

Розвиток, бойове застосування та озброєння зенітних ракетних військ

UDC 623.418.2

DOI: 10.30748/nitps.2018.31.07

B. Genov¹, B. Lanetsky², V. Luk'yanchuk², I. Nikolaev²

¹ Air Force Command of UA Armed Forces, Vinnitsa

² Ivan Kozhedub Kharkiv National Air Force University, Kharkiv

WAYS OF DEVELOPMENT OF SURFACE-TO-AIR MISSILE WEAPONS IN THE AIR FORCE OF THE ARMED FORCES OF UKRAINE IN CONDITIONS OF RESOURCE RESTRICTIONS

The problem issues are analyzed and the ways of the development of anti-aircraft missile weapons (AAMW) of the Air Forces of the Armed Forces of Ukraine are determined in conditions of financial, economic and other resource constraints. Proposals for providing the required level of combat readiness of the AAMW inventory in the medium term are given. It is shown that the development of anti-aircraft missile weapons in Ukraine should be carried out on the basis of a systematic approach to solving this problem within the framework of a long-term target program, which should include a balanced system of measures for the organization and implementation of research and development work for the creation and modernization of existing anti-aircraft missile weaponry. The main steps to be taken to ensure the further development of AAMW for the period up to 2025 are given.

Keywords: ways of development, resource constraints, combat readiness, anti-aircraft missile weapons, anti-aircraft missile system, anti-aircraft guided missile.

Introduction

The expansion of the nomenclature and the development of methods of combat use of airborne threats (ATs) have led to an increase in requirements for air defense capabilities (air defense). The experience of local wars and armed conflicts over the past decade has shown that effective air defense of important state facilities and troops should be based on modern air defense missile complexes (ADMCs) capable also of tactical missile defense [1]. But the combat capabilities of the ADCMs, which are used in the Air Forces of the Armed Forces of Ukraine, do not fully meet the modern requirements for combating modern and promising ATs. The most acute problem is the physical and moral aging of the existing ADCM fleet, which jeopardizes the ability of the Air Forces of Ukraine's Armed Forces to provide reliable air defense of important state facilities and troops [2–3].

The purpose of the article is to formulate proposals for the development of anti-aircraft missile weapons (AAMW) of the Air Forces of the Armed Forces of Ukraine in the medium and long-term perspective, taking into account existing resource constraints.

Main part

At present, the Air Force of the Armed Forces of Ukraine operates automated control systems (ASCs)

"Baikal-1" ("Baikal"), "Senezh M" and "Polyana-D4" and the air defense missile systems (ADMS) C-300PT, C-300ПC and CPK "Buk-M1" using the scheduled maintenance system. The scheduled duration of operation of armaments and military equipment (AME) ranges from 25 to 31 years. Currently, the average repair has been done to about 50% of ADCM S-300P, to 20% of ADCM "Buk-M1" and to some products from the composition of these MRKs.

The surface-to-air missiles (SAM) 5B55K (P) for AAMC C300P were made in 1985-1997. About 70% of these SAMs have exhausted their terms, and about 10% of them are disabled and need factory repairs. At the same time, the number of combat ready products 5V55K (P) will be reduced, starting from 2018 in connection with the expiration of the intended life (storage) of 30 years.

SAM 9M38M1 (9M38) for the ARM "Buk-M1" were manufactured in 1982-1991. 65% of the SAM 9M38M1 exhausted their intended service life (resource) and require works and factory repairs to continue their assigned indicators, and 35% are disabled. As a result of works on continuation of service life in 2017, the intended shelf life of 9M38M1 and 9M38 products in the container is set to 35 years [3].

Another problematic issue is the provision of the AAMW repairs with the necessary amount of spare parts that are not produced by Ukrainian enterprises [4].

