array of traditional chemical warfare agents filled in munitions such as artillery, bombs, and missile warheads, as well as stored in bulk.[223]

As a state party to the CWC, Russia is obligated to destroy its chemical weapon stockpile.

As of January 2017, Russia had destroyed 96.4% of its declared chemical weapons stockpile, according to press reporting.[224] Russia intends to complete destruction of its remaining declared stockpile by 2020.[225] Moscow has completed destruction activities and closed the facilities in Gornyy, Kambarka, Maradykovskiy, Leonidovka, Schchuch'ye, and Pochep and continues destruction of its remaining chemical weapons stockpile at a facility in Kizner.[226]

Russia used chemical incapacitants to resolve the Dubrovka Theater hostage situation in 2002 and may consider using them in other counterterrorism actions.[227]

Anti-Access/Area Denial

Anti-access/area denial (A2/AD) refers to preventing an adversary from operating in a particular region or area. Russia repeatedly cites in open source literature the need to repel or defend against a Western aerospace attack. Russia would seek to deter any Western use of aerospace power against Russia using its conventional, non-strategic nuclear, and, in extreme circumstances, its strategic nuclear forces. Russian military theorists have examined the likelihood of a great power war arising out of a local conflict, similar to the events leading up to World War I, and escalating to combat with U.S./NATO or another peer.[228] Based on insight gleaned from studies of warfare since 1991, Russia would seek to limit the capability of an adversary to conduct aerospace strikes on its territory.[229, 230]

Russian strategy for A2/AD would focus on a combination of various elements that military planners and theoreticians have identified as critical to the development of a comprehensive approach to A2/AD.[231, 232] These involve the incorporation of the following elements.

Information Operations

Information operations are seen as a critical capability to achieve decisive results in the initial period of conflict with a focus on control of the information spectrum in all dimensions of the modern battle space. Authors often cite the need in modern warfare to control information—sometimes termed "information blockade" or "information dominance"—and to seize the initiative early and deny an adversary use of the information space in a campaign so as to set the conditions needed for "decisive success." Russia continues to emphasize electronic warfare and other information warfare capabilities, including denial and deception as part of its approach to all aspects of warfare including A2/AD.[233]

Strategic Air Operations

Russian military theorists continue to emphasize the key importance of strategic air operations in modern war. This concept originated in the 1920s, where Soviet planners viewed the initial period of war as the time that aviation would strike deep in enemy rear areas to destroy mobilization and concentration areas. At the same time, air forces would also prioritize the defense of the country against enemy air attack and conduct close air support of

ground operations, achieving air supremacy in the first days of the war using all means.[234] This concept was underscored in 1993, when Defense Minister Grachev indicated that "war will begin with an offensive aerospace operation on both sides."[235] Russian planners have indicated that in such a war there will be no front and no rear, with space emerging as an independent theater of military operations. Russian doctrine, down to the present day, continues to emphasize that strategic objectives can be achieved with mass aerospace strikes early in a conflict with victory achieved without the seizure and occupation of territory by forces.[236]

Russian planners have analyzed U.S. operations such as DESERT STORM, NOBLE ANVIL, and IRAQI FREEDOM for insight, observing military art at the strategic, operational, and tactical levels in campaigns that displayed U.S. aerospace capabilities and underscored the importance of developing comparable indigenous capabilities that can be employed defensively.[237, 238] This emphasis on strategic air operations is reflected in long-term procurement goals of platforms and weapons focused on space, aerospace defense, and precision-guided munitions.[239, 240]

Integrated Air Defense System

Russian doctrine places a great deal of emphasis on aerospace defense as a key component in its overall A2/AD strategy.[241, 242] Though still in development, Russia's 21st century integrated air defense system will be designed to integrate future and existing systems around a central command structure that is designed to promote the interaction of all air defense forces and weapons.[243, 244] Capabilities optimized against cruise missiles are key to this defense component, not just those optimized to target aircraft.

Russian S-400 Surface-to-air missile systems – a key component of Moscow's A2/AD strategy.

Image Source: AFP

Modern Precision Strike Capabilities: Air and Sea Systems in Combination with Older Technologies [245, 246]

Russia continues to develop a variety of sea- and aerospace-based programs that offer a variety of offensive and defensive capabilities that could enable the implementation of its integrated A2/AD strategy.[247, 248] These include the continued production and deployment of coastal defense cruise missiles, air/surface/sub-surface-launched anti-ship cruise missiles (ASCMs),[249] submarine-launched torpedoes, and naval mines, along with Russian fighter, bomber, and surface-to-air missile capability.

These are intended provide Russia with the ability to limit access to its territory and extend its strategic depth by providing long range kinetic strike capability.

Precision Strike

Russian doctrine on Precision Strike is essentially a 21st century extension of the Russian doctrine of "deep battle" initially codified during the 1920s and 1930s by Chief of the General Staff Marshal Mikhail Tukhachevskiy and represents an attempt to incorporate new technology into traditional Russian strategic, operational, and tactical strategy. Deep battle was a strategic concept that focused on terminating, overwhelming, or dislocating enemy forces not only at the line of contact, but throughout the depth of the battlefield. Deep battle encompassed maneuvers by multiple Soviet Army front-size formations simultaneously. It was not meant to deliver a victory in a single operation; instead, multiple operations, which might be conducted in parallel or successively, would induce a catastrophic failure in the enemy's defensive system. Initially, deep battle focused on improved ground and air forces and was influential in Soviet operations in World War II from 1943 onward. Chief of the General Staff Marshal Nikolay Ogarkov, writing in the 1970s to 1980s, updated the deep battle concept to develop a more aerospace-centric approach in an attempt to incorporate traditional Russian doctrine with precision technology.[250]

Ogarkov theorized throughout his tenure as chief of the Soviet General Staff that conventional precision-guided munitions were part of a revolution in military affairs. In an influential 1983 Krasnaya Zvezda article, Ogarkov took notice of the impact of new types of precision weapons and micro-circuitry on the development of conventional capabilities. For Ogarkov, the development of new conventional forms of non-nuclear weapons would enable the sorts of multi-front operations that were envisioned in the original deep battle concept. On a theoretical basis, Ogarkov forecast that precision strike could exercise a direct and decisive outcome of a future war.[251, 252]

Despite enthusiasm by the Soviet General Staff, very little progress was made in the development of precision-guided munitions except at the theoretical level for the remainder of the Soviet period. In 1991, DESERT STORM provided the Soviet military with proof of concept regarding the use of precision-guided munitions. Former Soviet officials and Russian authorities argued that the DESERT STORM campaign demonstrated the capability of precision-guided airstrikes in the land attack role to paralyze the rear area and an adversary's economy. Targets could include vulnerable areas of the economy, command and control centers, and transportation centers. The introduction of precision-guided munitions changed the nature of modern war by reinforcing traditional concepts that emphasized decisive action during the initial stage of warfare and at the same time undermined the traditional Russian reliance on large ground force groupings to achieve tactical and strategic objectives.[253]

Russia was unable to achieve real progress in the development of precision strike until the first decade of the 21st century, when it was able to create a viable state armaments program that allowed prioritization of certain key components of 21st-century warfare. Between 2010 and 2015, Russia's strategic forces, space and aerospace defense platforms, and precision-guided munitions[254] such as ISKANDER, KALIBR, or KH-101 were defined as priorities, and system development, production, and testing occurred. The effectiveness of precision-guided munitions are being tested in a variety of settings, including Command Staff exercises KAVKAZ-2012, VOSTOK-2014, and KAVKAZ-2016, as well as operationally against targets in Syria beginning in 2015.[255, 256, 257]

Kh-101/102 air-launched cruise missiles on a Tu-95MS heavy bomber; Moscow first used its precision strike arsenal in combat during a series of 2015 strike operations by sea- and air-launched cruise missiles against targets in Syria.

Image Source: Shutterstock

Space/Counterspace

The Russian General Staff postulates that modern warfare is increasingly reliant on information, particularly from space, because of the expansion of the geographic scope of military action and the information needs of high-precision weapons.[258] Russia has a significant constellation of satellites in orbit. According to Colonel Sergey Marchuk, chief of the Main Test Space Center, Russia has more than 130 spacecraft, civilian and military, performing communications, navigation, geodetic survey support, meteorological, reconnaissance, and intelligence gathering missions.[259]

Russia's space program is both formidable and in a state of rebuilding. Moscow seeks to maintain the health of its current constellations while deploying a next-generation architecture on par with Western space systems. Over the next several years, Russia will prioritize the modernization of its existing communications, navigation, and earth observation systems, while continuing to rebuild its electronic intelligence and early warning system constellations.

Russia's current systems provide an array of capability including high-resolution imagery, terrestrial and space weather, communications, navigation, missile warning, electronic intelligence, and scientific observations. With a long-standing heritage in space, Russia gains a sense of national pride from its space program, which has included manned missions and leading the world in space launches. Currently ranked third in total number of satellites in orbit behind the United States and China, the figure below displays a breakdown of Russia's satellites in orbit.

Russian satellites in orbit, 5 October 2016 [260]

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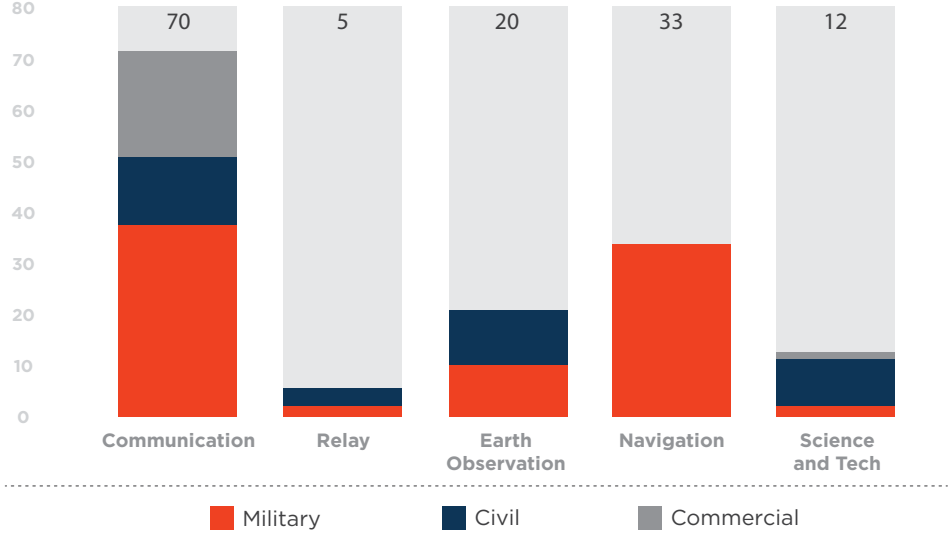


Russia has concluded that gaining and maintaining supremacy in space has a decisive impact on the outcome of future conflicts.[261] According to Russia's 2010 military doctrine, militarization of outer space is a "main external military danger."[262] The 2014 update to Russia's military doctrine calls out Western global strike capability by name.[263] Russia, in military journals, has observed that Western operations have shifted to non-contact operations that rely on long-range, space-supported precision-guided munitions.[264, 265, 266] Russia has been very vocal expressing its concerns about Western precision strike capabilities and missile defense plans. Deputy Prime Minister Dmitry Rogozin compared U.S. ballistic missile defense efforts in Eastern Europe to the Strategic Defense Initiative of 1983 and stated that such an effort justifies the development of Russian counterspace programs.

The Russian General Staff argues for pursuing in wartime such strategies as disrupting foreign military C2 or information support because they are so critical to the fast-paced, high-technology conflicts characteristic of modern warfare.[267, 268] Russia believes that having the military capabilities to counter space operations will deter aggression by space-enabled adversaries and enable Russia to control escalation of conflict if deterrence fails.[269] Military capabilities for space deterrence include strikes against satellites or ground-based infrastructure supporting space operations.[270]

On 1 August 2015, Russia created the Russian Federation Aerospace Forces by merging

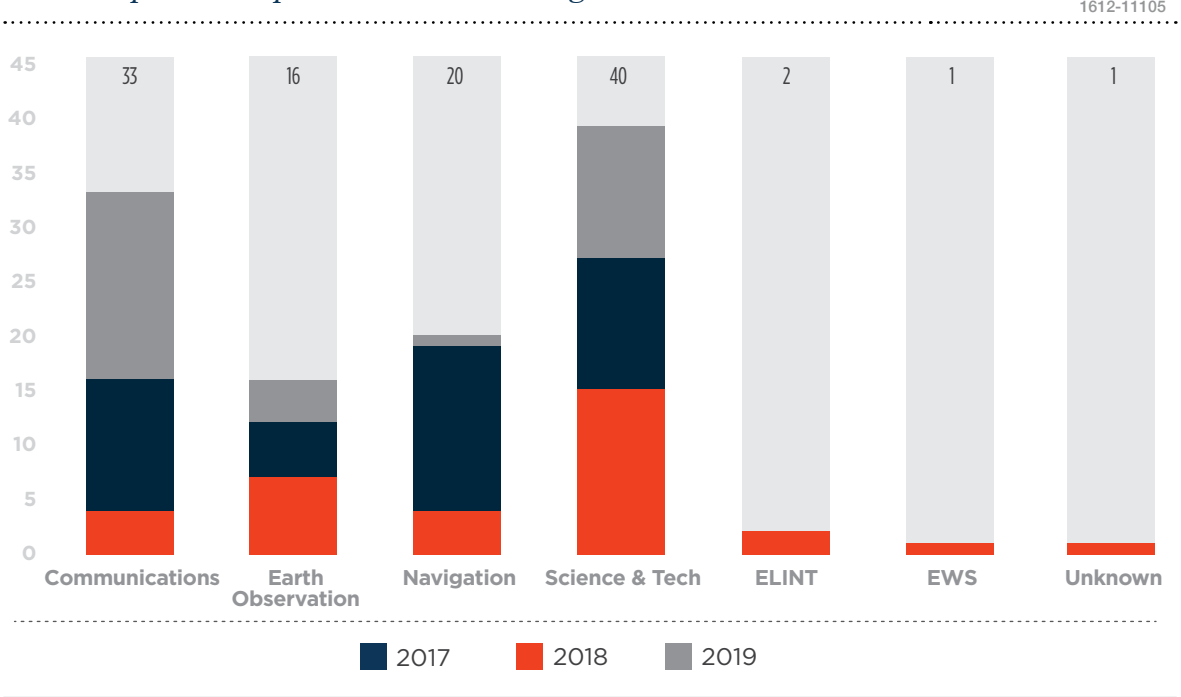
the former Air Force and Aerospace Defense Troops. Defense Minister Shoygu stated the change was "prompted by a shift in the center of gravity… towards the aerospace sphere" and as a counter to the U.S. Prompt Global Strike doctrine.[271, 272] This merged force includes Russia's space forces who have the mission of conducting space launches and maintaining the ballistic missile early warning system, the satellite control network, and the space object surveillance and identification network.[273, 274, 275]

Russia also reorganized its space industry responsible for space research, design, and production. Russia merged the government-owned United Rocket and Space Corporation (ORKK), which previously absorbed the majority of the space industry corporations in 2013, with the Federal Space Agency.[276, 277] President Putin finalized the dissolution of the Federal Space Agency on 1 January 2016, naming the joint organization the Roscosmos State Corporation.

