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CENTRAL INTELLIGENCE AGENCY  
WASHINGTON, D.C. 20505

27 May 1976

MEMORANDUM FOR: The Director of Central Intelligence  
FROM : William W. Wells  
Deputy Director for Operations  
SUBJECT : MILITARY THOUGHT (USSR): Field Air  
Defense in Combat with Low-Altitude Targets

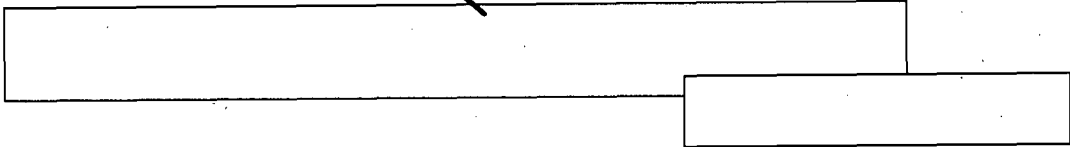
1. The enclosed Intelligence Information Special Report is part of a series now in preparation based on the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article briefly examines such problems as limited low-altitude radar and missile capabilities on the basis of Vietnam experience in recommending ways of improving means of combating low-flying targets. The author considers ground forces cover requirements in proposing a simplified weapons system based on the SHILKA antiaircraft gun mounted on a BTR-50P armored personnel carrier chassis. A system of low-altitude radar posts reinforced with visual observation posts also should be established to improve the warning system. This article appeared in Issue No. 2 (84) for 1968.

2. Because the source of this report is extremely sensitive, this document should be handled on a strict need-to-know basis within recipient agencies. For ease of reference, reports from this publication have been assigned

William W. Wells

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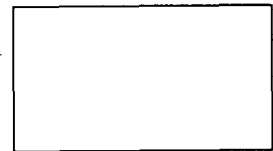
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## Intelligence Information Special Report

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COUNTRY USSR

DATE OF INFO. Mid-1968

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DATE 27 May 1976

SUBJECT

MILITARY THOUGHT (USSR): Field Air Defense in Combat with Low-Altitude Targets

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 2 (84) for 1968 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". The author of this article is General-Major of Artillery S. Prosvirkin. This article briefly examines such problems as limited low-altitude radar and missile capabilities on the basis of Vietnam experience in recommending ways of improving means of combating low-flying targets. The author considers ground forces cover requirements in proposing a simplified weapons system, based on the SHILKA anti-aircraft gun mounted on a BTR-50P armored personnel carrier chassis, to supplement surface-to-air missiles. A system of low-altitude radar posts reinforced with visual observation posts also should be established to improve the warning system. An illustration is provided of the effectiveness of surface-to-air missiles against targets at various altitudes.

End of Summary

[REDACTED] Comment:

The SECRET version of Military Thought was published three times annually and was distributed down to the level of division commander. It reportedly ceased publication at the end of 1970.

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Field Air Defense in Combat  
with Low-Altitude Targets  
by  
General-Major of Artillery S. Prosvirkin

In our periodical publications\* and in operational training the problem of combat with low-altitude targets is given a rather large amount of attention. This is quite natural, considering the difficulty of solving it.

The surface-to-air missile systems we have in service permit us to combat aviation and cruise missiles at low, medium and high altitudes. At the same time, combat at low and maximally low (under 100 meters) altitudes is the most difficult for our present-day air defense, and the least effective (Figure 1).

Judging from the experience of the Vietnam war, the latest modifications of existing surface-to-air missile systems, made to improve firing at low-flying targets, have not produced significant results. Fighter aviation interception of air targets also is not very effective at altitudes less than 1,000 meters, and hardly practicable at altitudes less than 300 meters. The complexity of solving the problem is aggravated by the lack of effective radar means among the troops to detect and track low-altitude targets. The lower range of existing radars, as we know, is for practical purposes limited to altitudes of 300 to 500 meters. Thus, the low-altitude target detection range is so limited that in rugged terrain conditions it is insufficient for fighter aviation as well as surface-to-air missile means. Front radiotechnical units essentially are not now capable of setting up a continuous radar field at low altitudes. In essence, a large amount of front territory which should be closely covered is left without radar support.

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\* Collection of Articles of the Journal "Military Thought", No. 1 (83), 1968; No. 2 (81) and No. 3 (82), 1967; No. 2 (78), 1966.

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Research as well as the experience of operational training and combat actions in Vietnam and the Near East show that, for the time being, light antiaircraft artillery and antiaircraft machineguns remain the most realistic force for combating enemy aviation at low and maximally low altitudes. Specifically, experimental firings have shown that the probability of one ZSU-23-4 self-propelled antiaircraft gun, firing from position and in motion, destroying a MIG-17-type aircraft flying at an altitude of 25 to 200 meters, is 0.42 to 0.67.

