DEVELOPMENT OF ROCKET FORCES AS A KEY FACTOR IN MAINTAINING THE GLOBAL BALANCE OF POWER IN THE 21ST CENTURY

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The development of rocket forces is not merely a history of increasing flight ranges; it is an evolution from a «weapon of intimidation» to a high-precision instrument of global deterrence and local dominance.

It is a story of humanity's attempt to create the ultimate deterrent. While in the mid-20th century a missile was «brute force» - capable only of delivering a payload to the general vicinity of a target – today it is a «scalpel» endowed with intelligence and hypersonic speed.

The primary vector of development has always been the search for a balance between speed, precision, and invulnerability.

The replacement of liquid propellant has allowed for a reduction in launch preparation time from hours to minutes, which is critically important for a retaliatory strike. Modern guidance systems (GLONASS/GPS, inertial navigation systems) have transformed missiles from area-effect weapons into surgical instruments.

The development of warheads capable of maneuvering in dense layers of the atmosphere at speeds exceeding Mach 5 (such as the Avangard systems) renders contemporary ABM (Anti-Ballistic Missile) defenses practically obsolete. The topic of hypersonics is currently the cutting edge of technological progress. These are not merely «fast missiles»; they represent a fundamental shift in the very physics and logic of modern combat.

Flight at speeds exceeding Mach 5 (approximately 6,000 km/h) is considered hypersonic. However, modern development in rocket forces focuses not so much on speed itself, but on maneuverability at such speeds.

The primary challenge in developing these systems lies in physics. When moving through the atmosphere at these velocities, the missile's surface heats up to 2000°C, necessitating the creation of new composite materials. Furthermore, a plasma sheath forms around the flying object, which blocks radio waves. The development of rocket forces today is a search for ways to "communicate" with the missile through this cocoon to perform course corrections.

Modern development follows two primary paths:

Hypersonic Glide Vehicles (HGV): A booster rocket delivers the glide vehicle into the upper layers of the atmosphere, after which it «slides» toward its target, maneuvering in both altitude and heading. This makes its trajectory unpredictable for ABM (Anti-Ballistic Missile) radars.

Hypersonic Cruise Missiles (HCM): These systems utilize scramjet (supersonic combustion ramjet) engines. They fly at lower altitudes and maneuver more actively within the dense layers of the atmosphere.

The development of these technologies effectively nullifies investments in conventional Air and Missile Defense (AMD) systems. While a ballistic missile is detectable immediately after launch and follows a simple parabolic trajectory, a hypersonic vehicle may appear over the horizon only a few minutes before impact.

Conventional interceptor missiles calculate the intercept point based on a mathematical model of the target's flight path. A hypersonic missile, however, constantly changes its course, making the calculation of this point impossible.

The development of rocket forces leads to the concept of Prompt Global Strike (PGS). Thanks to hypersonic technology, it becomes possible to strike a critical target on another continent with a conventional (non-nuclear) warhead within an hour. This provides political leaders with a tool for pressure without the immediate risk of triggering a nuclear apocalypse.

The era of accumulating thousands of nuclear warheads has been superseded by the era of intelligent systems.

The development of decoys and jamming systems has become as vital as the warhead itself. Furthermore, the capability of a single missile to engage multiple independent targets has radically increased the efficiency of each individual launcher.

The transition from stationary silos to Mobile Ground Missile Systems (MGMS) and BZhRK (Combat Railway Missile Complexes) has ensured the stealth and survivability of the nuclear triad.

Modern rocket forces are, above all, a powerful information network. They are inconceivable without Automated Control Systems (ACS), which minimize the «detection–decision–launch» cycle.

Today, rocket forces are inseparable from satellite constellations that provide target acquisition and Early Warning Systems (EWS) for enemy launches. In the context of network-centric warfare, protecting command and control channels becomes a higher priority than the physical hardening of missile silos.

The development of missile technologies directly dictates the rules of global politics. The emergence of high-precision, long-range conventional missiles allows for the achievement of strategic objectives without crossing the «nuclear threshold»

The proliferation of missile technologies in Third World countries is shifting the balance of power in local conflicts (for example, the role of missile strikes in modern hybrid warfare).

In summary, it can be stated that the development of rocket forces is moving toward a state of absolute inevitability. We are witnessing a transition from the quantity of warheads to the quality of their delivery.

However, it is crucial to understand that the arms race in this sphere will inevitably expand beyond the atmosphere. The future of rocket forces is inextricably linked to the militarization of space and the creation of Prompt Global Strike systems. The primary challenge for humanity today is to ensure that these sophisticated technologies continue to fulfill their fundamental function: serving as an instrument of diplomacy and the prevention of a major war, rather than becoming a means of waging one.

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