The development and production of scarce components to make spare parts and to maintain the operation of ADCM is at an initial stage for enterprises of Ukraine. At present, work on the replacement of a number of ultrahigh-frequency devices, component base of memory devices and other products for the S-300P and Buk-M1 ADCMs has been carried out to maintain the combat-ready state of the combat equipment of the S-300PS (PT). It should be noted that in the near future, the repair and subsequent operation of the S-300PC (PT) and "Buk-M1" can only be carried out in case of timely execution of works on the development and production of components by domestic enterprises.

In order to ensure the further operation of repaired ADCMs with minimal cost, it is expedient to transfer ground-based military equipment to the maintenance by technical condition (MTC) with the introduction of the service method of maintenance and repair (SMMR) [4–6]. This will allow to operate the ADCM until it reaches the limit of service life without carrying out factory repairs in case of appropriate provision of such operation with the necessary SPTA.

The most rational options for solving the problem of restoring and maintaining the combat status of the inventory are:

a) for the S-300P – the manufacturer's medium repair (with the capacity of three or more ADCMs per year, and the subsequent transfer to the MTC and the development of the service methods for SMMR);

b) for the "Buk-M1" ADCM – to carry out factory medium repairs with the capacity of two or more ADCMs per year, and their subsequent transfer to the MTC and the development of service methods for SMMR.

The implementation of the recommendations will allow to provide the required level of combat readiness of the existing inventory of ADCMs of the Air Forces of the Armed Forces in the medium-term.

The projected estimate of the quantitative composition of the AAMW of the Air Force of the Armed Forces of Ukraine (even taking into account repairs) indicates that in the long run, due to the achievement of the maximum period of service, the quantity of the ADCM S-300PS (PT) and "Buk-M1" will shrink starting from 2025 [5–8].

In order to update the AAMW in the long-term perspective, it is necessary to add modern ADCM specimens of domestic development and production, or to purchase modern foreign ADCMs. It should be noted that the purchase of a certain number of AAMWs abroad will not allow a radical solution to the problem of the rearmament of the Air Forces of the Armed Forces of Ukraine, since foreign ADCMs are of high cost, and the AAMW market is too fragmented on a political footing. Therefore, the main means of rearmament of the Air Forces of the Armed Forces of Ukraine

to modern AAMW in the long run still is the development and production of prospective ADCM (ADMS) by enterprises of "Ukroboronprom" with the involvement, if necessary, of foreign partners of Ukraine [7].

Development of AAMW in conditions of resource constraints is advisable to achieve by systematic and phased solving of the following tasks [8–12]:

– determination of the role and place of existing and perspective prototypes of AAMW in solving the air defense tasks in the predicted conditions of conducting air defense operation;

– assessment of the contribution of specific type of ADCM or a separate group of complexes (systems) in the effectiveness of the AAMW system of anti-aircraft missile troops;

– substantiation of the outline and operational-tactical requirements (OTR) to a promising system of AAMW of the Air Forces of the Armed Forces of Ukraine, its firepower, its intelligence and command&control subsystems;

– creation of a scientific and technical expertise, based on the latest achievements of scientific and technological progress, aimed at modernizing the existing and developing promising specimens (complexes, systems) of AAMW.

To address these challenges, the following steps have been planned and are being implemented at present:

– completion and implementation of research and development work (R&D) aimed at creating a scientific and technological expertise in the field of rocket science, radar, computer science, computer technology and other technologies;

– monitoring of the AAMW market with the aim of purchasing a limited number of modern ADCMs;

– creation of cooperation of enterprises of defense industrial complex, scientific groups, technological and experimental base, which will provide modernization, development and production of domestic models of anti-aircraft missile weaponry;

– modernization of the existing ADCM inventory in order to increase the performance characteristics and the combat capability of the ADCM by improving and replacing new separate functional systems, components, combat and technical means, produced using new technologies and achieved levels of scientific research and development carried out within the framework of research and development (R&D).

