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INTERNATIONAL CONFERENCE of SCIENTIFIC PAPER
AFASES 2015
Brasov, 28-30 May 2015

CONCEPTION OF COMPETENCES DEVELOPMENT OF AIR DEFENSE OF ARMED FORCES

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Abstract: *The article deals with present problems of Air Defense – modernization, organization structures, weapons, moral and material effectiveness and economical (financial) costiness. It evaluates and criticizes lately accepted conception of Air Defense development, which is not real in present conditions and possibilities. The article confronts some opinions with present development of Air Defense in some NATO countries and shows on possible solution processes and cooperation within membership states.*

Keywords: *Air Forces, Air Defense, weapons, possibilities, modernization, structure, armament*

1. INTRODUCTION

Since what people invented the aircraft started to deal with and thoughts about their use in wars and conflicts. The first combat use of the aircraft was carried out at the beginning of the 20th century in the local wars. In October 1911 in a military conflict Italy with Turkey, carried out by the Italian pilot on the first reconnaissance flight in Bleriot airplane watching the movement of Turkish troops. In November 1911, another Italian plane throw down on the Turkish position 4 heavy artillery grenades and in January 1912, the Italian plane throw down leaflets calling for Turkish soldiers to surrender. In February 1912, the Italians used aircraft for the first time in this war, to the execution of the photographic image of the combat theatre. Soon it was necessary to seek ways of defense against this new kind of armed forces. The scene is getting air defense.

An analysis of the experience gained in the field of AD in the local wars made it possible to highlight and, in practice show a wide range of directions and trends that characterize the development of the new branch of the armed forces. It concerned these directions and trends:

- increasing the role of AD in the war;
- decisive role of land means of AD in the fight with air attack enemy means;
- shift of combat aviation activities and hence the AD to small heights;
- the need for protection of the AD means against warfare battle means;
- the use of new means of aviation to the penetration of the AD-system;
- combat readiness AD – the first precondition for the successful destruction of the air enemy.

The role of land means of AD substantially increased in destroying of air enemy. Just compare:

- in the WW1, a total of 15% of planes were shot down by AD means;
- during WW2, was a number of downed aircraft by AD 40%;
- in the local wars in Asia and the Middle East, the number of downed aircraft by AD raised up to 90%.

2. THE CURRENT STATE OF AIR DEFENSE (AD) OF THE ARMED FORCES OF THE SLOVAK REPUBLIC (AF SR)

Of the conclusions and recommendations of the AD study from 2003, which was processed on the basis of the requirements of the Ministry of Defense of the Slovak Republic from 2001 through NATO AD committee for AD (NATO Air Defense Committee – the NADC, it follows that(1):

- to ensure the defense of the whole of the territory of the Slovak Republic would require substantially more AD systems than in current time, however, it is not sustainable from an economic point;
- the use of AD means must be prioritized and combined with tactical aircrafts;
- it is necessary to integrate an independent air surveillance radars missile groups to supply the decentralized command system (to supply primary RL information).

These recommendations, however, failed. To strengthen operational capabilities (an extension of the capacity of land AD means) was not realized due to the lack of financial resources. Use of the AD means in the framework of the recommendations within combination with the air force is provided according standard operating procedures at random in. The inclusion of independent surveillance radars to the missile groups has been carried out. The supply the primary radar information for the using of AD fire means is provided only in the SA-10 system (S-300PMU).

The "long-term plan of the structure and development of the Slovak Armed with a planning perspective in 2015" in 2004, to achieve the desired air defense capabilities have been proposed the following main steps [2]:

- acquisition of SAMOC (SAM-OC) in accordance with the objective forces A2900, Figure 1-3;
- modernization of SA-10 (PLRK S-300PMU) IFF system, Figure 4;
- upgrading/ replacement of SA-6 (PLRK 2K12KUB), Figure 5;
- ensure objective forces L1400.

