

UNMANNED AIR VEHICLES — CRITICAL TARGETS

INTRODUCTION

Unmanned Air Vehicles (UAV) are used in the time being as mainly reconnaissance means, but means more safe from point of view of their safety during their missions. Especially due to the fact that at the UAV board are needed instruments and devices only.

Regarding the different UAV utilisation in current military practice can be pointed out the following [1]:

- UAV during its flight collects a broad spectrum of reconnaissance or intelligence information's together with observation of large territories where can be expected serious targets;
- UAV can collect of combat action results;
- UAV regarding their board equipment can carry out optical, thermo vision observation, and recognition of electromagnetic waves spectrum as well as are able to observe the electronic warfare character;
- UAV can contribute to distinguish so-called “stealthy” operations, especially in very pure visibility conditions.

It is evident from the mentioned that UAV represent very serious threat regarding collection of information's being translated to ground centres in real time. More over there exists the possibility of UAV return to the ground base.

The UAV presence in the armies' armament represents very danger target from point of view of Air Defence (AD) tasks. Graphically it can be illustrated by figure 1.

Figure 1. introduces different targets regarding the possibility of their detection and destruction [1]. Further on is evident that UAV really represents one of targets type, which can't be simply detected and at the same time its destruction seems to be easily destructed. From point of view of AD task and jeopardy belong UAV to targets being very near to Tactical Ballistic Rockets (TBR) and Tactical Air to Surface Missiles (TASM) as targets which can be destroyed by different AD means (see figure 2).

Legend:

- CMs — Cruise Missiles;
- BR — Ballistic Rockets.

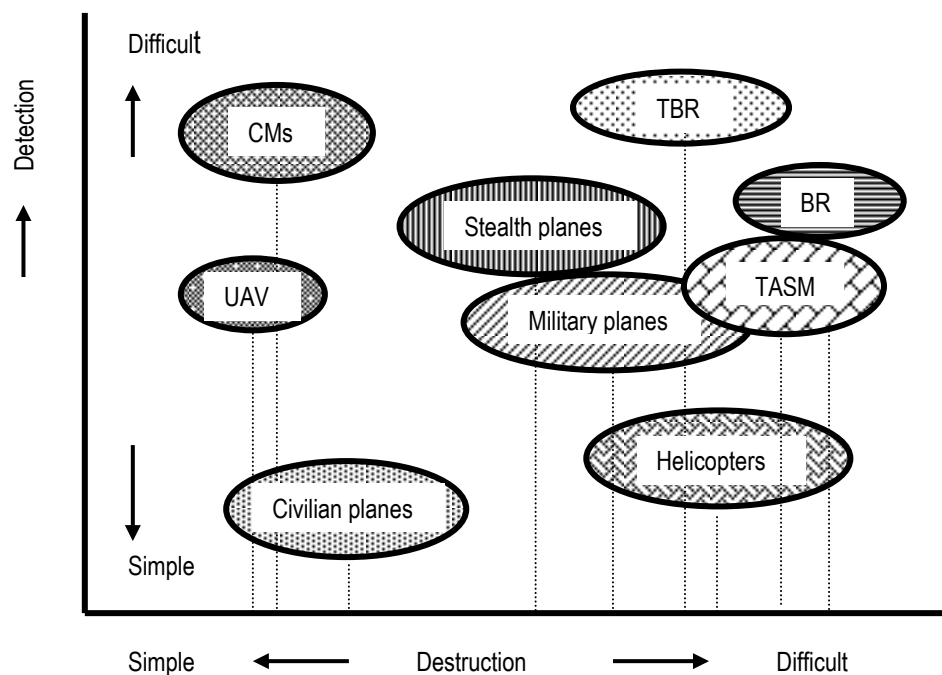


Fig. 1. Dependence „Detection – Destruction“ for different targets

MAIN PROPERTY OF UNMANNED AIR VEHICLES

UAV as means of which utilises mainly aerodynamic forces for its mission fulfilment (UAV trajectory – different from ballistic one) is as a rule guided either by the help of autonomous board control system or remotely. UAV is able to carry effective payload, which doesn't causes the target damage or payload determined for target destruction. According military authorities can be assumed utilisation of UAV of the *Air – to – Air* type or as UAV of *Air – to Ground* type. Such determination of UAV arises from future reasons to apply UAV as real combat means the cost of such mean is less when fielded into the army armament (this fact is interesting for those countries having smaller Defence Ministry budget) [2].

