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SHORAD SOLUTIONS FOR THE AIR FORCES SYSTEMS UP-GRADE

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Abstract: From time-to-time, due to the new technological development, the generation of weapon systems must be changed, air defence equipment included. The Romanian Air Forces is about to introduce in operations first unit of multirole fighter, alongside to increasing presence of allied aircraft on Romanian AFB's. For this main reason and few others, the Air Defence – those belonging of RoAF especially – requires correspondingly upgrade. The work-paper analyses actual air defence infrastructure and proposes two applications. These should be capable to improve the efficacy parameters in relative short time and for a good cost / performance report. This kind of programs strongly involves the local industry for integration, training and maintenance.

Keywords: SHORAD, missile, integration, RAP, communication

1. INTRODUCTION

East-European area was much time connected to doctrines, tactics and weapon technologies considering a possible major open confrontation between coalitions led by the heading superpowers as US and Russia. In these conditions the GBAD, in all its aspects, constantly was preoccupied the Romanian military thinking, especially because our country has many time must face to an enemy aerial superiority.

In our country the AD equipment production have a tradition starting with the guns produced under licence before WW2 (caliber 75mm model Vickers and caliber 37mm model Rheinmetal), indigenously developed centralized fire control devices, alongside of the ammunition production.

Regarding the ADMS, in the '60 –'70 decade few maintenance facilities were

founded, followed in '80s by the R&D and production capacities, especially for short range missiles.

The ADMS CA-94 and CA-95 is representative for this period.



Figure 1 - CA-94 VSHORAD



Figure 2 - CA-95 SHORAD

Its destination was the ground forces protection using IR homing missiles. The Romanian industry produced also the support equipment for school, check, maintenance and training.

CA-94 MANPADS uses an IR homing missile while the CA-95 represents a SP, light armored and amphibious system, both in the light and mechanized infantry units' endowment.

	U/M	A-94	A-95
Missile caliber	[mm]	72	120
Operational ceiling	[m]	2,300	2,800
Slant range		4,200	4,200
Target maximum speed	[M]	0.75	0.9
Missile average speed		1.5	1.5
Warhead	[kg]	0.8 HE	2.8 HEF
Missile weight		10	30
SSKP		0.22	0,33

The local industry development and integration capacity in missile weaponry was clear demonstrated by the common Electromecanica Ploiești and Krauss Maffei Wegmann program aiming to mix the German SPAAG Gepard with the Romanian CA-94 VSHORAD, with good operational results.



Figure 3 - Gepard/CA-94 Mixed ADS



Figure 4 - Field range fire results

The Romanian partner had in charge the missile, the launcher and the missile launching interface, crew training and field range logistics, while German partner had in charge the FCS integration, supplies, special testing facilities. The mixed ADS was tested in real firings and out-passed the initial requirements.

2. SHORAD SYSTEMS vs. THREAT

2.1 New operational trends and new system requirements.

The new security environment, supposing more flexible tasks and tactics raise in front of the air defence infrastructure and weaponry adequate arrangements. Regarding the roof missions, two appear direct connected with actual defence configuration:

- improvement of the SHORAD to MR GBAD in centralized multilayer C2I structure;
 - assurance of the AFB close self-defence.
- Concerning mainly the enemy evolving at low level, the modern battlefield imposes to AD systems few peculiarities, like:
- a wide targets diversity including fighter-bombers, helicopters, cruise missiles, U©AV's and stand-off munitions;
 - high density of the attacks;
 - growing of the attacks coordination level;
 - intensively use of the ECM/ furtive tactics to blind or decoy the defensive systems;
 - communications networks disturbing;
 - ELINT systems use to locate the AD pattern and to setup the SEAD operations.

All this considerations required the AD configuration concordant with the threat evolution.

One widely used tactics is to assure a gradual response of the aerial threat, with an increasing firepower, high SSKP, short reaction time and self-defence capability in proximity of the protected disposal.

Especially for the high value targets, AD systems must be capable to reject the saturation attacks. In order to accomplish this task is strongly recommended that these systems to have some characteristics, as:

- high automation level;
- improved C²I / C⁴I capabilities;
- good ECM resistance;
- short reaction time;
- multiple target engagement.



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The general menaces against which the SHORAD's must be ready to intercept are represented by fighter-bomber multirole and ground attack fixed wing aircraft, attack and support helicopters, cruise and ballistic missiles, UAV's and UCAV's and artillery rockets.



Figure 5 – Targets catalogue

It can be observed that the threat catalogue presents a wide range of characteristics, demanding a high agility and flexibility of defense. The modern SHORAD's assure these requirements at a good cost/effectiveness report.

2.2 Proposal for SIRET SHORAD

The exposed reason imposes to gain a technological joint deal with a powerful western ally supplier, in measure to propose an up-to-date high-performance SHORAD, based to a state-of-the-art dual purpose air-to-air and ground-to-air missile.



Figure 6 – SIRET for Ground Forces SHORAD

Based on the Diehl of Germany and EMP of Romania MoU, the SIRET SHORAD uses the IRIS-T missile in modern system architecture, with local or centralized working mode, as independent platform or integrated element into a multi-layer AD network, for a range of 10 km and a SSKP of 0.95.