Cyber

Russia views the information sphere as a key domain for modern military conflict.[278, 279] Moscow perceives the information domain as strategically decisive and critically important to control its domestic populace and influence adversary states. Information warfare is a key

Russia's planned space launches through 2019[280]



means of achieving its ambitions of becoming a dominant player on the world stage.[281]

Since at least 2010, the Russian military has prioritized the development of forces and means for what it terms "information confrontation,"[282, 283] which is a holistic concept for ensuring information superiority, during peacetime and wartime.[284] This concept includes control of the information content as well as the technical means for disseminating that content. Cyber operations are part of Russia's attempts to control the information environment.

The weaponization of information is a key aspect of Russia's strategy and is employed in time of peace, crisis, and war. In practice, information battles draw upon psychological warfare tactics and techniques from the Soviet Era for influencing Western societies.[285] Moscow views information and psychological warfare as a measure to neutralize adversary actions in peace to prevent escalation to crisis or war.

Chief of the General Staff Gerasimov announced that "information operations troops" were involved for the first time in the Kavkaz-2016 strategic command staff exercise in September 2016, demonstrating Russian military commitment to controlling the information domain.[286, 287, 288]

Propaganda Helps Shape The Information Environment

Russian propaganda strives to influence, confuse, and demoralize its intended audience, often containing a mixture of true and false information to seem plausible and fit into the preexisting worldview of the intended audience. Russian propaganda targets a wide variety

Information Confrontation

"Information confrontation," or IPb (*informatsionnoye protivoborstvo*), is the Russian government's term for conflict in the information sphere. IPb includes diplomatic, economic, military, political, cultural, social, and religious information arenas, and encompasses two measures for influence: informational-technical effect and informational-psychological effect.[289, 290]

- Informational-technical effect is roughly analogous to computer network operations, including computer-network defense, attack, and exploitation.
- Informational-psychological effect refers to attempts to change people's behavior or beliefs in favor of Russian governmental objectives.

IPb is designed to shape perceptions and manipulate the behavior of target audiences. Information countermeasures are activities taken in advance of an event that could be either offensive (such as activities to discredit the key communicator) or defensive (such as measures to secure Internet websites) designed to prevent an attack.

of audiences, including its own population, selected populations of other countries, domestic and foreign political elites, and the West writ large.[291, 292] The variety of techniques for disseminating Russian propaganda include pro-Kremlin "news" websites and TV and radio channels such as *Russia Today* and *Sputnik News*, bots and trolls on social media, search engine optimization, and paid journalists in Western and other foreign media.

Cyber-Enabled Psychological Operations

One of the newest tools in Russia's information toolkit is the use of cyber-enabled psychological operations that support its strategic and tactical information warfare objectives. These new techniques involve compromising networks for intelligence information that could be used to embarrass, discredit, or falsify information. Compromised material can then be leaked to the media at inopportune times.

- **Hacktivists.** Russian intelligence services have been known to co-opt or masquerade as other hacktivist groups. These groups appeal to Russia due to the difficulty of attribution and the level of anonymity provided. It is widely accepted that Russia, via patriotic hackers, conducted a cyber attack on Estonia in 2007.[293] Under the guise of hacktivism, a group called "CyberCaliphate," seemingly ISIS associated, conducted a hack against French station TV5 Monde in January 2015. The CyberCaliphate group was later linked to Russian military hackers. The same group hijacked the Twitter feed of the U.S. Central Command.[294]
- *CyberBerkut* – A False Persona. Russian hackers also use false personas. CyberBerkut is a front organization for Russian state-sponsored cyber activity, supporting Russia's military operations and strategic objectives in Ukraine.[295] CyberBerkut employs a range of both technical and propaganda attacks, consistent with the Russian concept of "information confrontation." Since emerging in March 2014, CyberBerkut has been implicated in multiple incidents of cyber espionage and attack, including distributed denial of service attacks against NATO, Ukraine, and German

Major themes of Russian propaganda include:

The West's liberal world order is bankrupt and should be replaced by a Eurasian neo-conservative post-liberal world order, which defends tradition, conservative values, and true liberty.[296]

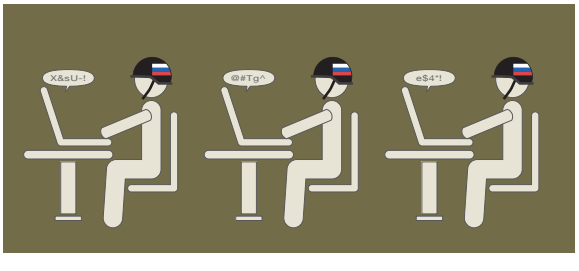
The West demonizes Russia, which is only trying to defend its interests and sovereignty and act as an indispensable nation in world affairs.

The United States is determined to interfere with and overthrow sovereign governments around the world.[297]

government websites. More recently, it has focused on the online publication of hacked documents, ostensibly obtained from the Ukrainian government and political figures' computers. CyberBerkut uses information gained through these hacks to discredit the Ukrainian government. The intent is to demoralize, embarrass, and create distrust of elected officials.[298, 299, 300, 301, 302, 303]

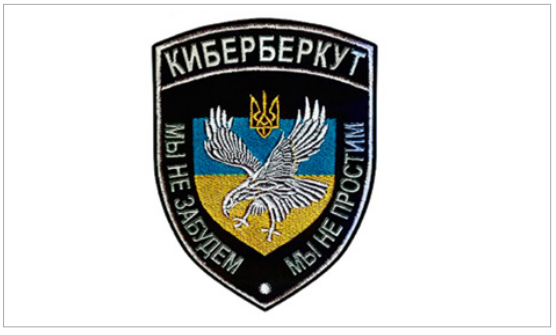
- **Trolls.** Russia employs a troll army of paid online commentators who manipulate or try to change the narrative of a given story in Russia's favor. Russia's Troll Army, also known as the Internet Research Agency, is a state-funded organization that blogs and tweets on behalf of the Kremlin.[304] Trolls typically post pro-Kremlin content and facilitate heated discussions in the comments sections of news articles. Their goal is to counter negative media and "Western influence." While the goal of some trolls is to simply disrupt negative content, other trolls promote completely false content.[305]

- **Bots.** Another way Russia manipulates the information space is through the use of bots. Bots are automated pushers of content on social media. These bots vary in sophistication and can continuously push content or imitate real life patterns. Bots can drown out unwanted content or push a specific message. Bots have the ability to overwhelm the information space and discourage readers from looking for real content.[306, 307]



Russia uses a Troll Army to disseminate and overwhelm blogs and twitter communications.

Image Source: DIA, D3 Design



CyberBerkut Arm Patch.

Image Source: Russia Ministry of Defense/Creative Commons 4.0 Copyright

Information Defense

The Russian Federation Security Council's 2016 Information Security Doctrine mandates protecting Russian citizens from outside threats to the information sphere. The doctrine aims to secure Russian information freedom and protect information technologies from foreign influence, cyberattacks, intelligence collection, and terrorism. The doctrine emphasizes the need to develop a national system for government control of the Russian Internet, information warfare forces, and cyber weapons.[308]

Since at least 1999, Russia has attempted to gain consensus on international governance of the Internet and international norms and rules

The Internet Research Agency in St. Petersburg.

guiding the behavior of states in the information space. A major component of the proposal pertains to a state's ability to govern its information space as a means of maintaining state sovereignty and preventing an arms race in cyberspace. Although state sovereignty traditionally refers to domestic enforcement law, Russia commonly uses this term to denounce other nations meddling in their internal affairs. Russia also proposed a code of conduct for cyberspace with specific dictums regarding non-state cyber-actors, such as criminal hackers involved in cyber activities.[309, 310]

Media Laws – A Hedge Against Instability

In the past decade, Russia has implemented numerous laws curbing domestic media in broadcast, print, and cyber media, taking an abrupt turn from the post-Soviet glasnost policies of media "openness" and its own constitutional guarantees of freedom of speech.[311] The use of social media to organize opposition street protests in 2011 and 2012 prompted a reappraisal of official internet policy. Since then, the authorities have treated the Internet as a serious threat, pushing through laws increasing government controls over technology and content giving the state powers to block content, ban websites, monitor online activity, and limit media ownership.[312] The ultimate goal of this policy appears to be to create what some have called a "sovereign internet."[313]

The Kremlin's strategy of reducing foreign influence on the media has not been confined to the internet. Numerous other pieces of legislation have been passed restricting the level of foreign ownership of the media, impeding the work of the foreign NGOs supporting independent media in Russia and forcing Russian media to account for any foreign funding they receive. A recent law has even banned foreign companies from conducting TV audience research in Russia.[314]

Indirect Action

Indirect action is a component of Russia's strategic deterrence policy developed by Moscow in recent years. Its primary aim is to achieve Russia's national objectives through a combination of military and non-military means while avoiding escalation into a full blown, direct, state-to-state conflict.[315] Drawing on a combination of facets from Russia's whole-of-government or interdepartmental strategy and overt or covert military means, indirect action seeks to exploit weaknesses and fissures in target countries in order to fulfill Moscow's desired national goals.[316]

In Ukraine, indirect action manifested itself in non-military measures first, with less visible efforts taken to exert pressure on Kiev, like restricting food imports to Russia, but then broadening to wider actions involving financial, economic, and information warfare. Later, this was followed by unconventional military action involving Russian Spetsnaz and other non-attributable military units in Crimea and eastern Ukraine.[317] This phase involved the actual seizure of facilities and infrastructure by these covered units, along with the use of local agents, sympathizers, and irregular forces in the vicinity to cause unrest and subversion, all of which are distinct hallmarks or evolutions of Soviet-era Spetsnaz wartime operations.[318]

Electronic Warfare

Based on authoritative military academic writings, the Russian military views electronic warfare as an essential tool for gaining and maintaining information superiority over its adversaries. Russia's world-class electronic warfare forces support denial and deception operations and allow identification, interception, disruption, and, in combination with traditional fires, destruction of adversary command, control, communications, and intelligence capabilities.

In addition to technical disruption, effective use of electronic warfare can confuse adversary commanders and decisionmaking at any or all levels, demoralize opposing troops, and allow Russian forces to seize the operational initiative.[319, 320, 321] Russia has fielded a wide range of ground-based electronic warfare systems to counter GPS, tactical communications, satellite communications, and radars.[322] Further, military academics have suggested that electronic warfare fuse with cyber operations, allowing electronic warfare forces to corrupt and disable computers and networked systems as well as disrupt use of the electromagnetic spectrum.[323, 324] Russia has aspirations to develop and field a full spectrum of electronic warfare capabilities to counter Western C4ISR and weapons guidance systems.

Power Projection

Moscow continues to prioritize modernizing its military forces, viewing military power as critical to achieving key strategic objectives and global influence. Russian acquisition plans for its ground, air, naval, and missile forces are designed to enable the ability to conduct out of area operations during peacetime and to contest

Russian jammer on display at Kubinka in 2016; Moscow has invested heavily in developing sophisticated electronic warfare capabilities.

Image Source: Shutterstock

U.S./NATO military superiority in the event of a regional conflict. The rebuilt Russian military includes modernized, agile general purpose forces, vital to limited out-of-area power projection. While the objectives of the Russian military do not suggest a return to the Cold War posture, Moscow intends to use its military to promote stability on its own terms and to assert its great power status.