Countries having at disposal modern Aircraft technology are able to design and produce UAV means. More over many of military authorities are of opinion that UAV compared with classical Air forces means (i.e. winged aircrafts and helicopters) represent future main Air forces means. Such conclusion results from the analyses of this problem, i.e.:

- UAV doesn't need high cost for preparation of flying personal;

- Convenient ground simulators can secure preparation of ground operators, which secure conditions being very near to the real ones, or are identical to real ones.

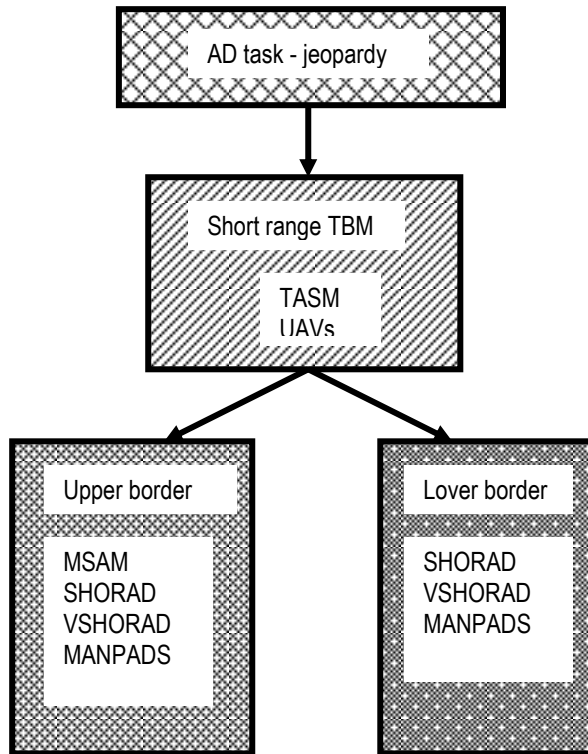


Fig. 2. Air Defence Systems being able to act against danger targets

Legend:

- MSAM — Medium Surface to Air Missiles;
- SHORAD — Short Range Air Defence;
- VSHORAD — Very Short Range Air Defence;
- MANPADS — Man Portable Air Defence.

As mentioned before the planning of operations takes into consideration to use UAV in combat missions. In such case the UAV is also called as Combat Unmanned Air Vehicle (CUAV). Using CUAV the number of aircraft flight missions can be reduced from 55% to 85% and costs of manned missions being compared with CUAV are approximately comparable.

The advantages of UAV (CUAV) can be introduced as follows [2]:

- Price of UAV will be less because there is no need equipment of pilot cockpit space (e.g. no need of pilot ejecting seat, climatisation etc.);
- Range and time of flight are as a rule bigger (due to smaller aerodynamic resistance of UAV, doesn't exist limitations regarding presence of flying personal and their fatigue);
- Bigger utilisation of UAV due to smaller reflection area, relatively smaller over all dimensions, higher manoeuvre ability, smaller overloading;
- Reduction of crew for ground UAV control and guidance and further personal;
- Smaller crew number and smaller auxiliary equipment (there is no need of take-off and landing runways as well as air force bases).

Beside the mentioned advantages exist also some disadvantages regarding UAV, i.e.:

- Communication with UAV board can accidentally be lost due to enemy electronic actions as well as common jamming and limited number of frequencies;
- Outer effect influencing the work of operator (e.g. due to the flight control actions, action of enemy aircrafts, fire of Air Defence systems, especially barrel means, infrared systems of air defence rockets etc.);
- Smaller possibility of quick and correct elimination of faults acting on UAV, there doesn't exist the possibility to remove the failure, incorrect function of board systems and subsystems during UAV flight, difficulties in case of accident landing on spare landing base and deficiency of fuel;
- Military types of UAV exist practically in two categories, i.e. [2, 3]:
 - Flying targets (for preparation of AD troops);
 - Reconnaissance means.

The prospective category of UAV will be soon the category of combat UAV (CUAV). Principle tactical and technical data of known UAV categories are introduced in table 1 and table 2 [2].

