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30 November 1978

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John N. McMahon
Deputy Director for Operations

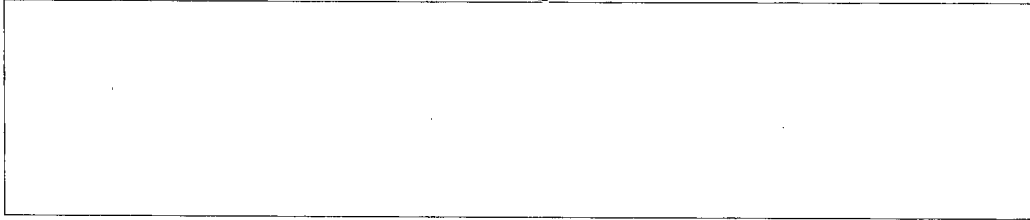
SUBJECT : MILITARY THOUGHT (USSR): Negotiation of
Enemy Air Defense by Aviation in a
Theater of Military Operations

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 indicates Soviet perceptions of the extent of air defense likely to be encountered in a European operation and discusses the methods of negotiating it -- missile strikes, electronic warfare, defensive fire, maneuver, and air strikes against the air defense means -- as these apply to long range, fighter, and military transport aviation. Some figures, admittedly tentative, are given on how much each method improves the odds of getting safely through an air defense. This article appeared in Issue No. 1 (80) for 1967.

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

John N. McMahon

~~TOP SECRET~~



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Intelligence Information Special Report

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MILITARY THOUGHT (USSR): Negotiation of Enemy Air Defense
by Aviation in a Theater of Military Operations

SOURCE Documentary

Summary:

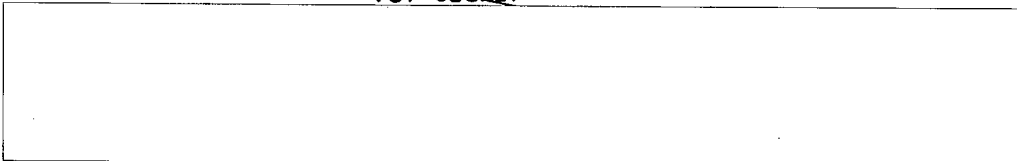
The following report is a translation from Russian of an article which appeared in Issue No. 1 (80) for 1967 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article, by General-Major of Aviation P. Bogza, indicates the extent of air defense he believes likely to be encountered in a European operation and discusses the methods of negotiating it -- missile strikes, electronic warfare, defensive fire, maneuver, and air strikes against the air defense means -- as these apply to long range, fighter, and military transport aviation. Some figures, admittedly tentative, are given on how much each method improves the odds of getting safely through an air defense.

End of Summary

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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Negotiation of Enemy Air Defense by Aviation
in a Theater of Military Operations
by
General-Mayor of Aviation P. BOGZA

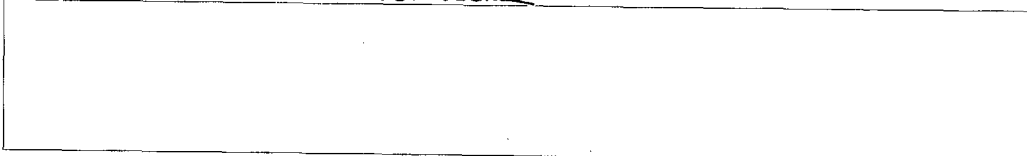
Negotiation of the opposition of air defense forces and means by aviation always has been and continues to be a matter of exceptional importance. It is therefore quite natural that it is being accorded considerable space in the military press.*

In this article individual, previously stated theses as to the nature of the air defense of our probable enemy are clarified and developed, and our capabilities for negotiating it are explored. Attention is focused primarily on the special characteristics of the negotiation of the air defense of our probable enemy in a European theater of military operations by long range aviation, front aviation, and military transport aviation.

The air defense of the NATO countries is organized through combined efforts and has at its disposal a large quantity of fighters, surface-to-air missiles, and radiotechnical means. All these means are deeply echeloned along the most important axes of the probable flight of our aviation and when necessary can execute extensive maneuvering in the theater of military operations. In addition, their capabilities are continually increasing owing to the introduction and improved control of new surface-to-air guided missile systems (including systems with atomic warheads), fighter interceptors, and radiotechnical detection means. All this enables the enemy to create on any given axes under certain conditions a solid zone of multilayer fire against our aircraft.