Russia's State Armaments Program will continue to emphasize priority programs related to the development of a viable 21st-century military, prioritizing strategic forces, space, precision-guided munitions, and aerospace defense capabilities. Russia's strategic triad along with the increasing capability of its conventional forces remains a critical deterrent in preventing an attack. Russian long-range aviation remains a priority for Russian leadership as a key part of its strategic deterrent capability, while also providing an advanced conventional option to rapidly project power well beyond Russian borders. Russia is also modernizing its naval forces, which conduct operations globally in order to "show the flag" and contribute to Moscow's narrative of Russia's re-emergence as a global power. Russia is also focused on enhancing its C4ISR capabilities, which will enable improved targeting and timely responses to perceived threats.

- **Long-Range Aviation:** Russia periodically deploys assets of its LRA bomber force to conduct limited out-of-area operations as a power projection tool. LRA operations have included activity in the Pacific, the Arctic, and even as far south in 2008 as Venezuela. The capabilities of LRA aircraft allow for missions as far as 5,000–10,000 kilometers away.[325]
- **Naval Forces:** The Russian Navy will continue to conduct operations in parts of the world that are deemed important to national objectives. In recent times, these have included operations in the Mediterranean,[326] the Arctic,[327] and periodic deployments to the western hemisphere[328] and the Indian Ocean.[329] Russia's naval recapitalization program will focus on the development of modern general purpose submarines and surface combatants to enable continued out-of-area operations.[330, 331]
- **Expeditionary Operations:** Along with more conventional power projection missions, Russia has displayed a new capability to field an expeditionary force capable of intervening in a foreign conflict. In Syria, Russia used a mix of maritime and air assets to forward deploy its forces, and Russia will almost certainly be able to logistically support its current level of operations in Syria via a mix of those means for the foreseeable future.[332]

After politically supporting the Syrian regime throughout the Syrian civil war, Moscow began to deploy military forces to Syria in September 2015, likely both to shore up the regime and assert Russia's status as a military player and powerbroker in the Middle East.[333] The majority of Russian air strikes and artillery operations have supported regime ground offensives and focused on opposition targets, with an increased focus against Islamic State forces at certain points in their campaign.[334, 335, 336]

Russia has also sought to use the Syrian intervention as a showcase for its military modernization program and advanced conventional weapons systems, including employing systems from out-

side of Syrian territory to demonstrate its power projection capacity. Moscow has launched Kalibr land-attack cruise missiles from naval units in the Caspian Sea and the Mediterranean Sea, demonstrated new capabilities with air-launched cruise missiles from its Tu-160M1 BLACKJACK and Tu-95MS BEAR H heavy bombers, forward-staged long-range Tu-22M3 BACKFIRE bombers for strikes from Iranian territory, and deployed some of its most advanced air and air defense systems to Syria.[337, 338, 339, 340] These operations are meant to demonstrate strategic capabilities and message the West about the manner in which the Russian military could operate in a major conventional conflict, while also providing combat experience for the personnel and allowing the systems to be field tested.[341, 342]

A Russian naval task force centered on its only aircraft carrier, the Admiral Kuznetsov, conducted a 5-month deployment to the Mediterranean to support strike operations in Syria.

Image Source: AFP

Underground Facilities

Russia inherited a vast underground facilities (UGFs) program from the Soviet Union, primarily designed to ensure the survival of the leadership and military command and control in wartime. This program involved the construction of underground bunkers, tunnels, secret subway lines, and other facilities beneath Moscow, other major Russian cities, and the sites of major military commands. Although the majority of these hardened facilities are near-surface bunkers, many critical sites are built deep underground and, in some cases, are hundreds of meters deep.[343]

Deep underground command posts both within and outside of Moscow are interconnected by a network of special deep subway lines that provide leadership a quick and secure means of evacuation. The leadership can move from their peacetime offices through concealed entryways to protective quarters beneath the city. A deep underground facility at the Kremlin and an enormous underground leadership bunker adjacent to Moscow State University are intended for the National Command Authority in wartime. They are estimated to be 200–300 meters deep and can accommodate an estimated 10,000 people.[344]

The leadership can remain beneath Moscow or travel along the special subway lines that connect these urban facilities to their preferred deep underground command posts outside the city, and possibly to the VIP terminal at Vnukovo Airfield, 27 kilometers southwest of the Kremlin. Two of the most important underground complexes for the National Command

Authority and General Staff are located some 60 kilometers south of the city.[345]

The support infrastructure for the UGFs in and around Moscow is substantial. A highly redundant communications system, consisting of both on-site and remote elements, allows the leadership to send orders and receive reports. Highly effective life support systems may permit independent operations for many months following a nuclear attack.[346]

Russian military officials suggest the UGF program has been retained. In October 2014, chief of the General Staff's Main Operations Directorate, General-Lieutenant Andrey Kartapolov, told a *Rossiyskaya Gazeta* correspondent that the new National Defense Management Center in Moscow is safe from a nuclear strike. The National Defense Management Center became operational in December 2014 and is at the apex of the national command structure. General Kartapolov noted that protection against nuclear strike is always considered in building the most important facilities.[347]

Denial and Deception

The Russian military relies on extensive use of denial and deception (*maskirovka*) to obscure intentions and conceal military movement. The family of capabilities that composed traditional *maskirovka* includes camouflage, deception, denial, subversion, sabotage, espionage, propaganda, and psychological operations.

Russian operational and tactical *maskirovka* is a form of operational combat support. It encompasses a set of interrelated organizational and technical measures and practical actions of staffs, troops, and facilities intended to deceive foreign intelligence. *Maskirovka* promotes surprise, maintenance of combat capability, and survivability. For example, *maskirovka* in rocket units and subunits is organized and carried out for the purpose of ensuring that the enemy experiences maximum difficulty in collecting intelligence data to reduce the effectiveness of strikes, but is also carried out to create the false appearance of a combined unit in support of deception at the operational level of war.[348, 349, 350, 351, 352, 353]

Moscow employed *maskirovka* at the beginning of the 2014 conflict in Ukraine, when media reported on the presence of "little green men" in Crimea who strongly resembled Russian soldiers although they wore uniforms without insignia identifying their origins. President Putin insisted they were "self-defense groups" or "volunteers." By the time Moscow admitted to the presence of Russian troops in Crimea, this deception had created enough confusion to forestall significant international intervention in the conflict, and the ground reality was irreversibly tipped in Russia's favor.[354, 355, 356, 357, 358]

Moscow used troops without insignia – the "little green men" – to seize the Crimean Peninsula in early 2014, claiming these forces were local militia.

Image Source: Shutterstock

Outlook: A Modernizing Force

The Russian military has built on the military doctrine, structure, and capabilities of the former Soviet Union, and although still dependent on many of the older Soviet platforms, the Russians have modernized their military strategy, doctrine, and tactics to include use of asymmetric weapons like cyber and indirect action such as was observed in Ukraine.

One of Russia's biggest hurdles since the dissolution of the former Soviet Union has been its need to rely heavily on its nuclear forces to deter aggression, resulting in its stated willingness for first-use of nuclear weapons.[359, 360] Russia has been building its conventional force capability along with modernizing its nuclear forces to create a more balanced military. Moscow has stressed development of conventional precision-strike weapons, a critical gap in its inventory, and recently has tested them in combat in Syria, providing it with an advanced non-nuclear capability to impact the battlefield.

In 2009, after almost two decades of deterioration and neglect of the Russian military, Moscow began developing a more modern military force capable of power projection outside Russia's borders. The New Look reforms instituted structural and organizational reforms and the State Armaments Program emphasized development of modernized platforms and weapons' systems. In 2013, readiness became an additional area of emphasis with institution of no-notice "snap" exercises and accompanying mobilization and deployments. Moscow's long-term goal is building a military prepared to conduct the range of conflicts from local war through regional conflict to a strategic conflict that could result in massive nuclear exchange.

Recently, Russian forces have been involved in conflict in Ukraine and conducted an expeditionary deployment to Syria, providing experience in combat operations, and employing new tactics and advanced weapons systems. This more flexible and modern Russian force did not spring up overnight but is a result of years of concentrated effort to develop and field an improved military force.

Russia's desire to be a leader in a multipolar world and recapture the "great power" status it had in Tsarist times and the latter days of the Soviet Union requires a force capable of deterring aggression, fighting the range of conflicts from local crises to nuclear war, projecting power and employing force if necessary to intervene in conflicts across the globe. Despite an economic slowdown that will affect the Russian military's timeline for building all of its planned capabilities, Russia is rapidly fielding a modern force that can challenge adversaries and support its "great power" aspirations.

Russia's commitment to building its military is demonstrated by its retention of the draft. All Russian males are required to register for the draft at 17 years of age and all men between the ages of 18 and 27 are obligated by law to perform one year of military service.

Appendix A: Russian Strategic Rocket Forces

The Strategic Rocket Forces (SRF) (Russian name: *Raketniye Voyska Strategicheskovo Naznacheniya* [RVSN]), is one of the most potent missile forces in the world.[361, 362] The SRF was established as a separate military service in December 1959 to operate the first nuclear-armed intercontinental-range land-based ballistic missile (SS-6), as the third element of Russia's growing strategic nuclear force deterrent triad.[363, 364]

The Russian SRF headquarters is in Moscow. The SRF's three missile armies—the 27th, 31st, and 33rd—have a total of 12 subordinate missile divisions. Eight of the divisions operate road-mobile ICBMs, with the other four armed with silo-based missiles.[365, 366] The Russian SRF have approximately 60,000 personnel.[367]

In 2016, the SRF had deployed 299 operational missiles, with half that number equipped with

Russia Strategic Rocket Forces

1612-11167

Locations of Strategic Rocket Forces missile divisions.[368, 369, 370]

multiple independently-targetable reentry vehicles (MIRV) payloads. The SRF arsenal includes three older ICBM types—46 SS-18s and 30 SS-19s in silos, and 72 road-mobile SS-25s—and two newer ICBM types—60 silo-based and 18 road-mobile SS-27 Mod 1s, and 73 of the most modernized SS-27 Mod 2s.[371, 372]

The development of new ballistic missile systems is a high priority for Russia. The Russian military has outlined that the SRF should be completely re-armed with modern (post-Soviet) missile systems by 2022.[373] Russia has stated that it will soon begin testing a developmental, heavy, liquid-propellant ICBM called the Sarmat to replace the aging SS-18. Russia's goal is to begin Sarmat deployment in the 2018–2020 timeframe.

Russia has announced a new missile called the Rubezh (Border) or RS-26, which is smaller than the SS-27 Mod 2 ICBM and will be deployed in 2017.[374] According to the SRF commander, the RS-26 is envisioned as a mobile system and has been referred to by Russian Vice-Premier Rogozin as a "missile defense killer."[375] Russian industry officials also claim development of the Barguzin rail-mobile ICBM is continuing. A decision on full development, production, and deployment will occur in the coming months.[376]

The currently deployed SS-18, which Russia plans to replace with the Sarmat, is a silo-based, 10-MIRV heavy ICBM first deployed in 1988; it needs to be replaced by 2018–2020, when the SS-18s' 27- to 30-year service lives expire.[377] The SS-19 is a silo-based, six-MIRV ICBM that entered service in 1980, which the SRF will replace with silo-based SS-27 Mod 2 by 2019, as the SS-19s retire.[378]

The SS-25 solid-propellant, single-warhead, road-mobile ICBM was first deployed in 1985 and will retire by 2019–2021, to be replaced by regiments of new production SS-27 Mod 2s, and possibly the two-stage, road-mobile RS-26 Rubezh.[379, 380]

In addition, Russian leadership claims a new class of hypersonic glide vehicle is being developed to allow Russian strategic missiles to penetrate missile defense systems. Hypersonic glide vehicles (HGVs) are maneuverable vehicles that travel at hypersonic (typically greater than Mach 5) speed and spend most of their flight at much lower altitudes than a typical ballistic missile. The combination of high speed, maneuverability, and relatively low altitude makes them challenging targets for missile defense systems.[381]

Russia's overall number of strategic systems is constrained by the New Strategic Arms Reduction Treaty (START), which entered into force on 5 February 2011. This treaty limits the United States and Russia to no more than 1,550 deployed warheads each (including warheads on ICBMs and SLBMs, and counting each heavy bomber as one warhead) 7 years after entry into force.[382]

Russia retains about 1,200 nuclear warheads for ICBMs. Most of these missiles are maintained on alert, capable of being launched within minutes of receiving a launch order. Although the number of missiles in the Russian ICBM force

will continue to decrease because of arms control agreements, aging missiles, and resource constraints, Russia intends to retain the largest ICBM force outside the United States.[383]

Despite Russia's modernization efforts, the size of the SRF may drop below 300 deployed ICBMs by the early 2020s, but most of those missiles will be equipped with multiple warheads. The composition of the force is changing significantly to meet the deployed strategic warhead total limit of 1,550. Notably, prior to 2010, no SRF road-mobile ICBMs carried MIRVs; by the early 2020s, all will do so.[384]

Russian ICBM Systems[385]

1612-11143

System	Number of Stages	Warheads	Propellant	Deployment Mode	Max Range km
SS-18 MOD 5	2 + PBV	10	LIQUID	SILO	10,000+
SS-19 MOD 3	2 +PBV	6	LIQUID	SILO	9,000+
SS-25	3 + PBV	1	SOLID	ROAD-MOBILE	11,000
SS-27 MOD 1	3 + PBV	1	SOLID	SILO and ROAD-MOBILE	11,000
SS-27 MOD 2	3 + PBV	Multiple	SOLID	SILO and ROAD-MOBILE	11,000

APPENDIX B: Russian Ground Forces

Russian Ground Forces

The Russian ground forces are composed of the Ground Troops, Airborne Troops (VDV), Naval Infantry, Coastal Troops, Coastal Missile Artillery Troops, and National Guard. The Russian Federation armed forces are geographically distributed across four military districts: Western, Southern, Central and Eastern. The Western Military District has three numbered combined-arms armies (CAAs), the Southern and Central Military Districts each have two, and the Eastern Military District has four.