Of those measures was partially realized modernization 3D RL ST-68MSK the system AD S-300PMU a part of the projects for the Objective Force 2008 (CS 2008) L1400, other projects have been not implemented.



Figures 1-3 SAMOC for AD systems



Figures 4-5 SA – 10 and SA – 6 AD systems



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The main project objectives in AD were filled only partially and did not solve the achievement of the desired operational capabilities. The current organizational structure of the AD is shown in Figure 6.

AF SR has limited operational capabilities AD, which allows a defense only part of the critical infrastructure and part of units of AF - figure 7.

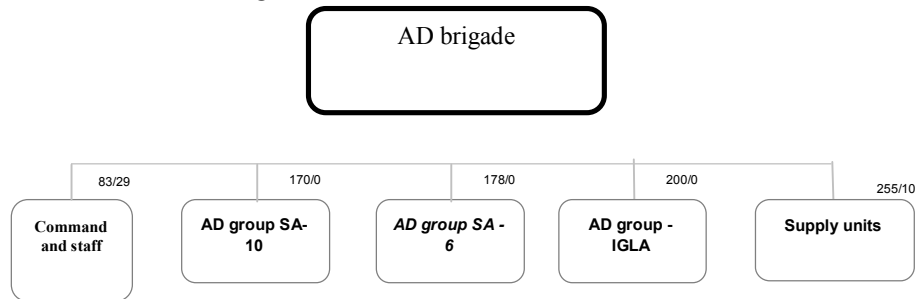


Figure 6 Organization structure of AD brigade – current state

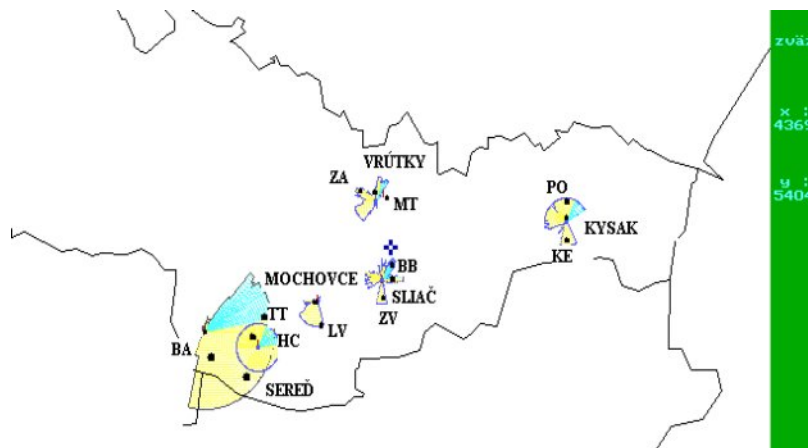


Figure 7 Defense of critical infrastructure by AD means

3. PERSPECTIVES OF AD DEVELOPMENT

Last year was created new model "Conception of competences development of Air Defense of Armed Forces". As suggested by the "Basic model AF SR 2024", the intention is to maintain one anti-aircraft missile wing Figure 8 [3].

To supply the required commitment of the Slovak Republic is crucial that the anti-aircraft missile wing possessed:

- * The January 1, 2018 capabilities:
 - C3 SAMOC at the wing level
 - GOC at group level
 - MSAM – M
 - MANPADS and C-RAM.
- * The January 1, 2021 competence:
 - HIMAD with TBMD.

