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MEMORANDUM FOR: The Director of Central Intelligence

FROM : John H. Stein
Acting Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Outlook for the Combat Employment of Front V/STOL Aviation

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 sees V/STOL aircraft as "the aviation of tomorrow" and attempts to predict the changes that will accompany its introduction. These include basing in smaller groups and ease of dispersal, smaller and more easily prepared landing sites, greater flexibility in combat, and quicker response in support of troops. On the other hand, servicing units will have to become more mobile and more efficient, and new techniques must be discovered to conceal the dust clouds these aircraft stir up and to chemically harden unsuitable soils. This article appeared in Issue No. 3 (76) for 1965.

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

John H. Stein

[redacted]

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SUBJECT

MILITARY THOUGHT (USSR): Outlook for the Combat Employment of Front V/STOL Aviation

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Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 3 (76) for 1965 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". The authors of this article are General-Mayor of Aviation M. Kozhevnikov and Engineer Colonel N. Speranskiy. This article sees V/STOL aircraft as "the aviation of tomorrow" and attempts to predict the changes that will accompany its introduction. These include basing in smaller groups and ease of dispersal, smaller and more easily prepared landing sites, greater flexibility in combat, and quicker response in support of troops. On the other hand, servicing units will have to become more mobile and more efficient, and new techniques must be discovered to conceal the dust clouds these aircraft stir up and to chemically harden unsuitable soils.

End of Summary

[redacted] Comment:

General Kozhevnikov has written three other articles on the employment of front aviation, in Issue No. 1 (71) for 1964 [redacted], in Issue No. 1 (77) for 1966 [redacted], and in Issue No. 2 (78) for 1966 [redacted]. 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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Outlook for the Combat Employment of Front V/STOL Aviation

by

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The experience of many exercises and research studies carried out in recent years testifies to the growth of the role of aviation in the operations of the ground forces. It is the only highly maneuverable means capable of conducting aerial observation of enemy actions, of intercepting and destroying the air enemy on the distant approaches to the troops to be covered, of searching out and immediately destroying small-size movable targets, and of landing and moving troops and materiel by air.

The diversity of tasks assigned to front aviation in modern operations predetermines the necessity of perfecting and further developing it. One of the most acute problems is increasing the mobility of aviation, its capability of operating jointly with the ground forces for the entire depth of offensive operations, and also increasing its survivability under conditions of enemy use of nuclear weapons.

What ways are there of solving this problem?

One of them is to build aircraft with great takeoff weights and long flight ranges based at airfields with improved runways at a great distance from the enemy which guarantee the accomplishment of combat tasks in support of front offensive operations with one or two rebasings. The technical prerequisites for creating such aircraft with acceptable flight specifications are available. However, airfields with improved runways, being stationary, will usually be known to the enemy and consequently be first-order targets for the delivery of missile and air nuclear strikes. Besides, building such airfields entails great material expenditures and requires many days. So such a direction for the aircraft of front aviation is unacceptable.

Another way is to increase the depth of the effect of aviation on the enemy by maximum approach of its basing to the provisional front line. However, such a solution does not give a substantial gain in the range of

the aircraft and, with air units remaining on airfields for a long time, it risks great losses from the effect of all the available enemy means of attack, including tactical ones.

The third way is to convert the entire aviation to dirt, keeping the takeoff and landing run on about the same order as in taking off from improved runways. The gain from realizing this method is enormous. Aircraft based on dirt are easier to disperse. More extensive possibilities appear for creating alternate maneuver airfields and building new ones. At the present time there are already practical results from the use of dirt airfields by front, military transport, and long-range aviation. Line units have already mastered, for instance, flights in SU-7B and MIG-21 aircraft from second-class dirt airfields which have a hard surface.