The Ground Troops

The Ground Troops, or *Sukhoputniye Voyska*, are the land warfighting component of the Russian Ministry of Defense. The Ground Troops constitute the largest component of the Russian Federation armed forces. The Ground Troops are currently organized into approximately 40 active and reserve maneuver brigades and eight maneuver divisions.[386] There are about 350,000 military personnel in the ground troops.[387]

According to Russia's Ministry of Defense, the roles of its Ground Troops include repelling enemy aggression and the protection of Russia's territorial integrity and Russian national interests.[388] Its main peacetime missions include maintaining adequate combat readiness, participating in international peacekeeping operations, participating in disaster recovery efforts, and assisting in the maintenance of internal security, if needed. Examples of what Moscow designates peacekeeping operations include ongoing efforts in breakaway enclaves in Georgia and Moldova.[389]

In times of heightened tension, the Ground Troops will mobilize forces, operationally deploy to threatened areas, call up and train reservists, and prepare for defensive operations. Finally, in a time of war, Russia's Ground Troops are charged to suppress military conflicts if possible, repulse enemy aggression, conduct defensive and counter-offensive operations to defeat the aggressor, and defend critical infrastructure.[390]

Organizationally, the Ground Troops are composed of main combat components—motorized rifle, tank, missile and artillery, and air defense units. Support elements for these units include

Russian armored fighting vehicles parade in Red Square; ground forces have historically played a dominant role in Russian military issues and leadership.

Image Source: AFP

reconnaissance, engineer, nuclear, biological and chemical defense, and signal troops.

- **Motorized Rifle Troops** units are the most abundant formations in Russia's Ground Troops. Essentially mounted infantry, these are highly mobile forces tasked with holding territory, repulsing enemy attacks, breaking through enemy defenses, capturing important areas, and defeating the enemy.[391]
- **Tank Troops** are the main strike component of the Ground Troops. They support Motorized Rifle Troop missions with direct fires during meeting engagements.[392]
- **Missile Troops and Artillery** are the main means of indirect fires for Russian combined arms operations. Missile Troops and Artillery forces are organized into missile, rocket-artillery, and combined artillery units.[393] Missile units operate close/short-range ballistic missiles. Rocket-artillery units operate multiple rocket launchers (MLRs), and combined artillery units operate composite towed or self-propelled artillery and MLRs.
- **Air Defense Troops** provide air defense for the Ground Troops. These units are equipped with anti-aircraft missiles, anti-aircraft artillery, anti-aircraft gun-and-missile systems, and portable anti-aircraft missile systems.[394]
- **Reconnaissance Troops** perform a wide range of tasks in order to provide decision makers with information about enemy strength, disposition, terrain, and weather conditions.[395]
- **Engineer Troops** perform a variety of specialized tasks, including the construction of fortifications, installation of obstacles (mine fields, etc.), the preparation of field deployment locations, the preparation and maintenance of deployment routes, the construction of bridges and ferry crossings, and water purification.[396]
- **Nuclear Biological Chemical Defense Troops** are specialized forces tasked with mitigating the effects of nuclear, biological, or chemical contamination.[397]
- **Signal Troops** are specialized forces designed for the deployment and maintenance of mobile redundant command, control, and communications systems.[398]

The New Look Reforms and the Ground Troops

The centerpiece of the 2008–2009 New Look reforms was the elimination of the divisional/regimental structure and its replacement by the brigade. The Russian Ground Troops currently have about 40 combined arms brigades.[399] In the winter of 2013, one motorized rifle brigade and one tank brigade were reformed as divisions, and in the spring of 2016, it was announced that four new divisions would be formed in the Western and Southern Military Districts and one in the Central Military District.[400]

The transition to the brigade structure was intended to optimize Russia's ground forces to fight in what the Russians call "local wars and armed conflicts," limited wars along Russia's periphery, which the Russian General Staff believes to be very likely under modern conditions. In November 2011, then-Chief of the General Staff Nikolai Makarov said: "The possibility of local armed conflicts virtually

along the entire perimeter of the border has grown dramatically."[401] The Russian ground forces fielded brigades of this type that had been field tested in Afghanistan (1979–1989) and had proved to be quite effective in combat.[402]

Another development that had received great impetus in the Afghanistan war was the reinforced battalion, or battalion tactical group (BTG), a motorized rifle or tank battalion, strengthened by other assets, such as artillery, reconnaissance, and air defense resources. BTGs are similar to NATO battalion task forces and are ad-hoc organizations, individually created and optimized to fulfill a particular mission.[403]

The new Russian divisions are much smaller than their Soviet predecessors. While a Soviet motorized rifle division numbered around 13,000 officers and soldiers, Russia's new motorized rifle divisions number around 9,000.

A proponent of the mixed division-brigade ground forces, then-acting chief of the ground forces, General Lieutenant Vladimir Popov, stated that Russia's combined arms brigades "in terms of structure are intended for fighting in local wars," but that they also "can be successfully employed in large-scale wars. They differ from divisions by lesser numbers of personnel and military equipment and are capable of executing missions with the very same high effectiveness as divisions, but in a smaller zone of responsibility."[404] The re-introduction of some smaller divisions may be based more on their potential intimidation value than they are on their potential value in combat.

These positive developments have led some analysts to claim that Russia is developing entirely new military concepts. Modern Russian tactics show a strong continuity with past practices. Recent Russian activity in eastern Ukraine, for example, demonstrates a creative use of their traditional combined arms and reconnaissance-strike tactics combined with a more aggressive application of information warfare concepts that date back to the Soviet period. Russian ground forces troops have cooperated with non-traditional semi-military forces such as partisans and Cossacks for centuries.[405] Regardless, the contemporary Russian ground forces pose a serious challenge to U.S. military planners, and they should be seen as neither a simple continuation of past Soviet practices, nor an entirely new force employing entirely new military concepts, but a highly nuanced and adaptive combination of both.[406]

The main combat power of the Ground Troops is centered in tank and motorized rifle divisions and separate tank and motorized rifle brigades that are normally subordinate to combined arms armies. Although Russia's military strategy is officially defensive, the Russian Ground Troops basic principle of land warfare is violent, sustained, and deep offensive action, just as it was during the Soviet era. Mechanized and armored formations supported by aviation and artillery are to seize the initiative at the outset of hostilities, penetrate the enemy's defenses, and drive deeply and decisively into the enemy's rear area.

Combined Arms Armies

The combined arms army is an operational and administrative organization that forms the basis of the Russian field army. A typical combined arms army includes two to four combined arms brigades, usually motorized rifle

brigades and in a few cases a tank brigade, plus artillery, missile, air defense, engineer, chemical defense, communications, intelligence and reconnaissance, and rear support units. By altering the mix of motorized rifle and tank formations and artillery and missile support, the army can operate in either offensive or defensive roles in different geographical areas and under various operational constraints.

The Tank Army

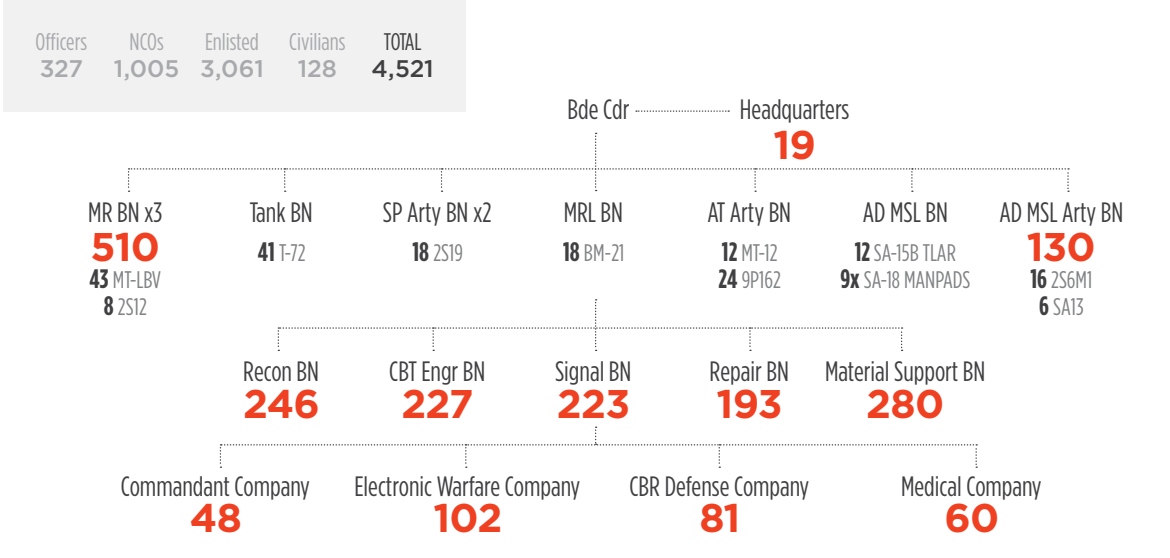
The Russian armed forces currently only have one tank army, the First Guards Tank Army (1st GTA). It, like the combined arms army, is both an operational and administrative unit. Currently, the 1st GTA includes a tank division, a motorized rifle division, and a tank brigade, plus artillery, missile, air defense, engineer, chemical defense, communications, intelligence and reconnaissance, and rear support units. The traditional role of a tank army is to exploit penetrations deep into the enemy's rear areas.

The Separate Combined-Arms Brigade

The primary combat formation of the Ground Troops is the separate combined-arms brigade, either motorized rifle (MR) or tank. There are three basic tables of organization and equip-

New Look Motorized Rifle Brigade Table of Organization and Equipment: Primary and Supporting Subunits[407]

1612-11131



ment (TO&Es) for separate MR brigades and one for separate tank brigades. All Russian combined-arms brigades, however, regardless of specific primary combat vehicle, are organized in essentially the same manner.[408]

Tank and MR brigades differ in organization in that where the MR brigade has three MR battalions, one tank battalion, and an antitank (AT) battalion, the independent tank brigade reverses this basic structure with three tank battalions, one motorized tank battalion, and no AT battalion.[409] The three MR TO&Es differ from one another in their primary combat vehicle, either wheeled armored personnel carrier (APC) or tracked infantry fighting vehicle (IFV).[410] The organizational structure of a typical tracked APC-equipped independent MR brigade is shown in the accompanying illustration.[411] In addition, the primary equipment of a separate motorized rifle brigade is shown in the table below.

Battalion Tactical Groups

BTGs are task-organized battalion-plus-sized tactical combat entities that are capable of performing independent combined-arms combat missions. They are similar in purpose, structure, and tactical use to U.S. Army battalion task forces. Most, if not all, New Look maneuver brigades

Russian Separate Motorized Rifle Brigade Personnel and Primary Offensive Equipment[412]

1612-11142

Nomenclature	Quantity
Personnel	4521
T-72B3 Main Battle Tank	41
BMP-3 Infantry Fighting Vehicle or	129
BMP-2 Infantry Fighting Vehicle or	129
MT-LBV Tracked Armored Personnel Carrier	129
BTR-82A Wheeled Armored Personnel Carrier	129
2S19 152-MM SP Howitzer	18
BM-21 Multiple Rocket Launcher	18

have one BTG, manned entirely or mostly with contract soldiers, that is used to perform the most difficult or complicated combat tasks assigned to the brigade. An order issued on 19 September 2012 required all maneuver brigade commanders to create a contract-manned BTG within the brigade if they had not already done so.[413]

The need to have effective BTGs is a primary driver of the New Look structural reforms. BTGs have their theoretical origins in the late Soviet period, where they were envisioned to fight against NATO on both a nuclear or non-nuclear battlefield in a nonlinear, large-scale environment. BTGs have been used in every local war or armed conflict in which Soviet and Russian forces have been involved since the Afghanistan War (1979–1989).[414] The tactical use of BTGs in combat has impacted the tactical principles that govern their construction and use. BTGs currently serve—and will continue to serve—as Russia's primary tactical fighting unit in all tactical circumstances, both in large-scale and small-scale conflicts, well into the future.