In order to ensure further development of AAMW for the period up to 2025, it is proposed to plan the implementation of the following [11–13]:

– clarification of the concept of the development of the AAMW of the Air Forces of the Armed Forces of Ukraine on the basis of the experience of modern hybrid wars and trends in the development of ATs in advanced countries;

– R&D works in the following directions:

a) substantiation of the requirements and the development of proposals for the procurement, acceptance of weapons and military products in the existing system of operation and maintenance of the ADMCs of foreign produce;

b) substantiation of rational ways to combat small unmanned aerial vehicles;

– execution of experimental design works in directions of:

a) development of a mobile multifunctional radar capable of detecting and tracking targets and missiles using active phase antenna array (PAR);

b) development of short-range missiles for the defeat of cruise missiles, unmanned aerial vehicles, high-precision weapons, tactical aircraft and helicopters at distances of up to 20 km and altitudes of up to 10 km;

– procurement abroad, acceptance for inventory, supply to troops and commissioning of modern multichannel mobile ADMCs of medium (long) range with the gradual withdrawal from the Armed Forces of the Armed Forces of Ukraine of the S-300PT and Buk-M1, which have reached the limit terms of service.

In order to ensure the development of anti-aircraft missile defense armaments in Ukraine, it is necessary:

– to urgently create special-purpose design bureaus for the development of small, medium and long-range ADMCs, SAMs for them, command&control facilities, specialized multifunctional radars based on passive and active PARs and other components and elements, to begin work on creation of necessary technologies, research and testing facilities;

– to restore or expand the necessary production capacities in the field of high-tech electronics, ultra high frequency devices, new gunpowder, rocket fuels and explosives, special materials for missiles and launchers;

– to ensure the efficient use and expansion of the scientific and technological expertise in the field of "breakthrough" technologies in order to accelerate the

development of promising prototypes of AAMW, allowing to create a new material base for further rearmament of the Air Forces of the Armed Forces of Ukraine;

– to ensure the creation of a testing ground complex equipped with modern means for measurement and testing;

– to ensure further development of the system of military repair, operation and restoration of AAMW with the involvement of industrial enterprises;

– to ensure transparency of distribution and spending of material and financial resources by years of the planned period in support of a combat readiness and modernization of existing AAMW, development and production of promising specimens of AAMW and their constituent parts.

Conclusions

In the paper, based on the analysis of the current state of the AAMW of the Air Forces of the Armed Forces of Ukraine, recommendations are made to provide the required level of combat readiness of Military Air Forces in the medium term perspective and the main ways are identified for developing the AAMW of the Air Forces of the Armed Forces of Ukraine for the period up to 2025.

Implementation of the proposed measures to replace the high deficit products with modern analogues of domestic production, necessary repair works and transfer the ADMC to maintenance by technical condition, introduction of service methods of maintenance and repair works to prolong the assigned service live of surface-to-air missiles using factory repairs, as necessary, and upgrading the inventory with modern prototypes of ADMCs of domestic or foreign produce will provide the required level of combat readiness of the ADMC inventory till 2025 and for the long-term perspective. Implementation of these measures is possible provided that they are timely funded and given the necessary scientific and technical support.

References

1. Yampolsky, L.S. (2000), "Obobshchennyi analiz prymereniyia sredstv vozdushnoho napadeniya OVS NATO pry provedeniyi voennoi operatsyyi v Yuhoslavyyi "Reshytelnaia syla" y v druiykh lokalnykh voinakh v 90-kh hodakh" [Generalized analysis of the use of means of air attack by the NATO ATS during the military operation in Yugoslavia, "Decisive Force" and in other local wars in the 90s], UIGTU, Ulyanovsk, 80 p.

2. Lanetsky, B.M., Lukianchuk, V.V. and Nikolayev, I.M. (2017), "Tekhnichne osnashchennia Povitrianykh Syl Zbroinykh Syl Ukrainy zenitnym raketnym ozbroienniam: stan ta problemy, shliakhy yikh vyrishennia" [Technical equipment of the Air Forces of the Armed Forces of Ukraine with anti-aircraft missile weaponry: state and problems, ways of their solution], *Scientific works of Kharkiv National Air Force University*, No. 5 (54), pp. 29-32.