However, this still does not fully solve the acute problem of basing aircraft on small-size dirt airfields (sites) as is required for aviation in its joint actions with the troops of fronts in offensive operations. Experience with flights from dirt airfields shows that the length of the takeoff run of MIG-21 aircraft varies from 800 to 1,000 meters, and for SU-7B aircraft with an external suspension (fuel tanks, bombs, rockets), from 1,400 to 1,800 meters. The length of the landing run on dirt even with the use of a drogue chute and wheel braking reaches 1,000 and 1,400 meters, respectively. Aircraft of these same types newly coming into service are more improved. They have one-half to two-thirds the takeoff (landing) run. But it is quite obvious that modern aircraft require still larger dirt airfields having a soil strength not less than seven to eight kilograms per square centimeter or a thickness of packed snow not more than 15 centimeters.

The conditions of combat use of front and military transport aviation necessitate with special urgency a transition to such designs of aircraft which would enjoy high mobility on soils of reduced strength and have a short takeoff (landing) run amounting to a few hundred meters or vertical takeoff and landing. As calculations show, aircraft with a short takeoff and landing run can be based on dirt airfields with a landing strip length on the order of 500 to 600 meters, and possibly even less, if the soil strength is four to six kilograms per square centimeter.

Here, along with the general tendency to reduce the takeoff and landing run by means of various design improvements (boundary layer blowing, thrust reversal, variable-sweep wings, etc.), a new direction in the development of aviation is spreading widely -- the development of

aircraft providing vertical takeoff and landing.

There is every reason to expect in the near future the appearance of a front V/STOL [bezaerodromnaya, literally "non-airfield"] aviation, primarily of fighter-bombers (ground attack aircraft), front fighter-interceptors, and light military transport aircraft.

The transition to aircraft with such takeoff and landing characteristics makes it possible to bring the basing of the front aviation closer to advancing troops, to carry out extensive maneuver of aviation behind the advancing troops, to reduce many times the dependence of the combat activity of air units on the time of year, weather conditions, and geographical latitude, and to facilitate the selection of sectors and shorten the times of putting new airfields in order. In essence, practically unlimited possibilites are created for the choice of places to base aviation, since small dirt areas whose preparation does not require great material expenditures and labor-consuming works may be suitable for this, and putting them into operation, according to tentative calculations, will take less than one day.

Speaking of V/STOL aviation, we are not inclined to contrast short takeoff and landing aircraft with vertical takeoff and landing aircraft. They are machines of one class which, in a number of cases, will take off like an airplane (in the overloaded variant) and under other conditions like a helicopter (in the normal variant). The practice of aircraft development here and abroad confirms this point.

For instance, the British vertical takeoff fighter-bomber P.1127 is capable of taking off vertically with a takeoff weight of 5.7 tons, but in combat variant -- with a takeoff weight of 7.0 tons -- its takeoff run reaches 200 meters. A similar picture is observed for the American experimental light military transport aircraft XC-142A, for which in vertical takeoff the allowable weight is limited to 18.5 or 19.0 tons, but in a takeoff with a run within the limits of 100 to 150 meters it can exceed 20 tons. One of the domestic models of aircraft being developed also provides vertical takeoff under normal load but in the overloaded variant it has a takeoff run on the order of 200 meters.

Besides that, an aircraft that takes off vertically from an airfield (site) situated at sea level will, with the same takeoff weight, have a definite takeoff run from an airfield (site) at an elevation of 1,000 to 2,000 meters. The same picture may be observed also in flights under

conditions of high surrounding air temperature.

The transition to V/STOL aviation will require the solution of a number of problem questions of an operational-tactical, organizational, and technical character and will cause definite peculiarities in combat employment. In what do these peculiarities consist?

First of all, in the fact that it will not require airfields in the customary sense, i.e., large airfields with one or two specially prepared runways, numerous constructions and structures for various purposes. However, this does not mean complete renunciation of airfields in general, or an unsystematic basing unconnected with the nature of the terrain and the concept of the operation being conducted. For combat actions, air units and subunits will utilize dirt fields (sites) with short runways and the minimum necessary complex of structures, whose preparation and construction is not bound up with large expenditures of time and materials. In virtue of this, the required number of dirt fields (sites) can be prepared in short times and in conformity with the rate and axis of advance of the troops of the front. It is to be assumed that definite planning-surveying and construction tasks (levelling and compacting of the ground in individual sectors, clearing of approaches, camouflage measures, etc.) will still be required, but their volume in comparison with those to be carried out at the present time will be reduced many times. With repeated takeoffs (landings) of aircraft, evidently, earthworks will have to be carried out that are connected with filling in of ruts in the ground, with erosion of the soil, etc.