The Airborne Troops

Russia's Airborne Troops, or VDV (*Vozdushno-Desantniye Voyska*), is an independent arm of service within the Russian Federation armed forces. It is composed of four maneuver divisions, four maneuver brigades, and a separate special purpose (Spetsnaz) reconnaissance brigade.[415] The VDV serves as Russia's high-mobility initial invasion and rapid response force.[416, 417] In its role as rapid response or initial assault forces, the VDV may be used to achieve specific objectives that shape the battlespace for follow-on ground forces. These may include:

- Seizing key terrain (i.e., bridges, airports, and seaports)
- Establishing blocking positions and vertical envelopment of a retreating enemy
- Disrupting enemy logistical supplies, communications, and command centers
- Destroying high value targets[418]

Maneuver formations within the VDV are designated as either parachute or air assault, the primary difference being in whether they arrive at their objective via airdrop or overland means. In all cases, VDV personnel are trained to operate both ways. Major VDV formations are:

- Two parachute divisions – the 98th Guards and 106th Guards
- Two air assault divisions – the 7th Guards Mountain and 76th Guards
- Four air assault brigades – the 11th, 31st, 56th, and 83rd
- One special-purpose reconnaissance brigade – the 45th Spetsnaz[419]

In line with its highly mobile function, the VDV is equipped with a large number of amphibious air droppable combat vehicles, the BMD-series IFVs and BTR-D series APCs. The VDV's increased mobility comes at the expense of armor and firepower; its primary combat vehicles are generally lighter than their Ground Troops counterparts. In late 2016, however, the air assault divisions and brigades received up to a company (10 to 13) of T-72-series main battle tanks. The tank companies within these air assault units will very likely increase to tank

battalions (30 to 42) by the end of 2018.[420, 421] The MBTs are not intended for air drops, but will accompany VDV ground maneuver formations to increase firepower and lethality.

Naval Infantry

Russian Naval Infantry is organized into units that are operationally subordinate to fleet commanders. Naval Infantry is focused on amphibious assaults, coastal defense, counterterrorism, anti-piracy, and ship security missions. The organization and equipment of Naval Infantry units are generally similar to that of motorized rifle units in the Ground Troops.[422]

The Naval Infantry consist of four independent brigades, one separate brigade, and three separate battalions.[423]

Coastal Troops

The Russian Coastal Troops consist of Coastal Missile Artillery Forces (CMAF) and Coastal Troops. CMAF consist of three independent brigades, two independent regiments, and one independent battalion.

The Coastal Troops are organized as ground forces but are subordinate to the Navy. The Coastal Troops consist mainly of motorized rifle brigades and artillery brigades. Their primary mission is coastal and regional defense.[424] The Navy Ground and Coastal Troop Headquarters, a command unit based in Moscow, heads the Coastal Troop force, but coastal missile units likely take operational orders from their respective fleets.[425, 426, 427]

Russia's coastal missile and artillery forces provide anti-ship defenses for Russia's coast-

Russian VDV Primary Combat Vehicles

1612-11144

System	Function	Capacity *(Crew/Dismounts)*
BMD-2	Infantry Fighting Vehicle	2/5
BMD-4M	Infantry Fighting Vehicle	3/5
BTR-D	Tracked APC	3/10
BTR-MDM	Tracked APC	3/10
2S9	120-mm SP Combination Gun	3
2S25	125-mm Tracked SP Antitank Gun	3

BASTION Coastal Defense Missile Launcher.

Image Source: AFP

line and littoral regions. Coastal missile defense in Russia is primarily centered on anti-ship missile systems. Most units are still dependent on two systems that entered production in the late 1970s to early 1980s—the STYX and SEPAL. Efforts are underway to rearm the coastal missile force with new, longer-range missile systems.[428] These systems include the BAL and BASTION, and they are slowly being introduced to the force.[429]

APPENDIX C: Russian Aerospace Forces

The former Russian Federation Air Forces and Aerospace Defense Troops merged to create the Russian Federation Aerospace Forces (VKS) in August 2015. The merger places former space and aerospace defense assets vital to strategic aerospace operations under one organizational structure.[430, 431] The Russian Aerospace Forces include four tactical air armies, which are aligned with the military districts. They also contain the Long-Range Aviation (LRA) and Military Transport Aviation (VTA), as well as the Space Troops, which are not subordinate to the military districts but to Aerospace Command in Moscow.[432] Overall manpower for the Russian Aerospace Forces is listed at 148,000 including conscripts.

The 6th Air Force and Air Defense Army (AFADA) is subordinate to the Western Military

Russian Air Forces Air Bases[433]

1612-11135

Moscow maintains aviation units in Armenia and Kyrgyzstan, represented on the map by the two fighter base symbols outside Russia's borders.

Image Source: DIA, D3 Design

District, the 14th Air Force and Air Defense Army to the Central Military District, the 11th Air Force and Air Defense Army to the Eastern Military District, and the 4th Air Force and Air Defense Army to the Southern Military District.

Long Range Aviation: The LRA is the bomber force of the Russian Aerospace Forces and operationally subordinate to the Supreme High Command of the Russian armed forces. The LRA is tasked with long-range bombardment of strategic targets with conventional or nuclear weapons. Currently, TU-95MS aircraft are being modernized to include the Kh-101/102 missile system.[434] The LRA has an inventory of 16 Tu-160, 60 Tu-95MS, and more than 50 Tu-22M3 bombers.[435]

Military Transport Aviation: The VTA is subordinate operationally to the Supreme High Command of the Russian armed forces and is the main provider of the air lift for Russian troops and equipment. The recent Ukraine and Syria conflicts have resulted in heavy

Russian Air Forces Order-of-Battle[436]

1612-11136

Aircraft Type	Total Number	Most Capable
Bomber	141	Tu-160
Fighter	420	MiG-29
Fighter Ground Attack	345	Su-35S
Attack	215	Su-25SM
ELINT	32	Il-22M
Airborne Warning and Control	22	A-50
C2	6	Il-86VKP
Tanker	15	Il-78M
Heavy Transport	122	An-124
Training	198	Yak-130

use of the VTA forces, allowing pilots to gain significant flight hours. The primary aircraft operated by the VTA include the Il-76, An-124, An-22, An-26, An-72, and An-12. The various sizes of aircraft allow the VTA to support many different missions from VIP flights, to small cargo, to transporting tanks and aircraft. Additionally, these aircraft tend to have larger fuel tanks allowing for extended missions without refueling to increase efficiency.[437]

Space Troops:[438] These forces within the Aerospace Forces have the mission of conducting space launches and maintaining the ballistic missile early warning system, the satellite control network, and the space object surveillance and identification network.[439, 440, 441]

Russian Combat Aircraft – Fighters [442, 443, 444, 445, 446]

1612-11138

Fighter Aircraft	Entered Service	Role
Operational		
Su-35S	2014	Multi-Role Fighter
Su-30SM	2014	Multi-Role Fighter
Su-34	2012	Multi-Role Fighter-Bomber
MiG-31BM	2012	Fighter Interceptor
Su-27SM3	2011	Multi-Role Fighter
MiG-29K/KUB	2009	Multi-Role Naval Fighter
Yak-130	2009	Light Attack Fighter-Trainer
MiG-29N/SE	2009	Multi-Role Fighter
MiG-29SMT	2006	Multi-Role Fighter
MiG-29UBT	2006	Multi-Role Fighter
Su-27SM	2006	Fighter Interceptor
Su-30M2/MK2	2003	Multi-Role Fighter
Su-33	1994	Naval Multi-Role Fighter
Su-27P/S	1986	Fighter Interceptor
Su-27UB	1990	Fighter Interceptor
MiG-29	1983	Multi-Role Fighter
MiG-31	1981	Fighter Interceptor
Developmental		
MiG-29M/M2	2018	Multi-Role Fighter
MiG-35S	2018	Multi-Role Fighter
PAK-FA	2020	5th Generation Multi-Role Fighter
LMFS	Circa 2030	Light Weight Multi-Role Fighter
PAK-DP	Circa 2030	Multi-Role Fighter Interceptor

Russian Bombers[447, 448, 449, 450, 451]

1612-11107

Bomber Aircraft	Entered Service	Role
Tu-95MSM BEAR	2015	Modified Strategic/Tactical Bomber
Tu-160M BLACKJACK	2014	Modified Strategic/Tactical Bomber
Tu-22M3M BACKFIRE	2014	Modified Regional Bomber
Tu-160	1987	Legacy Strategic Bomber
Tu-95MS	1983	Legacy Strategic Bomber
Tu-22M3	1981	Legacy Regional Bomber
Developmental		
Tu-160M2	2020	New Build Strategic/Tactical Bomber
PAK-DA	2025+	Future Strategic/Tactical Bomber

Integrated Air Defense System

Russia employs what is considered to be among the very best of modern military integrated air defense systems. Historically, Russia has been a leader in developing technologically advanced detection and engagement elements. During the 1990s, Russia largely maintained its research and development programs for air defense equipment.[452] During this period, Russia purchased very few of these systems for domestic use.[453] However, the State Armaments Program of 2015, and the subsequent 2020 plan, significantly enhanced support for the purchase and employment of the newest and most capable air defense equipment including radar, surface to air mis-

siles, command and control, and electronic warfare equipment. Concurrent to the acquisition plan, Russia continues to support research and development efforts in the air defense realm.[454]

The military integrated air defense system kill chain provides the framework for the Russian design, deployment, and command hierarchy of deployed air defense assets. The kill chain contains the seven elements that a fully functional Russian military integrated air defense system would employ in an air defense scenario.

To support the kill chain (outlined below), Russia employs redundant and overlapping systems.[455]

Russia employs its military integrated air defense system at home and abroad. The military inte-

Russian Military Integrated Air Defense System Kill Chain

1612-11110

Kill Chain Element	Associated Equipment/Process
Indications and warning	Human intelligence, signals intelligence, open-source information, over-the-horizon radar
Detection	Air surveillance radar, airborne early warning and control radar, passive Detection system, ship-based radar, visual observation, secondary surveillance radar
Identification	Secondary surveillance radar, visual identification, non-conformity with approved routes
Tracking	Integration of detection data into data processing and command & control elements to maintain positional data on an airborne threat
Assignment	Command & control (variable echelon, based on threat condition and other factors) takes track data and assigns target tracks to weapons platforms
Engagement	Surface to Air Missiles, Air to Air Missiles, Air Defense Artillery, Electronic Warfare
Assessment	Verification of engagement: air surveillance radar, airborne early warning and control radar, passive detection system, ship-based radar, visual observer, secondary surveillance radar in conjunction with command & control elements

grated air defense system also plays a significant role in Russia's domestic defense and expeditionary operations.[456] Russia's initial deployments to Crimea and Syria included the Pantsir and S-300 air defense systems. These systems allowed Russia to build an echelon-based air defense system in the Crimean Peninsula.[457] At a later point in the Crimean and Syrian operations, Russia deployed long-range strategic surface to air missile systems in both countries.[458]

Unmanned Aerial Vehicles

In 2008, Russia lagged behind the world in development of UAVs. However, the 2008 Georgia conflict accelerated efforts with initial require-

Russian Unmanned Aerial Vehicles[459, 460]

1612-11113

UAV	Entered Service	Role
Operational		
Pchela-1K	2009	Tactical UAV
Zala 421-08 Grusha / Granat-1	2010	Tactical UAV
Zastava	2013	Tactical UAV
Orlan-10	2013	Tactical UAV
Forpost	2013	Tactical & Strategic UAV
Rubezh-20 / Granat-4	2013	Tactical UAV
Takhion	2014	Tactical UAV
Developmental		
Orion/Inokhodets	2018	Tactical & Strategic UAV
Altius-M	2019	Strategic UAV
Gonshchik	2020+	Tactical & Strategic UAV
Okhotnik-B/U	2025+	Medium Weight UCAV

ments focused on tactical reconnaissance systems that currently dominate inventory. Russia has introduced a class of mini-UAVs for use by the military, but the most significant defense developments are occurring with larger, more capable systems for tactical and strategic use. Russia is also working on unmanned combat aerial vehicles (UCAVs).[461]

Russia's fleet of aircraft is aging, but they are rapidly modernizing their air force as well as their air defense systems. When the Soviet Union collapsed in 1991, Russia's air force entered a decline as industry and operational units languished. Since 2008, however, the Russian Air Force and Navy have invested unprecedented financial resources toward airpower to include the upgrade and/or new build of approximately 700 combat fighter/bomber aircraft through 2020 to replace legacy systems.[462, 463, 464]

Newly modified aerodynamic systems in Syria demonstrate that Russian airpower has returned in limited numbers. Similar efforts with newly upgraded air combat systems have been used in the Crimea/Black Sea and Baltic regions with Russian expectations that provocative moves by the United States and/or NATO will be met with more capable Russian air power. Finally, a slowly improved strategic bomber force (i.e., Tu-95MS BEAR and Tu-160 BLACKJACK) is again using Cold War concepts to conduct international flights that impinge upon the sovereign borders of foreign nations.[465]

APPENDIX D: Russian Navy

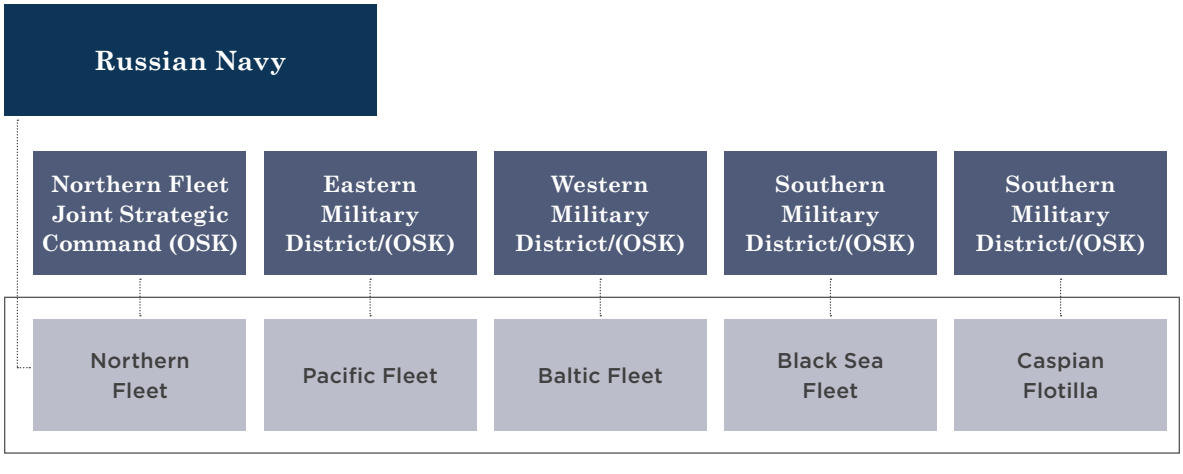
The disintegration of the Soviet Union in 1991, as well as the economic stagnation that followed, led to a severe downsizing for the Navy. Naval construction ground to a halt, and the fleet fell into disrepair and obsolescence.[466] Under Vladimir Putin, however, the Russian military's capabilities have undergone significant improvement, and the Navy is no exception.

