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Manned Aircraft or Pilotless Systems of Aerial Reconnaissance

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During the postwar years, much attention has been devoted to pilotless reconnaissance aircraft. In this regard, the view is occasionally offered contending that for the accomplishment of many reconnaissance tasks in support of the Ground Forces and, especially, the Rocket Troops, pilotless reconnaissance aircraft be used in place of manned aviation.

What is the actual status of pilotless reconnaissance systems and what are the possibilities of their further development and improvement? Are they capable now or in the near future of replacing manned reconnaissance aviation? A study of these questions, using materials from a number of countries, permits us to say the following.

In principle, pilotless means, in comparison with manned aircraft, incorporate such strong points as a non-airfield basing capability, which permits better camouflage on the ground than is possible for manned aircraft and, consequently, a higher degree of viability against enemy strikes. Non-airfield basing also permits the deployment of pilotless means in areas near the users of reconnaissance information. Structurally, pilotless means are simpler, their dimensions and weight are less, and they are somewhat less expensive than manned aircraft. Finally, there is no loss of personnel in case they are destroyed.

But existing pilotless systems and those envisioned for the near future have numerous shortcomings as well. First and foremost, present-day pilotless aircraft are in the first stages of development and, in the main, represent modifications of existing target drones with the installation of current standard reconnaissance equipment without any radical changes in design plans, materials, etc., which are essential for such special aircraft. They are less mobile than conventional aircraft, and their movement is effected mainly by land and is quite slow. Ground support for pilotless aircraft is cumbersome. In preparing them for launch, 50X1-HUM comparatively long period of time is expended. The large amount of automatic control equipment does not provide for a high degree of technical

reliability. Because no person is on board, they have no capabilities for taking stock of actual flight conditions. The cost of pilotless means is still high. Large dimensions and great weight, rectilinear flight, unfavorable altitudes for combat use, and considerable radar contrast, make them highly vulnerable to surface air defense means and fighters. Calculations show that there is a low probability for a penetration of up to 70 kilometers to the targets to be reconnoitered by a single pilotless reconnaissance aircraft flying through air defense forces and means that have not been neutralized.

The reconnaissance equipment on such an aircraft consists of only a camera with small area coverage from low-altitude flights. Moreover, reconnaissance data from the interpretation of wet negatives may be obtained only after three or four hours of flight. The possibility of a great deviation from the assigned course diminishes the probability of reaching the assigned target.

The need to await the return of the aircraft and the long period of time required for processing the materials gathered, render such information of little worth for use in the most critical periods of combat actions, that is, during the period when the requirement is most acute. Furthermore, the cost of the ground equipment making up the reconnaissance system is quite high.

It is true that in the modified systems many shortcomings are being eliminated, but the time when requirements placed upon such aircraft are fully carried out is still very far off. These shortcomings to a greater or lesser degree are inherent in any such pilotless systems whether constructed at home or abroad.

In speaking of the strong and weak points of pilotless means, it should also be kept in mind that one of the main advantages which pilotless aircraft have over manned, i.e. non-airfield basing, is gradually decreasing because manned aviation is making less use of vulnerable, artificial runways and is now making wide use of temporary airfields. It is also shortening the distances for takeoff and landing runs and is preparing to use vertical take-off and landing aircraft.

When the capabilities of non-airfield basing of manned aircraft are fully realized, it will significantly increase their maneuverability, which is closely tied to the tactical mobility of aviation large units and units. The rapid maneuvering of non-airfield aviation sharply increases the viability of front aviation and ensures a more secure concentration of its

forces and the element of surprise in their application. This means that the most mobile combat forces, under other indices, will be the most effective.

At the same time, the absence of improved all-weather and all-altitude reconnaissance equipment with high resolving power leads to an increase in the required number of reconnaissance systems and variations in their equipment, and, consequently, to an increase in the overall cost of the entire system of aerial reconnaissance. And although there is every reason to think that the reconnaissance equipment will, in the near future, increase the effectiveness of aerial reconnaissance, it will likely be quite a long time before the system is free of limitations and shortcomings. Not one of the means of the system provides for the conduct of round-the-clock, all-weather reconnaissance (with the exception of the radiotechnical reconnaissance equipment), their weight and dimensions are still very great, and the photographic coverage and resolving power of the equipment will be insufficient, especially for reconnaissance under adverse meteorological conditions.

In our opinion, the most serious difficulties in the realization of tactical-technical requirements of reconnaissance systems are encountered in the field of flight control system design, particularly in the design of equipment for the onboard processing and immediate transmission of data by radio to ground information collection posts. And this is the case at the same time that jamming-resistant transmission channels for the entire distance of reconnaissance flights by pilotless systems is the first and most important condition of their combat effectiveness.

Therefore, pilotless reconnaissance systems which are intended to carry out even a limited range of tasks under conditions of intense enemy air defense and radiation contamination of the air and terrain, and which do not have equipment capable of automatically transmitting reconnaissance information to ground collection posts within a realistic length of time, could hardly ever have an advantage over manned systems.

Thus, at the present stage of aviation technology development, the effectiveness of pilotless means of aerial reconnaissance does not justify placing them on the same level with manned means. At the present time, only a few tasks of aerial reconnaissance may be carried out by pilotless aircraft. The fundamental error committed in the use of pilotless means is that they are given the very same tasks and the same number of tasks as are levied against manned reconnaissance aviation.

The desire to replace, rather than to supplement, manned aviation results in overburdening pilotless aircraft with heavy, cumbersome, and very expensive reconnaissance equipment. Though they are copies of manned aircraft, they do not possess their most important advantages (the capability to visually orient themselves and to conduct observation of the enemy) and retain the most significant shortcomings (high losses to enemy air defense).