At the same time, it must not be considered that the V/STOL aviation of the air army will have at its disposal a countless number of separate takeoff and landing points of very small groups of aircraft. For air units of fighter-bomber and fighter aviation in the existing organizational structure, it will apparently be advisable to have one or two air sites per air squadron (five or six per regiment), which will allow extensive enough maneuver to be carried out by the air units and subunits. The preparation of such sites can be provided by the forces of the separate aviation engineer units (subunits) of the air army during an operation.

It stands to reason that realization of this variant and the number of sites will greatly depend on the capabilities of the airfield engineer battalions and of the materiel and technical support services of the air army in wartime.

In principle, the air sites must represent properly prepared sectors of the terrain -- fields with identification of runways for conventional takeoff and landing in any weather conditions and of places for vertical takeoff (landing). On the edges of the fields are prepared parking areas -- singly or in pairs -- for preparing aircraft and arming them for the sortie, and for performing periodic and other routine servicing. These same sites can be used for takeoff, and possibly also for landing, of the aircraft in helicopter fashion. However, besides parking areas, it will still be necessary to have a certain number of areas near the airstrips for landing of the aircraft of other subunits in case of maneuver or an emergency. The airfield and parking areas (landing sites) must necessarily be connected by approach ways for refueling and towing means and for motor transport with ammunition and the necessary expendable materiel.

The distance of the air sites from the provisional front line will be largely determined by the combat situation and the flight tactical specifications of the aircraft. However, there is no basis to consider that a radical change of the existing norms for depth of basing will be required under stationary conditions. In the dynamic situation of combat actions, bringing the airfield network of the air units closer to the troops is achieved mainly through more frequent rebasing of the aviation behind the advancing troops. This principle will remain in force also for V/STOL aviation.

The organizational structure of V/STOL aviation must ensure the possibility of autonomous actions in small groups. But one cannot, on the whole, picture it as a large number of roaming subunits operating in isolation. Like the aviation now existing, it requires technical preparation, fuel, and ammunition. Therefore, organizational units (subunits) will be preserved, although their structure and subordination may be altered.

One can picture the following possible version of the basing of an air regiment: all flight (parking) areas of the subunits and the corresponding airfield structures will be located in a limited area at distances of a few dozen kilometers from one another and from the command post (staff) of the regiment.

Having an effect on the basing of the regiment, naturally, will be the specific terrain conditions, the strength characteristics of the ground, and a number of other factors. However, for purposes of convenience in controlling the subordinate subunits and utilizing the means and equipment of the rear servicing organs, it appears advisable for the command post

(staff) and servicing subunits to be concentrated in the inner part of the basing area.

In controlling the flight and support units and subunits of V/STOL aviation, greater centralization and a higher level of automation will be required. This is due to the dispersal of the relatively small subunits over a large area, to the necessity of providing for the commitment to battle of large forces by enlisting many small groups, and to the frequent change of basing locations in immediate proximity to the enemy. Under these conditions, the role of the mobile means of communications, especially radio, increases. To all appearances, receiver-transmitters with transmission of previously arranged (encoded) signals in voice will find wide application.

The combat employment of V/STOL aviation, it may be assumed, will be based on generally known principles. The nature of the combat tasks to be fulfilled by the corresponding types of aviation will hardly change in connection with the transition to the new aircraft designs. Nor is it very likely that the list of targets on which the aviation will have to deliver strikes will change. However, certain peculiarities in combat actions are inevitable.