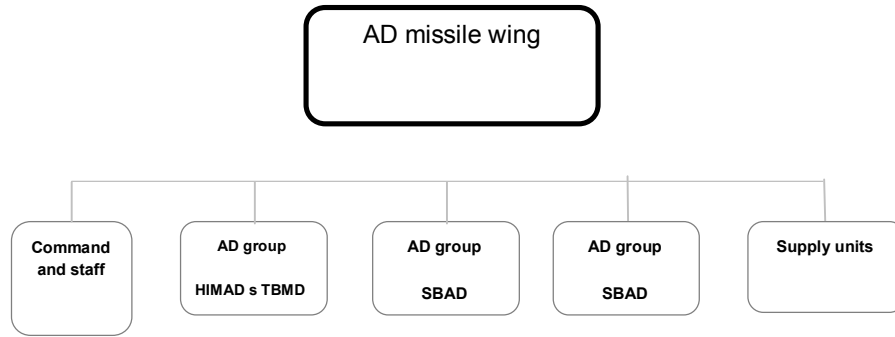


Figure 8 Organization structure of AD wing

In realization this target state will be assumed from composition of several branches of missiles systems which combat capabilities complement each other and at the same time eliminate restrictions on other branches of AD systems, their command and control will be provided by automated systems C2 (SAMOC and GOC) and will be connected to NATO operational networks -Table 1.

* Target state:

The target state of the AD of AF SR will created – Table 2:

- Command and Control System (SAMOC, GOC, ASV ASTRA AD);

- Anti-aircraft defense systems with long-range HIMAD with TBMD (up to 200 km, change of range from the current medium-range to long range to be secured by new radar and new anti-aircraft missiles);

- Anti-aircraft missile sets medium-range MSAM-M (up to 80 km);

- Anti-aircraft missile sets very short-range MANPADS (up to 6 km);

- Anti-aircraft defense systems against arriving munitions C-RAM (rockets, mortar shells and artillery shells up to 6 km).

Table 1 Tasks of AF SR with AD means

No	Tasks of AF SR	Unit of AD	Notes
1.	The continuous maintenance allowances SR to NATO high readiness forces (HRF)	Group - IGLA (MANPADS)	To favor battalion group
2.	Mechanized Brigade in low readiness NATO Forces	group SBAD	To favor Mechanized Brigade
3.	Keeping forces necessary to support the forces of high and low readiness.	antiaircraft missile wing	
4.	Air Defense Critical Infrastructure	antiaircraft missile wing	Group of ground AD means - SBAD

Table 2 Draft of AD systems for new structure

Characteristics of AD system	S-400	SAMP-T (ASTER 30)	PATRIOT PAC-3
Targets channels	6	10	9
TBMD	Áno	Áno	Áno
Recco distance	400	150 km	180 km
Range (min/max)	3 / 240 km	3 / 120 km	3 / 160 km
Range to TMBR (min/max)	5 / 60 km	3 / 35 km	3 / 20 km
Altitude (min/max)	5 / 30 000 m	15 / 20 000 m	60 / 24000 m
Guidance	TVM	distance / active	distance / TVM
Max. speed of target	4 800 m/s	2 000 m/s	2 200 m/s
Time to ready	> 5 min	>10 min.	> 25 min.
Price (mil. €)	500	400	1 100



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3.1. Cost Analysis. The total cost for capital construction in the years 2013 - 2024 for anti-aircraft missile wing represent 5,954,840, - €. Buying new AD systems or major modernization of existing systems costs would require billions of Euros. It is not within the power of the Ministry of Defense and even the Government.

To achieve technical and technological compatibility of communications and information systems:

- By the end of 2016 to purchase an automated system command SAMOC;
- By the end of 2017 to purchase automated command of 3 GOC;
- By the end of 2019 to implement the "Mode 5 IFF" and "Mode S" on the newly procured RL technique;
- Ensure the continuous performance of the tasks interoperability in response to the current requirements of NATO and the EU in

the areas of management and the use of force, training, material and technical equipment.

4. COMMENTS AND OBJECTIONS TO THE PROPOSED DEVELOPMENT CONCEPT AD

4.1. Motion weapon systems. The concept envisages the AD systems long, medium, small and short range. This proposal does not comply immediately for three reasons:
3.1 Establishment of air defense system of different range could afford at the time the CSLA which had more than 350,000 men, two armies, 10 divisions and creates a front - figure 9.

The organization of such groupings has logic and justification: AD system long range as a front mean; AD system medium range than military means; AD system small range as division means; AD system short range as regiment means.