What are the actual requirements for these means in order to set up close cover for the troops and installations in a front (army)?

Front zone installations having the greatest need of close cover number about 40 to 50. These installations will be: home airfields of the air army's aviation, launch sites and deployment areas of missile brigades and bases, command posts and control posts, crossings, special armament depots and others. Front and army surface-to-air missile units also require close cover.

On the basis of combat experience and the capabilities of existing and prospective low-altitude antiaircraft means, it has been established that to provide cover for an airfield requires a minimum of two batteries; cover for a front (army) missile brigade -- at least six batteries; close cover for a front command post -- six to eight batteries; and for one surface-to-air missile battalion -- one or two batteries. In Vietnam, for example, two or three batteries of 37-mm (57-mm) automatic weapons and two or three ZPU-4 (ZPU-2) antiaircraft machinegun platoons are allocated to cover one surface-to-air missile battalion.

As a whole, to provide close cover for particularly important front and army installations will require up to 10 to 15 additional antiaircraft artillery and antiaircraft machinegun regiments (battalions). These antiaircraft units (subunits) must be highly mobile and air-transportable (the latter quality is particularly important for antiaircraft artillery subunits covering an airfield). Organizationally, front (army) antiaircraft means for close cover may be combined into battalion-sized antiaircraft artillery groups, but mixed (antiaircraft artillery and antiaircraft machinegun) battalions

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are advisable.

The close cover capabilities of tank and motorized rifle divisions, which have the organic means to provide only 25 to 40 percent of their own cover, also must be increased. We specifically share the opinions expressed earlier on mounting antiaircraft machineguns on tanks, and also concerning the necessity for front units and subunits to organize and fire salvos against air targets using all types of small arms.

But a numerical increase in the existing models of antiaircraft artillery and machineguns in units and subunits alone still does not solve the problem as a whole.

The fact is that the S-60 57-mm antiaircraft systems, ZSU-57-2 self-propelled antiaircraft guns, 37-mm antiaircraft guns, ZPU-4 and ZPU-2 antiaircraft machineguns, and radar-equipped ZSU-23-4 SHILKA systems still have a number of shortcomings, which lower their combat effectiveness or performance. Even the recently developed rocket-type low-altitude means are not secure against jamming. Reliable close cover for troops and installations evidently will be possible only when a mass-supplied, specialized weapons system, which embodies all the best features of existing systems and is the result of further technical improvement of them, is available.

New armament must ensure the destruction of air targets throughout the whole range of low and maximally low altitudes, be highly mobile, easy to master, reliable in operation, relatively inexpensive and, particularly important, it must permit firing under conditions of any unforeseen jamming by the enemy.

It may be possible to base the prospective system on the antiaircraft component of the SHILKA. A wheeled chassis with cross-country capability (such as the BTR-60P armored personnel carrier) could be used as a base, thus reducing the cost of the undercarriage. We should avoid a turret which obstructs the direct field of view (necessary for firing on suddenly-appearing low-altitude targets), and should develop an automatic device for direct aiming at the target, improve the telescopic sight and retain a radar of very simple design in order to determine the direction to the target. Since maximally low altitudes, as a

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rule, require tracer fire, the muzzle velocity of the shell should be increased as much as possible.

Some reduction in firing effectiveness, due to simplifying the radar direction system, will be compensated for by the capability to fire on targets throughout the low and maximally low altitude range, and by the high reliability and simplicity of operation of the system as a whole. Simplifying the design and lowering its cost will make it possible to equip troops with these systems in a short time and, in conjunction with surface-to-air missile means, to create a fire barrier over front installations and troops against the attacks of aviation operating at all altitudes.

Speaking of the need for developing a simple antiaircraft tube artillery system and widely introducing it into our troops, we propose to supplement the development of new surface-to-air missile armament with an improved, reliable, and easily operated weapon which can make up for the shortage of low-altitude combat means which has developed among the troops, in a short time.

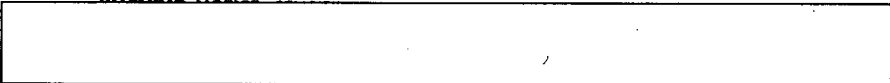
Heavily concentrating antiaircraft tube artillery in the troops will be a good way to supplement surface-to-air missile troops combating low-altitude targets. We know that in Vietnam, for example, the enemy created definite difficulties for surface-to-air missile units by jamming missile guidance radars and striking the launch sites of surface-to-air missile troops from low and maximally low altitudes.

Radar support of close cover in a front, in our opinion, has required establishing a system of low-altitude radar posts. These posts should be provided with high-speed, multichannel communications in order to send warning signals directly to the active means of combating low-flying targets.