Dispersed basing at many air sites produces better conditions for simultaneously putting up all the forces of the aviation on signal. The possibilities are increased for maintaining the constant combat readiness and combat effectiveness of air units for immediate actions. Higher effectiveness of the sorties of fighter-bombers is guaranteed for the support of troops on being called. The aircraft of V/STOL aviation, having a certain measure of hovering ability, will, under the conditions of a neutralized air defense, be capable of more successfully searching out and accurately hitting movable and small-size objects (targets); favorable conditions are brought about for the selection of individual point targets to hit. Actions in small groups are ensured to the fullest. The appearance of new battle formations, methods of attack (e.g., "hovering"), and tactical procedures is possible.

Undoubtedly, the actions of aircraft of the military transport aviation, especially those fulfilling tasks on behalf of a front, will acquire a new coloring. Short takeoff and landing (vertical takeoff and landing) aircraft will allow delivery of combat equipment, gear, and other technical materiel from their production areas and storage bases directly to the location of the troops, launching (firing) positions, support units, or rear services organs; airlifting of troops, ammunition, fuel, and

various troop rations in places of difficult access; and permit the landing of tactical and operational landing forces without their preliminary concentration in departure areas.

Combining the flight characteristics of a modern airplane and a helicopter in one aerodynamic vehicle, which can be achieved either by deflection of the thrust of the engines or by simultaneous application (reduction of thrust) of the cruising and lift engines, depending on the configuration of the powerplant, allows expanding the range of flight speeds and altitudes. Extremely low altitudes on the order of 50 to 150 meters can become completely acceptable for flights.

The new flying and maneuver capabilities of aircraft will apparently have a substantial effect on the methods of fulfilling tasks by aviation during support and cover of troops of the front and in dropping airborne landing forces and military cargoes.

For fighter-bombers, for instance, it will, in principle, become possible, along with the destruction of small-size movable enemy targets ahead of or on the flanks of advancing troops, during a sortie on call from a position of airfield alert or during the course of free search ("hunting"), to employ a new method in definite periods -- destruction of enemy targets from a position of airborne (hovering) alert.

In this case, the targets, primarily newly detected or revived ones, are indicated by the commanders of the supported tank and mechanized large units (armies). And the aircraft will evidently have more extensive capabilities for prolonged accompaniment of the ground forces by shifts in conformity with the rate of their advance.

Fighter-bombers of this type will become, as it were, an aerial platform capable in extremely short times of precisely hitting targets on arriving at them and, if the aircraft is equipped with long-range weapons, even without previously closing in on them.

The capability of switching to low flying speeds in immediate proximity to the surface of the ground will make it possible to reduce the fatigue of flight personnel and to facilitate orientation in flight. At the same time, the preconditions are brought about for sure hitting of moving targets (columns of motor vehicles with troops and combat equipment, railroad trains, ships, etc.) by aligning the aircraft along their axis and especially by synchronizing the movement speed of the aircraft and target. Capabilities of flying in mountainous and other areas with complex relief

are simultaneously expanded.

Prolonged flight at a low speed near the ground, with advance to transsonic and supersonic speeds of low-altitude flight in separate sectors of the route, will permit (in connection with the short range of detection of low-altitude air targets by ground radar) getting to the planned targets suddenly without encountering effective opposition from enemy air defense means on the route.

The process of air target interception by V/STOL fighters will be somewhat different. Full or even partial vertical takeoff and landing of fighters will shorten the time to make the takeoff run, hold the takeoff distance, and perform the maneuver to get on the necessary course. Conditions are brought about for a sortie in the direction toward the target of a single aircraft or a group directly from the ground (from the starting point), i.e., in a number of cases, the phase of searching for the air target or the necessity of additional target indication (guidance) from the ground will be eliminated.

In fulfilling combat tasks by the method of airborne alert by going over to a hovering regime or flying at the minimum possible speed, the opportunity presents itself of closing in on the target or getting to the estimated point of attack without the preliminary maneuver of turning toward the air enemy. The zones of airborne alert themselves can be reduced and acquire different lines. The necessity disappears, while flying in the zone, of holding the aircraft on a straight path for several minutes, and executing a box pattern. Apparently, flight paths will most frequently have the form of an ellipse, of which the dimensions of the semiaxes will be determined to a considerable degree by the characteristics of the onboard radar and the capability of the aircraft to switch from flight at low speed to its maximum, and also to employ the hovering regime in a combat situation.