2.3 IRIS-based SHORAD – an industrial cooperation opportunity

IRIS-T is a short-range, dual command (link and IIR guidance), vertical launch and high accurate ground-to-air missile, identically for the air-to-air use.

The main missile characteristics are:

- Weight < 90 kg
- Length ~ 3 m
- Maneuverability > 40 g
- Average speed > Mach 2
- Kill probability ~ 95%
- Range ground-to-air 10 km
- Altitude ground-to-air 6 km

Its aspect and envelope are presented in the following figure.



Figure 7 - IRIS-T missile aspect

IRIS-T is the result of cooperation between a NATO-member consortium including Germany, Norway, Italy, Spain, Greece and Austria. Its 5th generation remarkable features include:

- thrust vector control;
- advanced maneuverability;
- accurate IIR processor;
- countermeasures resistance;
- high SSKP;
- anti-missile capability.

The SHORAD development based on a state-of-the-art missile represents for the local

industry and especially for the Electromecanica Ploiești (EMP) a good opportunity to access new technological level and to have a significant participation into the system integration work.

3. APPLICATIONS FOR AIR FORCES

As derivative of this comprehensive concept, the Air Forces could benefit of the some relatively easy developments, as:

- A sort range AAM reserve directly and other aerial platforms (IAR-99);
- Integrated SHORAD system layered with MRAD Hawk XXI and the future HSAM.

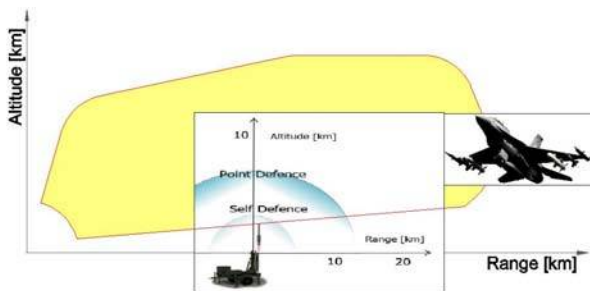


Figure 8 - Covering the low level gaps

- Close self-defence for AFBs

The variants for Air Forces can be simpler and respectively cheaper than the basic SIRET system, because:

- No necessary own search & track radar having integration with the available sensors;
- No necessary the mobility specific for the Ground Forces AD system, nor its ballistic protection.



Figure 9 - Towed IRIS-T SLS launcher

The integration of the battle management sub-system in an open architecture allows the access to all AD resources of zone.

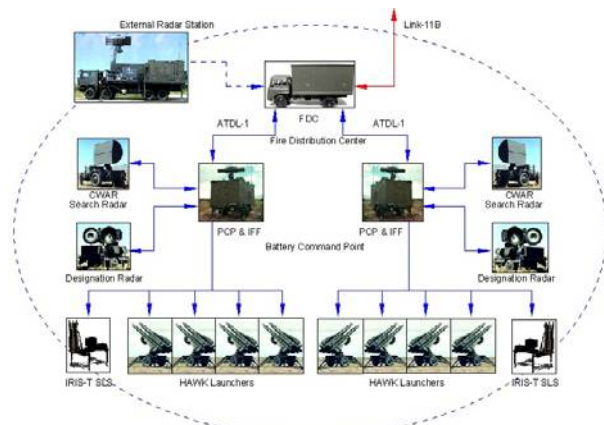


Figure 10 - Integration with MRAD Hawk XXI

Any accepted variant should have in background a national integration schedule containing a large participation of the local industry regarding the production, integration, maintenance and training for the whole system.

4. CONCLUSIONS

This vision offers a significant participation of the local industry and even of some R&D local organizations in order to implements the technological requirements into the local military infrastructure. Between the fields identified we can look to:

- Integration of launching system;
- Vehicle production & integration;
- C3 hardware integration;
- Integrated Logistic Support;
- Documentation & training.

An example of system integration shows that the local industry has a wide range of sub-assembly for development and production.

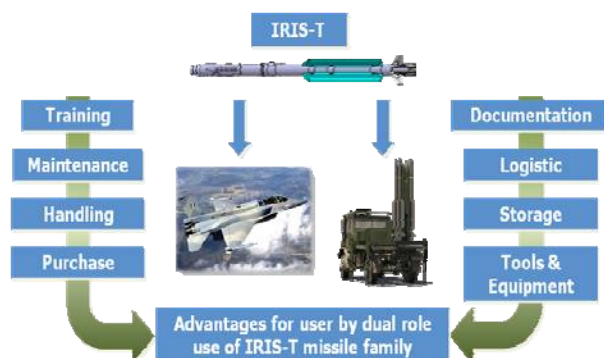


Figure 11 - The dual role missiles offers a wide field of technological transfer to the local industry

The option for a local-integrated SHORAD assures to the user local long term



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maintenance and training facilities and even the possibilities of the further upgrade programs in cooperation with the basic product provider.



Figure 12 - Local training for operators and maintenance personnel

EMP is capable to assure main local industrial facilities and also to concentrates a local (Romanian) R&D and industrial consortium to accomplish our part of system development engineering and integration work. In this respect, EMP as local partner can assume the organization of the computer based training facility, the local operating training facility, the maintenance facility or even a local Centre of Excellence for Missile Systems.

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