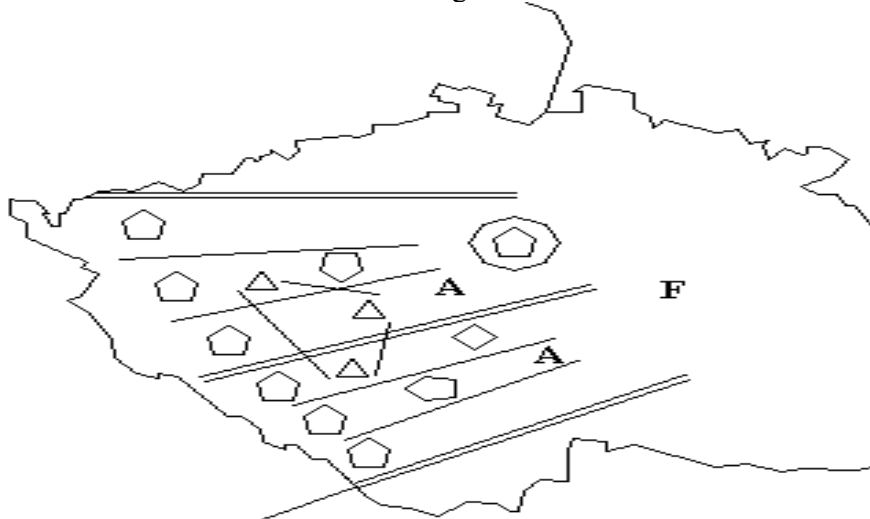


Figure 9 AD units in operational formation of front CSLA

4.2. Operation of AD systems. The proposed conception is also disadvantageous

in terms of cost exploitation weapon systems. The diversity of systems creates excessive

requirements for the operation of equipment, supply of spare parts, carry out repairs, care, tuning and controls demand quality staff and technological background. Estimate can calculate that the above provision is needed an additional 50% of the purchase price AD system.

4.3. Use of combat possibilities of AD systems. In Slovakia, the extremely rugged

terrain sharply reduces some combat characteristics. This fact may be mentioned the following two examples of the use AD systems SA – 10 (S-300 PMU) and SA – 6 (2K12 – KUB) on Middle and in Eastern Slovakia. From Figure 7 and in Table 3 that the measure killing zone and restrain zone is substantially reduced opposite optimal conditions.

Table 3

Data	Optimal positions			Middle SR			East SR		
	S	S _{br}	N _{str.}	S	S _{br}	N _{str.}	S	S _{br}	N _{str.}
SA 10 (S – 300)	5311	4285	18,64	962	746	3	2802	2333	15
SA 6 (2K12)	1183	674	11,65	690	288	6,73	905	212	9,87

Data for target with $S_{ef} = 1m^2$, $v_c = 300ms^{-1}$, $H_c = 300m$, S – kiling zone, S_{br} – protect area N_{str.} - number of fires

We can see the reduction of fire possibilities:

a) Middle Slovakia – SA-10: S_{PUP} more about 80%; S_{br} more about 85%; N_{str} 6 times;

SA-6: S_{PUP} more about 45%; S_{br} more about 55%; N_{str} 1.8 times;

b) East Slovakia – SA-10: S_{PUP} more about 46%; S_{br} more about 48%; N_{str} about 20%;

SA-6: S_{PUP} more about 21%; S_{br} more about 32%; N_{str} about 15%.

These figures indicate that in conditions of the rugged terrain are not combat possibilities of AD systems medium and long range so far used as in AD systems small and close-range.

5. CONCLUSION

Development of Air Defense of Air Force Slovak should ensure elimination of negative

trends in the available financial and material resources and the achievement of operational capabilities necessary for the smooth execution of the tasks of defense, national and international crisis management. Based on the assessment of operational needs and economic opportunities, we should focus on middle range 1-2 of AD systems and 2-3 AD systems PLRK small or short range.

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