The Russian Navy has approximately 130,000 personnel.[467] The combined major forces of the current Russian Navy number about one-sixth to one-quarter of what was the Soviet Navy in its heyday. That legacy force today has an average age exceeding 20–25 years. With the economic stabilization of the Russian Federation in the early 2000s, the past 10 years have seen a steady increase in the maintenance, training, and deployment activity of the Navy and, more importantly, the activation of a broad submarine and ship construction program to recapitalize the fleet. The Navy's missions remain focused on strategic deterrence and homeland defense. Periodic distant deployments support the Russian Federation's global foreign policy interests.

The Navy operates nuclear-powered ballistic missile submarines, which are an essential arm of Russia's nuclear triad and capable of delivering nuclear warheads from thousands of kilometers away. This strategic capability puts the Russian Navy in the top tier of foreign navies.[468]

Russian Navy Organization

1612-11111



Structure

The headquarters of the Russian Navy is located in St. Petersburg. The Russian Federation Navy consists of four fleets (Baltic, Black Sea, Northern, and Pacific) and a flotilla in the Caspian Sea. The fleets receive administrative orders and guidance from the Navy Staff in St. Petersburg, whereas operational orders are issued from the various Joint Strategic Commands (OSKs).[469] Each fleet and the Caspian Flotilla is operationally subordinate to one of these OSKs.

GRIGOROVICH frigate.

Image Source: AFP

Northern Fleet

The Northern Fleet is Russia's most capable naval force. Based in Severomorsk, located in the Kola Gulf (the only ice-free direct access to the North Atlantic), its seven operational ballistic missile submarines provide the bulk of the firepower for the Navy's arm of the strategic nuclear triad.[470] Russia's only operational aircraft carrier is also based in the Northern Fleet, along with the Navy's only nuclear-powered heavy cruiser.[471] Surface combatants and submarines deploy worldwide from the Kola Gulf, playing an active role in the ongoing Syria crisis, conducting counter-piracy patrols off the Horn of Africa, along with power projection in the North Atlantic and Caribbean. The Northern Fleet's two primary missions are to provide strategic deterrence with its ballistic missile submarines and to defend the maritime approaches to northwest Russia.[472]

Pacific Fleet

The Pacific Fleet lags behind the Northern Fleet in terms of maintenance and overall capability; however, it is still able to conduct strategic nuclear strikes against the U.S. mainland, and its surface units are active from the Pacific region to the Horn of Africa.[473] The Pacific Fleet has its headquarters in Vladivostok, but its forces are split between two main locations with the majority of surface ships and diesel powered submarines in the Vladivostok region and the nuclear powered submarines, including the SSBNs, located in Petropavlovsk-Kamchatskiy.[474, 475] The workhorses of the PACFLT are four UDALOY-class destroyers, which are regularly deployed throughout the region.[476]

Black Sea Fleet

The Black Sea Fleet for years has been a fleet in decline, forced to operate with a handful of Soviet-era vessels. Beginning in 2014 after the occu-

pation of Crimea, new units began to enter the order of battle including modern coastal missiles and naval infantry.[477] Then in 2015, new submarines and surface combatants began to arrive to bolster the fleet. Now armed with the KALIBR missile system, the Black Sea Fleet is a significant force in the region and over the next few years could have as many as six new attack submarines and six new surface ships, which can not only exert control on the Black Sea, but can operate in the Mediterranean to counter NATO forces and support operations in Syria.[478]

Baltic Fleet

The majority of Baltic Fleet vessels are located at Baltiysk in the Kaliningrad Oblast with a handful further north near St. Petersburg.[479] Headquartered at Kaliningrad, the fleet's mission focuses on specifically ensuring sea-lines of communication and trade are open between Kaliningrad and St. Petersburg, and in countering NATO forces in the region.[480, 481] The Baltic Fleet has also been a key player in support of Russian interests in the Eastern Mediterranean Sea and Horn of Africa.[482] With the arrival of two KALIBR-equipped vessels in 2016, the Baltic fleet presents a significant long-range precision conventional and theater nuclear strike threat to Western Europe.

Caspian Sea Flotilla

The Caspian Sea Flotilla is the dominant naval force on the Caspian Sea and was the first Russian surface force operationally equipped with the KALIBR missile system. Russia's naval superiority ensures Moscow has leverage in regional economic disputes. The KALIBR land attack cruise missile gives Moscow a precision strike weapon that can range targets in Central Asia, the Middle East, and parts of Europe, as evidenced by strikes into Syria in October 2015.[483] Most of the flotilla's combat power (all of the KALIBR shooters) are based at Makhachkala, possibly to be closer to regional threats and also to avoid having to navigate the Volga River Delta to reach the sea, as is the case with ships based at Astrakhan.[484, 485]

Naval Aviation

Naval aviation assets are spread through four fleet air forces, each with composite regiments under their command. The main missions of naval aviation are to track and destroy enemy submarines and warships and also help achieve air superiority where the fleet is operating.[486] Most naval aviation aircraft are land-based; the only aircraft carrier, ADMIRAL KUZNETSOV, can accommodate 22 strike aircraft and 17 attack helicopters.[487]

Submarine Forces

Russia's sea-based strategic deterrent is deployed in the Northern and Pacific Fleets. There are six DELTA IV SSBNs, one DOLGORUKIY SSBN, and one remaining TYPHOON SSBN used as a test platform in the north. Three DELTA III and two DOLGORUKIY SSBNs are in the Pacific. All sea-launched ballistic missiles (SLBMs) carried by these submarines—SS-N-18 (DELTA III), SS-N-23 (DELTA IV), and SS-N-32 (DOLGORUKIY)—can reach U.S. targets from their home-

base piers and, if required, could be launched with the submarines on the surface.

These SSBNs are protected by nuclear-powered cruise missile and torpedo attack submarines, which also engage enemy surface and submarine forces and pose a land attack cruise missile threat against an enemy homeland. In the Northern Fleet, these attack submarines include three OSCAR II and one SEVERODVINSK SSGNs and three VICTOR III, six AKULA I/II, and four SIERRA SSNs. The SEVERODVINSK class is new, extremely quiet and is armed with a wide range of advanced cruise missiles to destroy enemy ships and targets ashore. The Pacific Fleet has five OSCAR II SSGNs and four AKULA I SSNs. It will eventually receive SEVERODVINSK SSGNs. A new fifth-generation general purpose nuclear-powered submarine is under development.

Non-nuclear diesel-electric submarines round out the Russian submarine forces. These units are assigned to all fleets for close-in area defense missions in adjacent seas. Older and newer versions of the KILO class comprise most of this force: six in the Northern Fleet, two in the Baltic, three new KALIBR-equipped units in the Black Sea, and eight older KILO class in the Pacific. The newest KILO version continues in construction with three more units destined for the Black Sea Fleet and eventually another six for the Pacific Fleet. A single PETERSBURG-class improved design experimental unit is in the Northern Fleet with two additional units to be completed. A future non-nuclear, KALINA design, likely having an air independent propulsion plant, is in development with construction projected after 2020.

Surface Forces

The Russian Navy's major combatant surface ships, frigates and larger, comprise some 32 units assigned across all 4 fleets.

- The Northern Fleet has Russia's only aircraft carrier (KUZNETSOV), one nuclear-powered KIROV-class cruiser, one conventionally powered SLAVA-class cruiser, and four UDALOY-class destroyers. The first new GORSHKOV-class (KALIBR) guided missile frigate was recently commissioned with more expected. This fleet also has 12 minor anti-ship and anti-submarine combatant ships, as well as 4 ROPUCHA-class amphibious assault ships.
- The Baltic Fleet has nine major ships—two older SOVREMENNYY-class destroyers and seven frigates: one KRIVAK-class, two NEUSTRASHIMYY-class, and four new STEREGUSHCHIY-class units. It recently received two SVIYAZHSK-class (KALIBR) guided missile patrol ships. These are supplemented by 18 minor combatants and 4 amphibious assault ships.
- The Black Sea Fleet has one SLAVA-class cruiser, one 47-year-old KASHIN-class destroyer, two older KRIVAK-class frigates, and the first of a planned six new GRIGOROVICH-class (KALIBR) frigates. More new construction units are expected for the Black Sea Fleet. The fleet is supplemented by 15 minor combatants and 7 amphibious assault ships.
- The Caspian Flotilla has two GEPARD-class frigates (one with KALIBR) and recently received two new ASTRAKHAN-class patrol ships and three SVIYAZHSK-class (KALIBR-capable) guided missile patrol ships.

- Finally, the Pacific Fleet has seven major ships: one SLAVA-class cruiser, four UDALOY-class and two SOVREMENNYY-class destroyers. These are supplemented by 24 minor anti-ship and anti-submarine combatants and 4 amphibious assault ships.

The Russian Navy has several weapons upgrade programs in progress. The new SS-N-32 BULAVA submarine launched ballistic missile is being produced for the DOLGORUKIY-class SSBNs. The most consequential development is that Russia plans to deploy KALIBR capability on all new design construction nuclear and non-nuclear submarines, corvettes, frigates, and larger surface ships. KALIBR provides even modest platforms, such as corvettes, with significant offensive capability and, with the use of land attack missiles, all platforms have a significant ability to hold distant fixed ground targets at risk using conventional warheads. The proliferation of this capability within the new Russian Navy is profoundly changing its ability to deter, threaten, or destroy adversary targets.

Although the Navy is mainly made up of Soviet-era surface ships and submarines, an extensive modernization program is underway, focusing first on the submarine force.[488, 489, 490] Progress in submarine modernization is underway; however, the majority of the naval inventory still consists of aging units from the 1980s and 1990s. While more new classes of ships are planned, the Navy will have to maintain its older fleet for several years until these new vessels come online. Despite this, Russia is still capable of deploying its assets worldwide, best evidenced by continuous support to Russian operations in Syria since 2012 and recurring counter-piracy deployments to the Gulf of Aden since 2008.[491, 492]

APPENDIX E: Russian Special Operations Forces

Russia's special operations forces are popularly known by the abbreviation "Spetsnaz," short for **Spets***ial'noye* **naz***nacheniye*, a term meaning "special purpose." Spetsnaz, although similar to special operations forces in Western countries, retains a slightly different set of roles and missions than those commonly found elsewhere. The current incarnation of Spetsnaz traces its origin back to naval and ground units created back in the mid-1950s to establish a dedicated special purpose force to operate with the armed forces, although its wider lineage can be attributed to counterrevolutionary and partisan units formed during the Russian Revolution and World War II, respectively.[493]

These predecessor units became pivotal in defining the hallmark missions of the modern Spetsnaz force, from diversionary acts conducted by partisan units behind German lines in World War II to deep reconnaissance and intelligence collection, reflecting the postwar perception of a potential conflict with the West during the Cold War.[494] These traditional missions—with slight modifications and variations—still manifest themselves in Spetsnaz doctrine and are associated with Moscow's recent strategy of using indirect action, albeit with the wider aim of achieving goals while avoiding a large-scale conflict.

Within Russia, the term Spetsnaz is often misappropriated and misattributed. Moscow's true Spetsnaz force is a relatively small, select group of mission-dedicated special purpose forces, primarily belonging to the military and its Main Intelligence Directorate (GRU) (e.g., the Defense Ministry's ground and naval Spetsnaz units), and to a lesser extent, the security services of the National Guard, Federal Security Service (FSB), Foreign Intelligence Service (SVR), and Justice and Emergency Situations Ministries.[495] Estimated to number 20,000–30,000 personnel, Spetsnaz units in these organizations all retain distinct and separate missions from one another. The single largest contingent with which recent and visible exploits of Spetsnaz are attributed reside with the GRU.

APPENDIX F: Russian Intelligence Services

Russia has three primary intelligence services: the Federal Security Service (FSB), the Foreign Intelligence Service (SVR), and the Main Intelligence Directorate of the General Staff (GRU). The FSB and SVR trace their lineage to the old Soviet Committee of State Security (KGB). Although the FSB and SVR are considered military services under Russian federal law, they are more akin to civilian intelligence agencies.[496]

The Federal Security Service

The FSB has three primary missions: countering foreign intelligence services, combatting organized crime, and ensuring economic and financial security. It is also the Russian lead counterterrorism organization.[497] President Vladimir Putin launched a major reorganization of the FSB during his first term, placing the organization under the president's direct control. The FSB has continued to grow, integrating the Border Guard Service of Russia and the Federal Agency of Government Communication and Information (FAPSI).