3. Karpenko, D.V., Grib, D.A., Luk'yanchuk, V.V. and Nikolayev, I.M. (2015), "Osnovni problemy i napriamy rozvytku zenitnoho raketnoho ozbroiennia v Ukraini na dovhostrokovu perspektyvu" [The main problems and directions of the development of anti-aircraft missile weapons in Ukraine in the long-term perspective], *New technologies – for airspace protection: XIII scientific conference KNAFU*, pp. 108.

4. Lanetsky, B.M., Chepkov, I.B., Luk'yanchuk, V.V. and Nikolayev, I.M. (2012), "Mekhanizm zaminy komplektuiuchykh vyrobiv ozbroiennia ta viiskovoi tekhniki suchasnymy analohamy novoi tekhniki" [Mechanism of replacing component parts of weapons and military equipment with modern analogues of new technology], *Science and Defense*, No. 2, pp. 54-60.

5. Karpenko, D.V., Burdyko, D.G., Lanetsky, B.M. and Lukyanchuk, V.V. (2017), "Osnovni zavdannia tekhnichnoho osnashchennia Povitrianykh Syl Zbroinykh Syl Ukrainy zenitnym raketnym ozbroienniam" [The main tasks of the procurement of anti-aircraft missile weaponry in the Air Forces of the Armed Forces of Ukraine], *New technologies – for airspace protection: XIII scientific conference KNAFU*, pp. 168.
6. Lanetsky, B.M., Chepkov, I.B., Terebukha, I.M. and Luk'yanchuk, V.V. (2017), "Suchasnyi stan i shliakhy vdoskonalennia systemy tekhnichnoi ekspluatatsii ta remontu zenitnoho raketnoho ozbroiennia Povitrianykh Syl Zbroinykh Syl Ukrainy" [The current state and ways of improving the system of maintenance and repair of the anti-aircraft missile artillery of the Air Forces of the Armed Forces of Ukraine], *Science and Defense*, No. 3–4, pp. 54-60.
7. Grib, D.A., Luk'yanchuk, V.V. and Nikolayev, I.M. (2016), "Osnovni problemy i napriamy rozvytku zenitnoho raketnoho ozbroiennia na tryvalu perspektyvu" [The main problems and directions of the development of anti-aircraft missile weapons for a long-term perspective], *Arms and Military Equipment*, No. 1 (19), pp. 37-40.
8. Chepkov, I.B., Lanetsky, B.M., Luk'yanchuk, V.V. and Nikolayev, I.M. (2013), "Struktura i tendentsii rozvytku tekhnolohichnoho bazysu suchasnoho zenitnoho raketnoho ozbroiennia serednoi ta velykoi dalnosti" [Structure and tendencies of development of technological basis of modern anti-aircraft missile weapons of medium and long range], *Science and Defense*, No. 4, pp. 56-62.
9. Lanetsky, B.N. Luk'yanchuk, V.V., Kirillov, I.G. and Nikolayev, I.M. (2014), "Poriadok obosnovanyia operatyvno-taktycheskykh trebovaniy k systeme zenytnoho raketnoho vooruzheniya y ee strukturnym komponentam" [Procedure for substantiating operational-tactical requirements for a system of anti-aircraft missile weapons and its structural components], *Systems of Arms and Military Equipment*, No. 1 (37), pp. 51-55.
10. Lanketsky, B.N., Lisovenko, V.V. and Nikolayev, I.M. (2008), "Kontseptualnye aspekty stvorennya informatsyonno-analytycheskoi systemy nauchno-tekhnicheskoho soprovozhdeniya ekspluatatsiy y remonta zenytnoho raketnoho y radyo-tekhnicheskoho vooruzheniya" [Conceptual aspects of creating an information and analytical system of scientific and technical support for the maintenance and repair of anti-aircraft missile and radar equipment], *Information Processing Systems*, No. 3(70), pp. 83-89.
11. Grib, D.A., Nikolayev, I.M., Lukyanchuk, V.V. and Zalevsky, G.S. (2016), "Shliakhy stvorennya ta modernizatsii zrazkiv ozbroiennia ta viiskovoi tekhniki Povitrianykh Syl Zbroinykh Syl Ukrainy na period do 2020 roku" [Ways of creation and modernization of specimens of weapons and military equipment of the Air Forces of the Armed Forces of Ukraine for the period up to 2020], *Creation and modernization of armament and military equipment in modern conditions: 16th scientific and technical conference of the State Testing Center of the Ukrainian Armed Forces*, Chernihiv, pp. 92-93.
12. Grib, D.A., Luk'yanchuk, V.V. and Nikolayev, I.M. (2016), "Systemno-kontseptualna model hlybokoi modernizatsii ZRK «Buk-M1»" [System&conceptual model of deep modernization of the "Buk-M1" ADCM], *Problems of coordination of military-technical and defense-industrial policy in Ukraine. Prospects for the Development of Arms and Military Equipment: IV International Scientific and Practical Conference of the Central Scientific Research Institute of the Armed Forces of Ukraine*, Kyiv, pp. 201-202.
13. Grib, D.A., Luk'yanchuk, V.V., Nikolayev, I.M. and Zalevsky, G.S. (2017), "Propozytsii zi stvorennya ta modernizatsii zrazkiv ozbroiennia ta viiskovoi tekhniki Povitrianykh Syl Zbroinykh Syl Ukrainy na period do 2020 roku" [Proposals for the creation and modernization of samples of weapons and military equipment of the Air Forces of the Armed Forces of Ukraine for the period till 2020], *The latest technologies – for the protection of air space: XIII scientific conference of KNAFU*, Kharkiv, pp. 175.