* For example, matters pertaining to this subject were broached in the article of Colonel General of Aviation A. MIRONENKO "The Negotiation by Aviation of Enemy Air Defense Opposition in the Initial Operations of a War," published in the Collection of Articles of the Journal "Military Thought", No. 3 (79) for 1966.



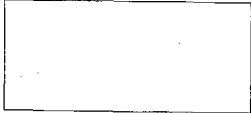


In the more general case, one can assume that in Europe our aviation will have to negotiate four air defense zones: ① a zone in which action against it by fighters predominates (if our aviation flies at a high altitude, the beginning of the zone will be located 100 to 150 kilometers from the state borders of the countries of the socialist camp); ② a zone in which action against it by surface-to-air missiles predominates (from the same borders and to a depth of 200 to 300 kilometers into enemy territory); ③ another zone in which action against it by fighters predominates (the beginning of the zone is more than 300 kilometers from the state borders); and ④ finally, the air defense zone in the area of the delivery of the strike, which, depending on the importance of the targets located within it, may be covered by fighters, surface-to-air guided missiles, and antiaircraft artillery. Thus, our aviation will meet with combined opposition to a depth of up to 300 kilometers.

Only if this defense is decisively neutralized through the combined efforts of all branches of the armed forces and branch arms will aviation be able to negotiate it. Strategic nuclear forces may play a special role in accomplishing this task at the beginning of a war. How effective combat against enemy air defense will be in this case can be judged by the following results which we have obtained on the basis of calculations.* If there are massed actions of aviation at the beginning of a war without prior destruction and neutralization of enemy air defense in the theater, losses during flight to the strike areas and back may be as high as 70 percent.

Hitting the air defense system beforehand with nuclear strikes alone (taking into account the effect of radioactive contamination of the terrain) reduces aircraft losses by a factor of two (i.e., in this case losses may be 30 to 40 percent). If combat against air defense forces and means is carried out simultaneously through the delivery of nuclear strikes and jamming, aviation losses do not exceed 15 to 25 percent.

* Because of the comparatively great complexity of the calculations and the substantial number of intermediate calculations, they have been omitted from the article.



Aggressive fire of aviation weapons from on board the aircraft against the attacking fighters and surface-to-air guided missiles of the enemy, when combined with other combat methods, will decrease our aviation losses by another five percent.

Thus, with joint actions of the different branches of the armed forces and branch arms to combat enemy air defense in the theater of military operations, our aviation losses may not exceed 10 to 20 percent.

Such joint actions require coordination in determining the time of the aviation sortie (during or after a launch of missiles, in the daytime or at night, under ordinary or adverse weather conditions), the main axes of the strikes, the flight routes and profiles, the operational disposition and battle formations of the forces, the density of the raid, the procedure for maneuvering and using jamming, etc. In addition, in the interests of the joint actions, maximum advantage should be taken of several weaknesses of the air defense of the enemy, such as the lack of a clear-cut, conclusively established organizational structure, because of which he may at any moment have difficulties in building up forces and means, thus decreasing the effectiveness of air defense.

All these measures are interrelated, supplement one another, and are jointly implemented; it is therefore necessary to find the optimum combination of them. Under present-day conditions there is an objective need for overall coordination of the efforts of the different branches of the armed forces and branch arms of aviation (types of aviation), aimed at the effective negotiation by aviation of air defense opposition. In our opinion, this coordination can be done by the same command level that plans operations in the theater of military operations. It alone, while determining the targets and delivery times of strikes and allotting the efforts of the branches of the armed forces, is capable of best outlining and coordinating the array of measures for effective negotiation by aviation of the enemy air defense system throughout the entire theater.

We shall now dwell in greater detail on several special characteristics of the negotiation of enemy air defense as they apply to the combat actions of the different branch arms of aviation.

The special characteristics of the negotiation of air defense by long range aviation are due on the one hand to its limited capabilities for expending its means for this purpose, and on the other hand to the necessity of allocating its forces for negotiating the enemy air defense. It is advisable first and foremost to include in the composition of these forces groups to implement jamming and to carry out deception measures. It is also essential to provide for groups to destroy surviving air defense means (consisting predominantly of missile delivery aircraft) and for target search and designation groups, and also to have several crews for final reconnaissance, guidance, and poststrike reconnaissance. In addition to the groups enumerated, it is also desirable to have in the battle formations of the strike groups individual aircraft with special missiles that automatically home in on operating radar.