The Foreign Intelligence Service

The SVR is Russia's main external intelligence agency; it focuses on civilian affairs, whereas the GRU focuses on military affairs. According to Russian law, the SVR is authorized to carry out the following missions:[498]

- Conduct intelligence.
- Implement active measures (disinformation, propaganda, etc.) to ensure Russia's security.
- Conduct military, strategic, economic, scientific, and technological espionage.
- Protect employees of Russian institutions overseas and their families.
- Provide personal security for Russian government officials and their families.
- Conduct joint operations with foreign security services.
- Conduct electronic surveillance in foreign countries.

Responsibilities of Russian Intelligence Services[499, 500, 501, 502]

1612-11140

	Political Intelligence	Economic Intelligence	Military Intelligence	Measures of Support	Counter-Intelligence	Political Security	Law Enforcement
Soviet KGB	Main Role	Main Role	Subsidiary Role	Main Role	Main Role	Main Role	Subsidiary Role
Main Intelligence Directorate (GRU)	Subsidiary Role	Subsidiary Role	Main Role	Main Role	Subsidiary Role		
Federal Security Service (FSB)	Subsidiary Role	Subsidiary Role	Subsidiary Role	Main Role	Main Role	Main Role	Subsidiary Role
Foreign Intelligence Service (SVR)	Main Role	Main Role	Subsidiary Role	Main Role	Subsidiary Role	Subsidiary Role	
Federal Protection Service (FSO)					Subsidiary Role	Main Role	Subsidiary Role
Interior Ministry (MVD)					Subsidiary Role	Subsidiary Role	Main Role
National Guard (developing)				Main Role		Main Role	Main Role

Main Role Subsidiary Role

GRU Headquarters Moscow.[503, 504]

The Main Intelligence Directorate of the General Staff

The GRU is the Ministry of Defense's foreign intelligence organization that provides military intelligence for the General Staff, Ministry of Defense, and senior government officials.[505, 506, 507, 508] The GRU's responsibilities include providing senior political and military leadership with all-source intelligence, including indications and warning of strategic threats and information to assist leadership in making decisions regarding Russia's armaments program.[509, 510] GRU operations abroad involve human intelligence (HUMINT) collection on potential enemies' military-industrial capabilities, troop movements, and weapon systems.[511, 512] The GRU manages military attachés, intelligence analysis, cryptanalysis, space-based assets, telecommunications intercept capabilities, and radio-electronic and telecommunications-based offensive capabilities.[513, 514] It also oversees Spetsnaz units and special operations forces.[515, 516, 517, 518] GRU operational combat and advisory roles have expanded dramatically in the past decade, involving military operations in Ukraine's Crimea region, eastern Ukraine, and Syria.[519, 520, 521, 522, 523, 524, 525, 526]

APPENDIX G: Defense Industry and Modernization Programs

Russia's huge defense industrial complex focuses predominantly on weapons production, though the goal is to move toward a combination of military and non-military products.[527] President Vladimir Putin and Deputy Premier Dmitriy Rogozin, whose government portfolio covers the defense industry, have said that high levels of spending on the military and defense industrial complex will benefit the entire economy.[528, 529] In April 2016, Putin announced Russia's arms sales from the last year had been higher than planned, totaling $14.5 billion, with additional orders for $56 billion, the highest since 1992.[530, 531] However, while Moscow's pursuit of arms trade deals abroad may help partially offset challenging financial conditions and support continued military modernization goals, significant problems remain.

Challenges, partly due to Western sanctions, have slowed production for some weapons and equipment. Russian industry's dependence on weapons production, the depreciation of the ruble, and growing interest rates on industrial loans, which are used to finance facility modernization and production expenses, have increased business costs for Russian defense firms.[532] Russian economists have warned that the resulting imbalance between civilian and military spending could be problematic.[533, 534, 535, 536]

Russia's 2011–2020 State Armaments Program reflects President Putin's ambitious mandate that 70% of Russia's weapons inventory consist of new or upgraded equipment by 2020.[537, 538] In pursuit of that goal, Putin personally makes decisions about the defense industry's weapons modernization, production, and financing. Putin reestablished the Military Industrial Commission (VPK) in 2007 to better manage state control of defense production and acquisition.[539, 540]

Since May 2013, Putin has chaired week-long working groups with the Defense Ministry and defense industry leadership twice a year to monitor program implementation and oversee adjustments.[541, 542, 543] By 2014, Putin decreed himself Chairman of the VPK, probably to ensure that defense modernization efforts were fulfilled within economic constraints.[544, 545] At the same time, Defense Minister Shoygu set up a half dozen new Defense Ministry scientific and technical organizations, headed by military scientists, to place priority on defense orders that were cutting-edge, Russian-made, and technologically feasible.[546, 547]

The following are examples of weapons systems in active production, testing, or assimilation into military use, indicating current Russian leadership priorities for defense industry.

Ballistic Missile Sector

A key area of development detailed in Russia's 2011–2020 State Armament Program are the ballistic missile forces, which form the backbone of Moscow's nuclear triad.[548, 549] Russia has three competent bureaus that specialize in the design and development of ballistic missiles.[550] Russia's modernization efforts are driven by an aging missile inventory, the need to maintain a credible launch capability, and concern with the deployment of anti-missile defense systems by the United States.[551] As of 2015, modernized systems only made up 56% of the missile force; they are scheduled to reach 100% by 2022.[552]

Intercontinental Ballistic Missiles (ICBM)

Russia has several legacy ICBMs in its active inventory, including the SS-18, SS-19, and SS-25 that are being replaced by the SS-27, Sarmat, and SS-27 Mod 2; replacements should be completed by 2022.[553, 554, 555]

The SS-27 is a solid-propellant ICBM (silo and mobile variants), which uses a delivery vehicle made by the Minsk Heavy Wheeled Vehicle Factory in Belarus with launch equipment added by TsKb Titan in Volgograd. The SS-27 missile was designed by several institutes: the

SS-27 Mod 2 ICBM.

Image Source: Shutterstock

Moscow Institute of Thermal Technology for the overall design, NPO Soyuz in Lubertsy for the three solid rocket motors, the All-Union Scientific Research Institute of Experimental Physics in Sarov for the nuclear warhead, and GPO Votkinskiy Mekhanicheskiy Zavod in Votkinsk for final assembly.[556, 557, 558]

The Sarmat heavy ICBM is still in testing with the State Missile Center Makeyev and is scheduled to complete development around 2018.[559] The missile will be manufactured by the Krasnoyarsk Machine Building Plant, while the NPO Energomash-designed motor will be produced by Proton-PM based in Perm.[560]

A new solid-propellant ICBM, the RS-26 (Rubezh), was developed as a lighter version of the SS-27 and will only be deployed as a mobile variant sometime in 2017.[561] The missile's lower weight increases mobility and survivability, and the RS-26 will make use of various countermeasures to penetrate anti-missile defense systems.[562]

In addition, Russian officials claim a new class of hypersonic vehicle is being developed to allow Russian strategic missiles to penetrate missile defense systems. Hypersonic glide vehicles are maneuverable vehicles that travel at hypersonic (typically greater than Mach 5) speed and spend most of their flight at much lower altitudes than a typical ballistic missile. Press reporting claimed a successful test of this system from an SS-19 booster occurred in April 2016.[563]

Submarine-Launched Ballistic Missiles (SLBM)

The SS-N-18 SLBM, first deployed in 1978, is a two-stage liquid-propellant system designed to be launched from a DELTA III submarine. The latest version, the SS-N-18 Mod 3, can carry up to three warheads to a maximum range of over 5,500 kilometers.[564]

The SS-N-23, initially deployed in 1989, is a three-stage, liquid-propellant missile designed by the State Missile Center Makeyev. It can carry four warheads to a range of over 8,000-km and is launched from Delta IV submarines.[565] An upgrade of the SS-N-23, known as SINEVA, was completed in 2007 by the Krasnoyarsk Machine Building Plant.[566]

The SS-N-32 BULAVA is a solid-propellant, sea-launched ballistic missile that underwent a 19-year development cycle at the Moscow Institute of Thermal Technology.[567] The BULAVA can carry up to six independent nuclear warheads to a range of around 8,000 kilometers, is in service on the DOLGORUKIY-class submarines, and is replacing older SLBMs in the Russian inventory.[568, 569]

Short-Range Ballistic Missiles (SRBM)

The SS-21 TOCHKA is a mobile, single-stage, solid-propellant missile; it originally entered service around 1976. The latest TOCHKA-U version entered service in 1990 and is the most capable system (maximum range of 120 kilometers, inertial navigation with GLONASS updates, and radar or optical terminal guidance).[570, 571]

SS-26 ISKANDER-M is a mobile, single-stage, solid-propellant missile that is replacing the SS-21. The ISKANDER is equipped with an inertial/GLONASS guidance system and either radar, electro-optical, or infrared image matching terminal guidance system, enabling it to strike moving targets.[572]

Russian ISKANDER-M missile system.

Image Source: AFP

Cruise Missile Sector

Russia's 2011–2020 State Armament Program also places a priority focus on the development and production of highly capable cruise missile systems.[573] Russia has invested heavily in the development of air-, ground-, and sea-launched cruise missiles, and the development or refurbishment of associated launch platforms.[574] In addition to developing domestic variants, Russia is focused on producing export variants of several cruise missile systems to remain competitive in the international arms market.[575]

Russia's Tactical Missile Corporation

Russia's Federal Target Program for "Restructuring and Development of [the] Defense Industry (2002–2006)" and a Presidential decree in January 2002 prompted the establishment of the Tactical Missile Corporation (KRTV). The corporation, which has oversight of 30 weapon manufacturing enterprises, is Russia's largest developer and producer of anti-ship, anti-radar, and multipurpose missiles for tactical airborne, ship borne, and coastal cruise missile systems.[576, 577]

In 2014, the General Director of KRTV reported that the corporation received about $1 billion from the Federally Targeted Program for the Development of the Defense Industry (OPK) through 2020 to help modernize and re-equip production facilities.[578, 579] To increase production capacity, Russia focused on improving production facilities in anticipation of the high production demands under the State Armament Program 2020.[580]

Air-Launched Cruise Missiles (ALCM)

Russia is in the process of refurbishing its long-range strategic bombers to carry the newest air-launched cruise missiles, the Kh-101 (conventional) and the Kh-102 (nuclear-variant). These missiles were developed by the Raduga Science and Production Association [Machine-Building Design Bureau], a Tactical Missile Corporation subsidiary located in Dubna.[581] The missiles are the follow-on system to the Kh-55, the main armament of Russia's Tu-95 and Tu-160 bombers.[582, 583]

Sea-Launched Cruise Missiles (SLCM)

The KALIBR-family of cruise missiles are some of Russia's most capable systems. Designed by the Novator Design Bureau, a subsidiary of Almaz-Antey, the KALIBR-class missiles are the more capable domestic versions of the CLUB-family, which Russia has exported for several years.[584] The KALIBR class of missiles reportedly has an operational range up to 2,500 kilometers and has a lower flight profile than other Russian cruise missile systems.[585, 586] The 3M-14 (SS-N-30A) is a long-range, land-attack cruise missile capable of carrying conventional or nuclear warheads.[587] The 3M-54 (SS-N-27A) is an anti-ship missile, capable of being launched from submarine and surface ships.[588]

The ONIKS (SS-N-26) anti-ship cruise missile is another capable weapon system produced in Russia that also has a land-based variant, the BASTION mobile shore-based missile complex.[589]

Russia is also developing and testing the TSIRKON, its first hypersonic anti-ship cruise missile. This missile, which is expected to enter service in 2018, will have a 500 to 1,000-km range.[590] Once operational, the nuclear-powered guided missile cruiser ADMIRAL NAKHIMOV will be one of the first naval vessels to carry these cruise missiles.[591]

Russia demonstrated some of its newest capabilities in military technology in its Syria campaign. Russia's use of the KALIBR sea-launched cruise missile, including launches from a submerged submarine, and of the Kh-101 air-launched cruise missile for the first time in a combat situation demonstrated its advancements in precision-guided munitions.[592]

Surface-to-Air Missiles (SAM)

Russia's surface-to-air missile (SAM) systems remain among the best in the world, and Russia maintains a robust production capacity to satisfy both domestic and export requirements. In recent years, Russia has also developed several highly-capable SAM systems and has invested in new infrastructure to support aggressive SAM production schedules.[593] Many countries, including China, are interested in acquiring some of Russia's longer-range systems.[594]

Almaz-Antey is Russia's primary company responsible for development and production of air defense systems, including land-based and naval short, medium, and long-range air defense missile systems, ground surveillance radar stations, and automated control systems. Almaz-Antey formed in 2002 as a result of a merger between Antey Corporation and NPO Almaz.[595, 596]

Long-Range SAMs

Russia is adding new defense infrastructure to increase production of its newest long-range SAM system, the S-400; S-400 (SA-21) regiments are operational throughout Russia.[597, 598]

S-400 long-range SAM system.

Image Source: AFP

The ANTEY-2500 is a long-range air defense system that reportedly can engage short-and intermediate-range ballistic missiles, cruise missiles, precision-guided weapons, strategic and tactical aircraft, as well as early warning and electronic warfare aircraft.[599]

ANTEY-2500 long-range SAM system.