Received by Editorial Board 16.01.2018
Signed for printing 20.03.2018

Відомості про авторів:

Генов Борис Анатольович

ТВО начальника ЗРВ Командування Повітряних Сил
Збройних Сил України,
Вінниця, Україна
<https://orcid.org/0000-0002-0370-691X>
e-mail: henov.hnups@gmail.com

Ланецький Борис Миколайович

доктор технічних наук професор
провідний науковий співробітник
Харківського національного університету
Повітряних Сил ім. І. Кожедуба,
Харків, Україна
<https://orcid.org/0000-0001-5889-0307>
e-mail: Laneckij.B.hnups@gmail.com

Information about the authors:

Borys Henov

Air Force Command
of UA Armed Forces,
Vinnytsia, Ukraine
<https://orcid.org/0000-0002-0370-691X>
e-mail: henov.hnups@gmail.com

Boris Lanetsky

Doctor of Technical Sciences Professor
Leading Research Associate of Ivan Kozhedub
Kharkiv National Air Force University,
Kharkiv, Ukraine
<https://orcid.org/0000-0001-5889-0307>
e-mail: Laneckij.B.hnups@gmail.com

Лук'янчук Вадим Володимирович
кандидат технічних наук
старший науковий співробітник
начальник науково-дослідного відділу
Харківського національного університету
Повітряних Сил ім. І. Кожедуба,
Харків, Україна
<https://orcid.org/0000-0001-5695-7723>
e-mail: super.vadim1973@ukr.net

Vadym Lukyanchuk
Candidate of Technical Sciences Senior Research
Chief of Scientific Research Department
of Ivan Kozhedub Kharkiv National
Air Force University,
Kharkiv, Ukraine
<https://orcid.org/0000-0001-5695-7723>
e-mail: super.vadim1973@ukr.net

Ніколаєв Іван Михайлович
кандидат технічних наук
старший науковий співробітник
провідний науковий співробітник Харківського
національного університету Повітряних Сил
ім. І. Кожедуба,
Харків, Україна
<https://orcid.org/0000-0002-1250-9918>
e-mail: nikolaev49@ukr.net