Successful negotiation of enemy air defense depends on the proper choice of flight routes and profiles. The flight route must be at the maximum possible distance from the areas most densely covered by the enemy. Therefore, when the situation and the geography of the theater permit, the best alternative is a flight over the sea or over deserts, and occasionally over mountainous areas. When selecting routes, one should also take into account the air radiation situation in the theater.

As regards the flight profile, in the majority of cases low altitudes are the most advantageous, since they substantially decrease the range and probability of aircraft detection and consequently ensure surprise of actions. In a number of cases low altitudes hinder the use of surface-to-air guided missiles and antiaircraft artillery against the aircraft and also make it difficult for fighters to use onboard radar sights in the attack. Finally, with low-altitude flight over targets that are of importance to the enemy, the enemy is deprived of the opportunity to use weapons with nuclear warheads against the aircraft.

At the same time, during a flight at low altitudes, the capabilities of the enemy to repel the aviation strike may sometimes increase owing to the use of hand-fired surface-to-air missiles, machineguns, automatic weapons, and rifles. The combat experience of American aviation in Vietnam specifically testifies to this. Therefore, it obviously will not always be possible to use low altitudes during a flight over large groupings of enemy

ground forces. One should also take into consideration that the enemy may use barrage balloons along the probable flight axes or around important targets.

In order to deprive fighters of the capability to intercept our aircraft, it is advisable not only to maneuver simultaneously by direction, altitude, and speed, but also to make the flight along divergent and intersecting routes. Against fighters that have succeeded in going to the attack, it is necessary, in addition to maneuver by altitude and direction, to employ active and passive jamming.

As regards antimissile maneuvering, one way to accomplish it is to have the aircraft (echeloned by altitude to avoid being hit by surface-to-air guided missiles with nuclear warheads) converge into narrow zones in order to increase the density of the raid and decrease the number of surface-to-air guided missile batteries capable of taking part in repelling the raid.

During a flight of long range aviation aircraft, in addition to antifighter and antimissile maneuvers, jamming should be extensively employed against the greatest possible number of enemy radioelectronic means. As the strike groups approach the lines of possible fighter interception or the zones in which air surveillance is carried out with the aid of surface-to-air guided missile target designation radars, jamming should be increased in intensity and power by using the group and individual means of the aircraft. The most intense jamming should be implemented (on the frequencies of the guidance stations for surface-to-air guided missiles) in the surface-to-air guided missile fire zones. During the return flight, it is also advisable to implement jamming in conformity with the location of zones of possible aggressive activity of air defense forces and means, using roughly the same procedure as during the flight to the targets of the aviation strike.

In our opinion, it is advisable to use diversionary groups when an air large unit must overcome air defense on a narrow front. In such cases the diversionary groups travel on different axes (than the strike groups) at high altitudes and, by implementing jamming up to the line of strike group detection by the enemy radar, they divert the enemy air defense to themselves. But if the air defense must be negotiated, let us say, by a corps



of long range aviation on a wide front (300 kilometers and over), it hardly makes sense to expend forces and means on diversionary actions since even without them the air situation will be very complicated for the enemy.

The special characteristics of the negotiation of air defense by front aviation are due to the considerable advantages it has as compared with other types of aviation: it is capable of independently delivering effective strikes on air defense forces and means, and it enjoys great maneuverability, speed, and flight altitude. As a rule, the targets designated for destruction by front aviation are located throughout the front zone; because of this, front aviation must operate on a wide front.

When front aviation is following a route that crosses the fire zone of surface-to-air guided missiles, it is best to draw up its battle formations within a narrow zone (10 to 15 kilometers) since this considerably reduces the number of batteries that can oppose it. The depth of the battle formation, particularly during operations at night and in the daytime when there are clouds, as far as possible should not exceed the length of the path travelled by the aircraft during the time of a firing cycle of the surface-to-air guided missile batteries.