The capability of changing speed over a wide range will undoubtedly make it easier for fighters to combat such slow-moving air targets as helicopters and unmanned balloons, as well as to escort the flight echelons of the military transport aviation during its fulfilment of the tasks of landing troops and combat equipment.

Like the fighter-bombers, the front V/STOL fighters will be able to cooperate more closely immediately over the battlefield with the ground forces. It will become realistic to carry out cover of troops and rear installations of the front by means of having small groups of aircraft on

alert in shifts over the main attack groupings of troops of the front or over separate large units on the main attack axis, with them moving out forward to intercept and destroy air targets on the distant approaches to the troops and installations being covered.

Besides this, employing a hovering regime brings about favorable conditions for organizing "air ambushes" on the most probable flight axes of the enemy aviation, over the main attack grouping of the troops of the front, and also in areas (zones) and at altitudes unable to be fired upon by the surface-to-air missile units (subunits) of the troops of the front. These fighter forces on alert, when necessary, increase their efforts by calling up new groups of aircraft located on airfields in readiness for a sortie.

Also somewhat changed will be the content of airfield technical support -- the work of the aviation engineer service. The transition to aircraft basing in small groups will require greater independence of the flight, and especially of the technical, subunits. To prepare for a sortie of such subunits, not uncommonly located at rather great distances from one another, it will be necessary to have highly productive integrated technical servicing means, the development of which has to be carried on already now.

During the support of successive flights in small groups when the need does not arise for simultaneous takeoff of many aircraft, for instance, during actions on call, it appears advisable to prepare aircraft or small groups (pairs, flights) successively by an assembly line group method, but with the servicing groups rather than the aircraft moving from place to place. The servicing groups prepare the aircraft for sorties simultaneously or by turns with refueling. Great mobility and high productivity of these can be attained if the personnel and the tool and checkout equipment complex are situated on one (several) motor vehicles of high mobility. The cross-country capability of all airfield technical equipment will undoubtedly become necessary, since air sites in a number of cases will be selected far from approach roads. Besides that, these means must be suitable for moving into new basing areas on their own.

Adoption of V/STOL aviation into service puts forth the demand that all airfield structures be collapsible, that they can be quickly assembled and disassembled, carried by all types of ground and air transport, and constructed predominantly of local non-scarce materials. Nor can one exclude the building of accommodations for one-time or temporary use (for the period of basing).

With the appearance of V/STOL aviation, camouflage of air sites acquires a new meaning. Aircraft basing in small groups provides a more concealed disposition. However, in vertical takeoffs (landings) there usually arise give-away dust clouds. Reduction of these give-away signs can be attained by combining vertical takeoff with some forward movement (within the limits of a few meters), by having a grassy surface on the areas, and by using very simple protective devices in the form of small metal plates.

It will be possible to make wider use of folds in the terrain and forests for camouflage and to employ camouflage nets and improvised materials with great effect. The very pronounced approach roads will disappear to some degree. The numerical smallness of the aircraft groups will undoubtedly hinder detection of the basing locations from the air and with the aid of radar reconnaissance means.

In conclusion, it should be noted that the character of the combat employment of V/STOL aviation in a battle and operation will largely depend on its combat and operating qualities. We need in the future not the kind of aviation for which concrete or metal plates are needed, if only on starting and landing points, but aircraft that take off and land with zero or very short takeoff (landing) run on ground of low strength without preliminary treatment with great expenditures of labor.

Preliminary hardening of weak soils by means of quick treatment with chemical agents or another simple method can apparently be considered acceptable. Therefore, parallel to the development of aircraft of the type considered, further research into effective ways of solving this problem too are necessary.

V/STOL aviation is the aviation of tomorrow. Its appearance gives rise to the necessity of exploring effective methods of its operation and combat employment. The present article is devoted to the solution of this problem, although the authors acknowledge that some of its positions are controversial and have the nature of a forecast of the future.

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