The system of low-altitude posts will require reinforcement with a network of visual observation posts which have been provided with modern signal equipment. Experience shows that where visual observation is well organized and a reliable warning system is set up using all signal means, even the simplest ones, losses are always significantly less. Helicopter-mounted radars and patrolling airborne visual observation posts can be very effective in detecting low-altitude targets, and should be widely

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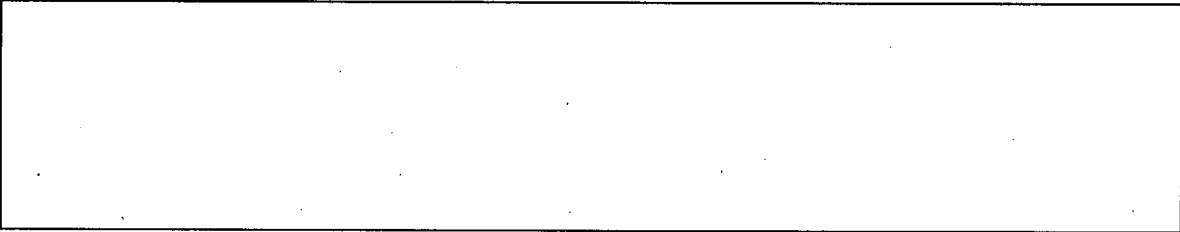
introduced into our troops.

Timely reconnaissance of low-altitude air targets is possible only when planning is centralized on a front (army) scale, and effective combat with them (timely commitment of active air defense means to battle) is possible only when warning and fire control are decentralized.

The level of readiness of close cover means to repel enemy air strikes will depend primarily on the ability of personnel to combat low-altitude targets under all conditions of the air and ground situation. In this connection, inculcation in personnel of solid skills in the timely detection and destruction of targets flying at low and maximally low altitudes is now acquiring especially great importance.

Training troops to fire tank antiaircraft machineguns and small arms deserves a great deal of attention. It would seem desirable for tank units, whose tanks have antiaircraft machineguns, to not only master single firing against air targets, but also widely put into practice group firings of antiaircraft machineguns by companies and battalions.

Warning troops and close cover means of the threat of attack by low-altitude targets requires further improvement.



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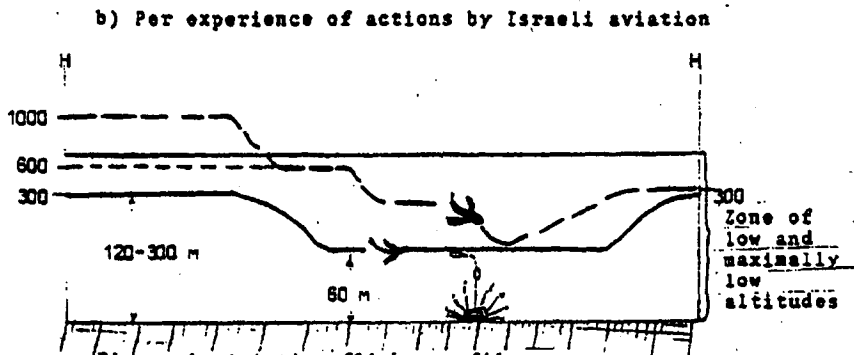
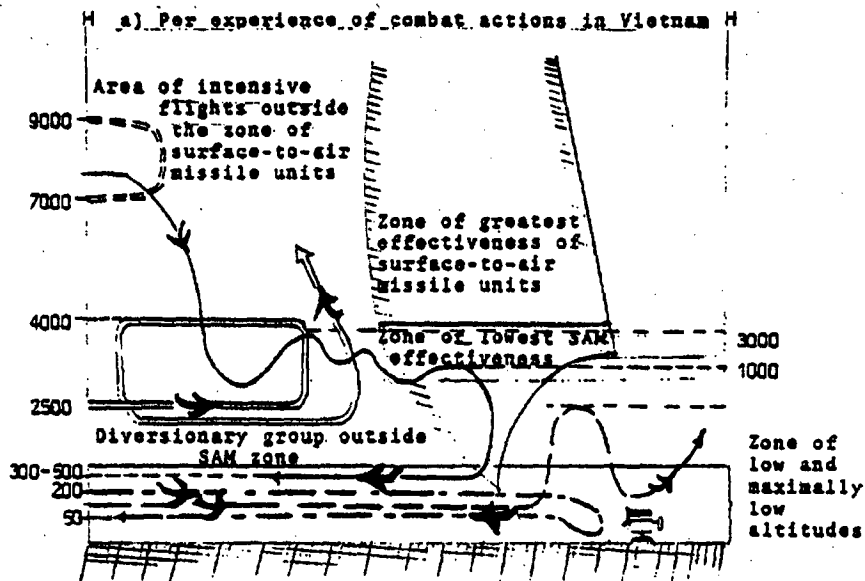


Figure 1. Aviation flight profiles  
a - per experience of combat actions in Vietnam;  
b - per experience of actions by Israeli aviation