Flights at high speeds and low and extremely low altitudes are of particularly great importance in effectively overcoming air defense.*

* The detection range of aircraft flying at altitudes of less than 250 meters with the aid of radar stations is one-fifth to one-tenth the range at high altitudes; calculations confirmed by war experience in Vietnam show that the Hawk, Chaparral, and Redeye surface-to-air guided missiles are nearly unable to hit aircraft flying lower than 100 meters; it has also been established by calculations that increasing the flight speed of aircraft from 800 kilometers per hour to 1,200 increases fivefold the probability of negotiating the fire of Hawk surface-to-air guided missiles.






Since it has great flight speed, front aviation is capable of successfully negotiating the opposition of enemy fighters. And what is more, in many cases modern reconnaissance aircraft, fighter bombers, and bombers can get away from fighter attacks altogether.

The success of front aviation in negotiating air defense also largely depends on antifighter and antimissile maneuvers. In our opinion, the former will be more effective if they are carried out toward the attacking fighters and combined with an abrupt change of altitude and flight speed. If conditions permit, it is advisable to escape into the clouds, toward the sun or a storm cloud.

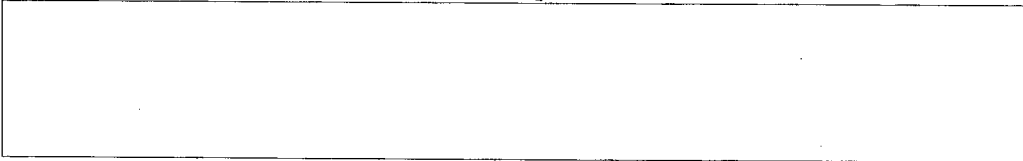
One way of carrying out antimissile maneuvering in the target designation zones of surface-to-air guided missile batteries that we can recommend is to have the aircraft change places in the formation during the flight, using the so-called "scissors" maneuver. In addition, it is desirable to cross the zone of target designation at an angle of 30 to 60 degrees to the presumed disposition line of the batteries, combining this with a change in altitude (most preferably by decreasing it) and an increase in speed. As regards radio jamming, it is advisable to carry it out in a manner similar to that indicated for long range aviation.

The effectiveness of combat against fighters and surface-to-air guided missiles can be considerably increased by using missiles that have radar and thermal decoys and that are equipped with corner reflectors, lens reflectors,* and sources of infrared emissions. It is also advisable to provide fighter-bombers with equipment for getting to operating radar stations and to arm them with "air-to-radar" missiles.

The special characteristics of the negotiation of air defense by military transport aviation are due primarily to the principles of its use and to the tactical-technical specifications of the aircraft, which in many ways are inferior to the aircraft of the other branch arms and types of aviation. Thus, the conditions of flight of large groups of aircraft -- for

*  comment. "Lens reflectors" include Luneberg lenses and lenses with a reflective coating on the back side.





instance, with a landing force -- impede their maneuvering.* Consequently, the negotiation of air defense by military transport aviation is something extremely complex. For this, as calculations and exercise experience show, it will be necessary to allocate considerable forces and means from the different branches of the armed forces and branch arms and to distribute the tasks among them in the following manner.

Reconnaissance aviation must detect air defense means; the rocket troops and artillery of the fronts must destroy the enemy air defense means to a depth of up to 450 kilometers; front aviation must support military transport aviation's flight to the landing areas, with fighter coverage to a depth of up to 300 kilometers and with actions against various targets to a depth, of up to 500 kilometers; the long range fighter aviation of the air defense of the country must cover military transport aviation to a depth of up to 900 kilometers; the SPETSNAZ units of the fronts and air armies can be given the task of jamming to neutralize the operation of radioelectronic means. Those air defense targets that are located beyond the range of our operational-tactical missiles and front aviation must be destroyed and neutralized by the strategic rocket forces, and in a number of cases by long range aviation.

Successful negotiation by military transport aviation of a deeply echeloned enemy air defense must, in addition, be based on the performance of a number of measures in the large units and units during the preparation and execution of the flight. These should include selection of the most advisable flight zones and routes within them, selection of the altitudes, battle formations, and disposition of the air units and large units, and determination of the permissible limits of maneuver and the jamming procedure.

* The simultaneous flight of a large number of groups of transport aircraft in a limited zone over several routes with a deeply echeloned disposition, as well as the necessity of strict maintenance of the flight plan and of the position in the battle formation, greatly impede maneuvering. Therefore, only slight maneuvering in the horizontal plane to circumvent the fire zone of individual surface-to-air guided missile systems is possible.