Image Source: AFP

Short-to-Medium Range Priority SAMs

The PANTSIR-S/S1 is a short-range air defense system developed by the KBP (Instrument Design Bureau) Tula. It is armed with 12 missiles and two 30-mm anti-aircraft guns; for target acquisition and tracking it uses two radars and an electro-optical system. It was designed to defend ground installations and longer-range SAM systems against a variety of weapon systems, including fixed-wing aircraft and helicopters, precision guided missiles and cruise missiles, and unmanned air vehicles.[600] It is usually deployed as a battery of 4–6 combat vehicles per site and each combat vehicle can engage up to four targets simultaneously. Russian air force plans to acquire 100–120 PANTSIR-S/S1 combat vehicles by 2020.[601]

Developmental Systems

The S-500 is a developmental system expected to have the capability to simultaneously engage 10 targets at a maximum range of 600 kilometers; it is expected to be operational around 2020.[602]

The Vityaz is a short-to-medium-range SAM system; Russia hopes to produce up to 30 systems by 2020.[603] The Vityaz system reportedly can carry two types of missiles, the 9M96E missiles or the 9M100.

Air Sector

In 2006, Russia's United Aircraft Corporation (UAC) was created to consolidate aircraft design and production companies under one state controlled corporation. UAC controls 18 companies responsible for the design and production of most military and civilian aircraft.[604,605] UAC will have to deliver over 1,000 new airplanes and helicopters to Russia's military forces by 2020 to meet modernization goals established in the 2011–2020 State Armament Program.[606]

Bombers

Russia plans to upgrade and operate its fleet of Tu-160/BLACKJACK, Tu-95MS BEAR H, and Tu-22M/BACKFIRE bombers beyond 2030.[607,608] The upgrades are intended to keep older aircraft operational until the fifth-generation PAK-DA bomber reaches production. The PAK-DA will have new navigation systems and the capability to deploy Kh-101/Kh-102 air-launched cruise missiles (ALCMs).[609,610,611,612,613]

Russia has restarted Tu-160M2/BLACKJACK initial production to fill a critical gap in aircraft availability. Serial production of new Tu-160M2/BLACKJACK bombers is scheduled to begin no earlier than 2023 at the Kazan Aircraft Plant. The new bombers will have NK-32

PAK-FA (T-50) fighter.

Image Source: AFP

engines, which will be produced at the Samara-based enterprise Kuznetsov, currently being modernized to start production by 2020.[614]

Fighters

Russian fighter production occurs at several plants, including the Sukhoi Aircraft-Manufacturing Plants in Komsomolsk, Irkutsk and Novosibirsk, which produce the Su-30SM, Su-34, and Su-35; the MiG plants in Lukhovitsy and Nizhniy Novgorod produce the MiG-29.[615]

The fifth-generation fighter (PAK-FA) program began in 2008 and is a high-priority item for the Russian air force. Six flying prototype aircraft were completed through 2016, with additional prototype aircraft in testing by the end of 2016. The Ministry of Defense plans to start serial production this year with the goal of producing 12 for the air force by 2020.[616, 617]

Helicopters

The state corporation Russian Helicopters operates five primary helicopter plants that produce the Ka 52 and Mi-28 attack variants, Mi-8/17, Mi-35, Mi-26, and ANSAT for the armed forces and for export.[618, 619] Moscow's previous reliance on helicopter engines produced in Ukraine has not adversely affected Russia's ability to meet the needs of its military.[620]

Transport Aircraft

The UAC is responsible for operating two large aircraft production plants at Kazan and Ulyanovsk. Russia is producing its new transport, the Il-76MD-90A, which is a redesign of the Il-76/CANDID transport, and plans to produce 39 Il-76MD-90A planes by 2020.[621] The Ilyushin Design Bureau has begun development of the Il-78MD-90A refueler and the Il-112 light military transport, based on Il-76 airframe design.[622, 623]

Naval Sector

In an effort to streamline the design and construction of surface ships and submarines, President Putin established the United Shipbuilding Corporation in 2007 to provide oversight of all major domestic military and civilian shipbuilding. The corporation includes approximately 40 companies, including design bureaus and shipyards. Russia is currently upgrading and modernizing its naval fleet, constructing multi-role platforms with modular designs.[624] However, some new platforms have taken up to, or over, a decade to complete construction and to enter into service as Russia's shipbuilding industry is besieged by sanctions. Moscow is working to overcome the negative effects of international sanctions by becoming more self-reliant, indigenously producing components formerly purchased from foreign suppliers.[625]

Russia currently has eight operational shipyards dedicated to surface ship and submarine construction. While construction of patrol boats and corvettes has continued at a steady pace, major combatants and amphibious ships have encountered significant delays. For example, the Yantar Shipyard has faced difficulties meeting production deadlines during construction of the GRIGOROVICH FFG and IVAN GREN LST.

Surface Combatants

Construction of the ADMIRAL GRIGOROVICH and GORSHKOV-class frigates, along with the STEREGUSHCHIY-class corvette, was to mark Russia's return as a shipbuilding power and are intended to become the backbone of the fleet. A total of 17 of the ships (6 GRIGOROVICH, 4 GORSHKOV, and 8 STEREGUSHCHIY) were ordered to be built. Final delivery of over half of these ships was disrupted due to the lack of gas turbine and diesel engines from Ukraine's Zorya-Mashproyekt State Gas-Turbine Manufacturing Enterprise.[626]

Delivery of three GRIGOROVICH and two GORSHKOV frigates were eventually cancelled because domestically-produced gas-turbine engines would not be ready before 2020. The imported engines for the STEREGUSHCHIY corvettes have been replaced by domestic diesel engines produced by the Kolomna Engine Plant in Moscow, allowing for the production of corvettes and patrol boats to continue at a steady pace in spite of construction delays to the larger ships.[627]

GORSHKOV-class Frigate.

Image Source: Shutterstock

The Russian Navy has one operational aircraft carrier in its inventory, the 26-year-old ADMIRAL KUZNETSOV, which is expected to enter a 2- to 3-year overhaul period beginning in 2018. This overhaul is not scheduled to consist of any major modernization or modifications and will keep the KUZNETSOV in the fleet until a new aircraft carrier becomes operational.[628] The Murmansk Shipyard is planning to convert and enlarge its drydock to overhaul the KUZNETSOV and to provide maintenance/repair service for large commercial ships. When complete, the result will be the country's largest drydock (400 x 80 meters).[629]

Russia is planning to start the design of a nuclear-powered aircraft carrier (the Shtorm) in 2020, with completion by 2030. Based on a model mock-up and initial information, the carrier will have a beam of 40 meters and draft of 11 meters. Shtorm will be 330 meters in length, shorter than the U.S. Navy's newest carrier but 10% longer and wider than the KUZNETSOV. The Shtorm will have RITM-200 nuclear reactors, a catapult, and two ski-jump ramps for launching aircraft and will be able to carry up to 90 aircraft and helicopters.[630]

Submarines

Historically the backbone of the Russian Navy, 75% of the 61 operational submarines are over 20 years old and are slowly being replaced. Russia will continue production of its fourth-generation DOLGORUKIY-class submarines through 2020. There are currently three in

service, with an additional eight scheduled to enter service in the coming years. Russia is also planning to construct a fifth-generation strategic missile SSBN between 2031 and 2050.[631, 632]

The YASEN-class SSGN (Project 855, aka SEVERODVINSK) will replace aging VICTOR III SSNs. The YASEN is produced at the Sevmash shipyard; the first of up to 10 hulls was delivered to the Navy in 2014, but the program has encountered delays. The flagship of the class (hull 1) required 16 years to complete; hull 2 should soon be completed after 7 years.[633] Modernization and upgrade efforts are occurring on the OSCAR II SSGN and SIERRA II SSNs. The improved KILO SSK class (Project 636.3) is being produced without significant delays. The initial order of 6 was expanded to 12 in early 2016. The first three KILOS were delivered to the Black Sea Fleet in 2014–2015.[634]

YASEN SSGN Hull 1.

Image Source: Shutterstock

Ground Arms

Since 2010, there have been significant improvements in the condition of Russian ground arms, including the modernization and upgrade of the main battle tank (MBT) inventory. The active inventory includes the T-72, T-80U, and T-90 MBTs.[635] The T-72 is one of Russia's oldest active MBTs and has been upgraded to include substantial enhancements in explosive reactive armor, electronic components, and enhanced navigation systems.[636] Russia's newest in-service MBT, the T-90, features the new Sonsa-U sighting systems and Shtora soft-kill active protection system.[637] While Russia's Ministry of Defense planned to phase out the T-80, the Omsk Transport Machine Building Plant, one of Russia's two MBT production and modernization facilities, is planning to upgrade the T-80U with Sosna-U, Relikt third-generation dynamic protection complex, and advanced radio and C2 systems. [638]

New Technology

The Uralvagonzavod (UVZ) Corporation is Russia's primary MBT production and modernization center and is responsible for the production of Russia's newest MBT (the Armata) to fulfill part of the 2020 and 2025 State Armament Program.[639, 640] The new-generation T-14 Armata MBT is being used as a common chassis for the Army's heavy armored vehicles, including the T-15 Armata heavy infantry fighting vehicle (IFV) and the Koalitsiya-SV 2S35 self-propelled howitzer.[641] This universal platform offers the Russian defense industry a more streamlined

T-14 Armata Tank.

Image Source: AFP

means of armored vehicle production and will reduce maintenance and modernization costs in the future.

Like the Armata, the Kurganets-25—slated to begin production in 2018—will provide a lighter, universal tracked platform for new IFVs and armored personnel carriers.[642] The Bumerang wheeled armored personnel carrier has completed preliminary testing as of June 2016.[643, 644] Russia will continue to field the BMP-3 (~700 units), BMP-2 (~1,800 units), and BMP-1 (~500 units) while new systems are designed and produced.[645] The BMP-3 is Russia's most modern IFV in service.[646]

Russian artillery modernization efforts include the Koalitsiya-SV 2S35 152-mm self-propelled howitzer, which is intended to be the future of Russian self-propelled artillery units and will ultimately phase out the 2S19 Msta-S.[647] Several of Russia's multiple rocket launchers (MRLs) have also been improved: the URAGAN 220mm MRL, the SMERCH 300mm MRL, and the new TORNADO-2 300 MRL, which is a modernized version of the SMERCH.[648] Russian MRLs are produced in large quantities for the Russian Army and export customers worldwide.[649]

APPENDIX H: Arms Sales

Russia remains the second largest arms exporter worldwide, in terms of the annual value of both its export contracts and equipment deliveries. Russia's arms export strategy included planning $13 billion in annual sales through 2016, and thereafter seeking growth until 2020.[650] In 2016, Russian officials announced that Moscow exported $14.5 billion in military products in 2015.[651]

Russia is an exporter of nearly every category of conventional military equipment, from small arms to long-range air defense systems and submarines. Moscow sees great prospects in the global arms marketplace for many of its products. In the aircraft sector, Su-35, Su-30 and MiG-29 fighter aircraft, Yak-130 combat trainers, and a variety of Mil and Kamov helicopters are key products. In the air defense sector, S-400 TRIUMF, ANTEY-2500, BUK-M2E, and TOR-M2E surface-to-air missile systems, the PANTSIR-S1 air defense missile/gun system, and IGLA-S MANPADS are top sellers. Frigates, submarines, and patrol boats are best-selling naval exports. Russia's land warfare products are centered on T-90 tanks, BMP-3 infantry fighting vehicles, and Tigr armored cars.[652]

Marketing, contracting, and exporting Russian defense products is executed by state company Rosoboronexport (ROE). ROE typically accounts for approximately 85% of Russia's total exports of weapons and military hardware. It ships Russian defense products to about 70 countries and cooperates with over 700 Russian defense industry companies. ROE is incorporated into Rostec (formerly known as Russian Technologies or Rostechnologii), the state corporation established in 2007 to promote the development, production, and export of civilian and military high technology products.[653] Although ROE manages the majority of Russian arms trade, over 15 companies are authorized to export products abroad directly, most often spare parts and maintenance services, and these contracts account for about $2 billion annually.[654]

Russia's largest export markets for arms are the Middle East/North Africa and the Asia-Pacific regions. Russia also maintains sales in Sub-Saharan Africa, Latin America, and some parts of Europe, although at a much lower level.[655] Moscow is seeking to grow its market share in Southeast Asia and Latin America especially. Russia also is committed to expanding high-level military technical cooperation with other member states of BRICS (Brazil, Russia, India, China, and South Africa).[656, 657]

Russia is taking steps to overcome challenges and remain competitive in the global arms market. ROE increasingly has been offering commercial credit for arms transactions, especially to countries in Asia and Sub-Saharan Africa that cannot afford to purchase expensive equipment or upgrade their armed forces without financial assistance. Similarly, Russian officials have acknowledged that exchanging arms for access to customers' natural resources may be

necessary to stave off competition from other suppliers.[658] President Putin has expressed Moscow's willingness to improve financing options for contracts, expand offerings for joint production and local assembly of defense equipment in customers' countries, and improve upon post-sale support and equipment servicing.[659]

Moscow casts itself as a reliable and predictable arms trade partner that does not make its commitments dependent on market preferences or political trends.[660] Russia also is touting the effectiveness of its combat operations in Syria and using this to add cachet to its military products for export. Moscow believes that advertising many of its weapons systems as combat-proven will generate additional interest and orders from customers.[661]

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