Ivan Nikolaev
Candidate of Technical Sciences Senior Research
Lead Researcher of Ivan Kozhedub
Kharkiv National Air Force University,
Kharkiv, Ukraine
<https://orcid.org/0000-0002-1250-9918>
e-mail: nikolaev49@ukr.net

ШЛЯХИ РОЗВИТКУ ЗЕНІТНОГО РАКЕТНОГО ОЗБРОЄННЯ ПОВІТРЯНИХ СИЛ ЗБРОЙНИХ СИЛ УКРАЇНИ В УМОВАХ РЕСУРСНИХ ОБМЕЖЕНЬ

Б.А. Генов, Б.М. Ланецький, В.В. Лук'янчук, І.М. Ніколаєв

У статті аналізуються проблемні питання і визначаються шляхи розвитку зенітного ракетного озброєння Повітряних Сил Збройних Сил України в умовах фінансово-економічних та інших ресурсних обмежень. На основі аналізу сучасного стану зенітного ракетного озброєння Повітряних Сил Збройних Сил України запропоновані рекомендації щодо забезпечення потрібного рівня боеготового стану ЗРО Повітряних Сил у середньостроковій перспективі та визначені основні шляхи розвитку ЗРО Повітряних Сил Збройних Сил України на період до 2025 року. Показано, що реалізація запропонованих заходів щодо заміни гостродефіцитних комплектувальних виробів сучасними аналогами вітчизняного виробництва, проведення ремонтів та переведення ЗРК на експлуатацію за технічним станом із впровадженням сервісних методів технічного обслуговування та ремонту проведення робіт з продовження призначених показників зенітних керованих ракет із заводськими ремонтами за необхідністю та дооснащення сучасними зразками зенітного ракетного озброєння вітчизняного або закордонного виробництва дозволить забезпечити потрібний рівень боеготового стану парку ЗРО до 2025 року та на довгострокову перспективу.

Обґрунтовані основні шляхи розвитку зенітного ракетного озброєння. Показано, що розвиток в Україні повинен здійснюватися на основі системного підходу до вирішення цієї проблеми у рамках довгострокової цільової програми, яка повинна містити збалансовану систему заходів щодо організації і виконання науково-дослідних і дослідно-конструкторських робіт із створення нового і модернізації існуючого зенітного ракетного озброєння. Приведені основні заходи, які необхідно здійснити для забезпечення подальшого розвитку ЗРО на період до 2025 року.

Ключові слова: шляхи розвитку, ресурсні обмеження, боеготовий стан, зенітне ракетне озброєння, зенітний ракетний комплекс, зенітна керована ракета.

ПУТИ РАЗВИТИЯ ЗЕНИТНОГО РАКЕТНОГО ВООРУЖЕНИЯ ВОЗДУШНЫХ СИЛ ВООРУЖЕННЫХ СИЛ УКРАИНЫ В УСЛОВИЯХ РЕСУРСНЫХ ОГРАНИЧЕНИЙ

Б.А. Генов, Б.Н. Ланецкий, В.В. Лукьянчук, И.М. Николаев

Анализируются проблемные вопросы и определяются пути развития зенитного ракетного вооружения Воздушных Сил Вооруженных Сил Украины в условиях финансово-экономических и других ресурсных ограничений. Приведены предложения по обеспечению требуемого уровня боеготового состояния парка зенитного ракетного вооружения в среднесрочной перспективе. Показано, что развитие зенитного ракетного вооружения в Украине должно осуществляться на основе системного подхода к решению этой проблемы в рамках долгосрочной целевой программы, которая должна содержать сбалансированную систему мероприятий по организации и выполнению научно-исследовательских и опытно-конструкторских работ по созданию нового и модернизации существующего зенитного ракетного вооружения. Приведены основные мероприятия, которые необходимо осуществить для обеспечения дальнейшего развития ЗРО на период до 2025 года.

Ключевые слова: пути развития, ресурсные ограничения, боеготовое состояние, зенитное ракетное вооружение, зенитный ракетный комплекс, зенитная управляемая ракета.