Calculations done in the Red Banner Military Air Academy, conference materials, and the results of exercises demonstrate that it is advisable to decrease the width and depth of the overall disposition of battle formations by decreasing the spaces between routes and by echeloning the units and subunits by altitude, with a simultaneous reduction of the distances between groups and aircraft.

With a reduction in the number of routes from four to two (but with an increase in the number of echelons in altitude so that the overall depth of disposition remains unchanged, i.e., the same as with four routes), the probability of negotiating an air defense increases by a factor of 1.5 to two. If, in addition, the distance between routes is decreased, the probability of negotiating the air defense increases still more. (For example, if the distance between routes is reduced from 30 to 10 kilometers, the probability of overcoming the air defense increases by a factor of almost three.

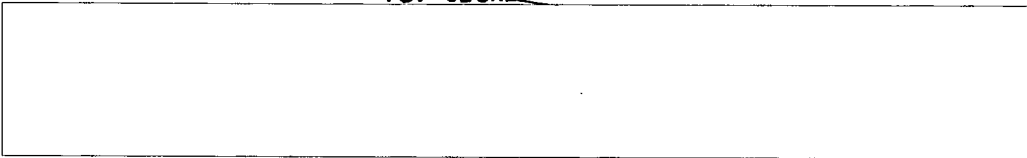
However, it is generally advisable to not only decrease the number of flight routes, but to also reduce the depth of disposition of the battle formations. This will reduce the length of time the aircraft are within the zone of actions of surface-to-air guided missiles.

To overcome air defense it is necessary also to take advantage of adverse weather conditions that sharply reduce the number of opposing fighters, antiaircraft machineguns, and guided missiles of various classes with thermal homing heads.

In addition to the enumerated measures, radioelectronic warfare and, in particular, radio jamming have an enormous influence on the success of military transport aviation actions. Unfortunately, military transport aviation is incapable of effective jamming with its own forces. Consequently, this problem can be solved only by the combined use of all the jamming means at the disposal of the front.

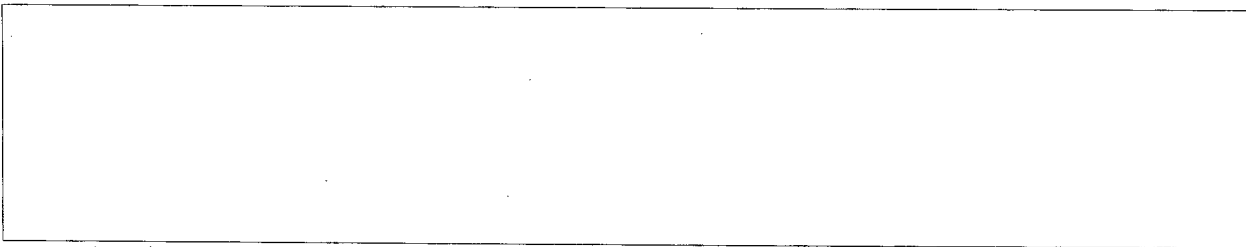
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In conclusion, let us examine the comparative effectiveness of possible alternative methods of negotiating an enemy air



defense in one out of many quite possible situations.*

If no methods whatever of combating enemy air defense are used, our aircraft losses solely on the flight route to the areas where combat tasks are to be carried out may be as high as 25 to 30 percent of the number participating in the flight. When the air defense is negotiated after a strike of the strategic rocket forces and the front rocket troops, losses are reduced to 15 or 20 percent. If active and passive jamming are intensively employed after such a strike, losses will be decreased still further to seven to 11 percent. The enumerated combat methods plus the conduct of defensive fire by the aircraft crews will decrease losses to six to nine percent. And if, in addition, the aircraft engage in antifighter and antimissile maneuvers, aircraft losses will be reduced to four or five percent. And finally, if all these measures are combined with aviation strikes against the air defense forces and means during the flight to the target, total aircraft losses are decreased to three or four percent. On the basis of these calculations, we can draw the conclusion that under nuclear war conditions the successful negotiation of enemy air defense by our aviation is basically achieved through the delivery of successive strikes by rocket troops against the air defense forces and means of the enemy and also through radioelectronic warfare.



* The techniques used to obtain the basic data and the very calculations employed in determining the effectiveness of the negotiation of air defense, especially during mass actions of aviation, are still not adequately developed and require further research and improvement. Therefore, the results of the final calculations do not claim complete accuracy.