Tab. 1

Category	Flight duration (h)	Tactical UAV	
		Ceiling (m)	Range of flight (km)
Micro (μ)	1	250	< 10
Mini	< 2	250	< 10
Close Range (CR)	2 ÷ 4	3000	10 ÷ 30
Medium Range (MR)	1	3000 ÷ 5000	> 250
Low Altitude and Deep Endurance (LADP)	1	9000	> 250
Long Range (LR)	6 ÷ 13	5000	> 500
Long Endurance (LE)	12 ÷ 14	8000	> 500

UAV (CUAV) characteristics introduced in tables 1 and 2 are deduced from respective construction arrangement and equipment of auxiliary ground elements of UAV (CUAV) [2, 3].

Mission of UAV (CUAV) is as a rule determined by character of effective payload, i.e. respective sensors and armament at the board. Sensors at the UAV board can vary regarding the UAV mission and task type.

Tab. 2

Category	Flight duration (h)	Strategic UAV	
		Ceiling (m)	Range of flight (km)
Medium Altitude and Long Endurance (MALE)	24 ÷ 48	8000	> 500
High Altitude and Long Endurance (HALE)	12 ÷ 14	20 000	> 1000

Conception of UAV (CUAV) can schematically be illustrated by figure 3.

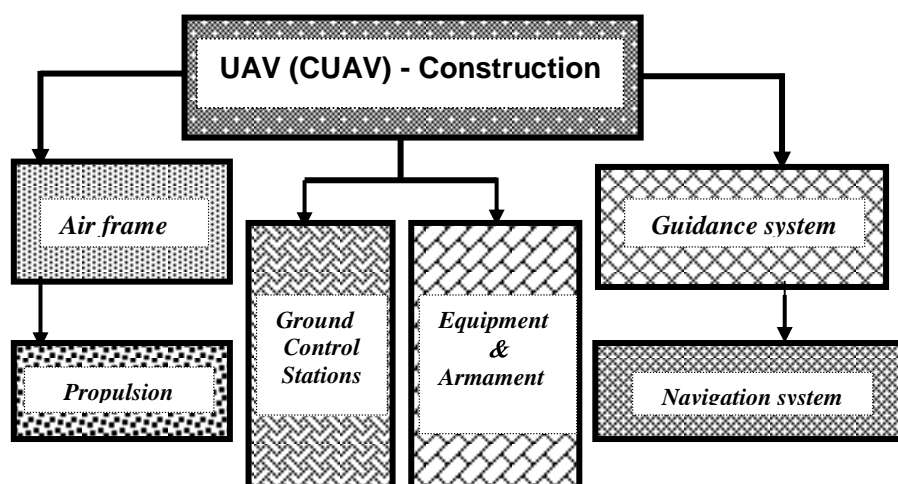


Fig. 3. Conception of UAV (CUAV) Construction

Possible reconnaissance and tracking tasks as well as electronic combat actions usually are of need of infrared, or opt electronic sensors and further on laser markers etc. According to available information were carried out successful experiments with weapon systems at the UAV board, e.g. Mk 82 bombs or guided missiles “Maverick”.

In conclusion can be stated that UAV (CUAV) systems eliminate the human being from the UAV flight process.

CONCLUDING REMARKS

It is evident from above mentioned that unmanned systems represent qualitatively new systems being able to fulfil different combat tasks. Therefore such category of armament regarding the future combat missions seems to be as very important from point of view of “*reconnaissance*” and “*combat*” tasks.

Beside the problems related to UAV (UCAV) should also be solved problems related to the questions of effective defence against them.

Respective solution of effective defence against such targets type should follow the individual defence system task. There exist a variety of possible manner allowing covering of target type as well as the type of threatening are the properties, which should be fulfilled by effective defence system. Therefore can be applied different AD systems, but every one would have specified task.

Reduction of Defence Ministry budgets beside sophisticated technologies together with political pressure results in the following:

- Development of unmanned means starts to have high priority;
- Exists a broad scientific and military teams working in the scientific and development sphere.

The introduced notes represent main but important problems related to UAV (UCAV) problems. From the introduced is therefore clear that the future weapons and armament systems.

Beside the UAV (UCAV) design problems would be solved the problems related to the AD and its effectiveness. Mainly for that, that such sophisticated weapon systems represent high threat regarding the defended combat structure and territory.

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