To replace manned reconnaissance systems with pilotless ones (even for the accomplishment of a limited number of tasks), it is essential, first of all, that the latter possess a high capability for overcoming enemy air defenses. In addition, they must be capable of reconnoitering small-size targets under all weather conditions, to process onboard, and select and immediately transmit the collected reconnaissance information (or, at first, with a delay of not more than two minutes from the moment the target is fixed by reconnaissance equipment). It is also important that their cost be several times less than that of similar manned aircraft while having the same degree of technical reliability in the accomplishment of tasks. In addition, the launch preparation time must not exceed 20 minutes.

Only when such requirements are satisfied will it be advantageous to use pilotless systems to accomplish, roughly, the following tasks: reconnaissance of small targets before a missile/nuclear strike, or the final reconnaissance of the situation in a specified, limited area; monitoring the results of a missile/nuclear strike against a target; and precisely determining the level of radiation contamination of the atmosphere and terrain in enemy territory. The accomplishment of even these limited tasks is possible only through a carefully organized defense of the systems against enemy surface-to-air missiles and fighter aviation by flying at the most advantageous altitudes and speeds, thus ensuring radar "transparency" of the aircraft; by jamming enemy radar and other means of detection and guidance, etc.

In examining the requirements for pilotless reconnaissance systems, the fact cannot be ignored that the nature and functioning of military targets in the theater of war have changed significantly. 50X1-HUM

In the armed forces of many countries, the relative proportion of the means of missile/nuclear attack has sharply risen, thus increasing their importance in combat operations. As a rule, these means are small in size and highly mobile. In view of the danger of a retaliatory strike, the disposition in depth (regardless of the distance from the front line),

dispersion, shelter, and camouflage of installations are increased.

Depending on the situation, approximately 40 percent of the military targets may be located in the depth of tactical aerial reconnaissance (at a distance of up to 400 kilometers). Of these targets, up to 70 percent may be mobile and approximately 15 percent may have limited mobility or none at all; thus, a significant portion of all objectives (30 to 35 percent) will be located at a depth of up to 100 kilometers from the front line.

To ensure mobile combat actions of large units of the Ground Forces, an acute need has arisen for additional reconnaissance means for short-range reconnaissance at a depth of 50 to 70 kilometers, which would permit the command of large units to carry out reconnaissance tasks more efficiently.

Since aerial reconnaissance information is needed by all front first-echelon divisions, aerial reconnaissance must be conducted along a wide front often without the reliable neutralization of the numerous and varied enemy air defense means. As a result, reconnaissance aviation of the front air army may suffer great losses.

In our opinion, the development of short-range aerial reconnaissance means must proceed along the lines of using light, small-size, pilotless aircraft (helicopters) with low flight speeds, equipped with inexpensive, light, and small-size reconnaissance gear which ensures the immediate transmission from onboard the aircraft of collected data.

The low cost of pilotless reconnaissance aircraft must also determine the mass nature of the use of this means of aerial reconnaissance. The aim of this approach must not be to duplicate the front air army but to supplement it; and not to bring about the autonomy of the Ground Forces in questions of aerial reconnaissance, but to reinforce and strengthen coordination with the Air Forces on the basis of a clear-cut allocation of tasks at its weakest level, i.e., short-range tactical aerial reconnaissance.

While acknowledging the necessity for the Ground Forces to have their own means of tactical aerial reconnaissance, we feel, nevertheless, that given the present stage of development of pilotless systems, to include in them long-range reconnaissance means and reconnaissance equipment equal to that of manned aircraft is economically unjustified. In addition, the development of pilotless means of reconnaissance which have specifications similar to those of manned aircraft leads to a degree of parallelism in the

work of the Ground Forces and the Air Forces, as well as to an increase in the number of special units and specific types of armament in the Armed Forces. Furthermore, in the process there is only an insignificant increase in the probability and reliability of information gathered on the enemy, while the cost of such information is significantly higher.

Reconnaissance aviation of the front air army conducts reconnaissance in support of the commands of the front and armies, i.e., in support of the principal command levels which make the decision on the use of nuclear weapons. Only front and air army headquarters can most effectively plan, support, and carry out flights of aircraft to reconnaissance and strike targets located at a great depth, with the neutralization and destruction of enemy air defense means. In particular, calculations show that the effectiveness of radar jamming produced by aviation is directly proportionate to the number of aircraft creating it.

Consequently, the effectiveness in the fulfilment of combat tasks and the magnitude of losses depend to a significant degree, on the quantity of forces participating in the flight and on their combat support. Therefore, whenever possible, reconnaissance flights must be combined with massive bomber and fighter-bomber flights.

We think that, since pilotless systems are still short of being perfected technically, they should be turned out in small quantities and thoroughly checked, and the tactical and technical aspects of their application worked out. For this, it is advisable to form one or two special experimental or combat-training units according to wartime T/O and E, manning them completely with well-trained specialists for whom conditions and incentives for scientific research work must be created.

Officer cadres of these units must be able to collate the experience of work with the new equipment and work out recommendations for its technical improvement and instructions for its tactical use. It is inadvisable, costly, and not particularly effective to accept into the armament intermediate types of pilotless reconnaissance systems, and even less so to create numerous units and subunits armed with such systems.

In our opinion, this, or a similar, method of selecting armament will lessen the likelihood of falling behind the pace of development of modern science and technology. 50X1-HUM

We do not want to contrast manned systems with pilotless ones but only want to make an attempt to select the best combination for effectively

executing the tasks of aerial reconnaissance at an acceptable cost.

At the present time, i.e., during the first stage of the development of pilotless means of reconnaissance, great advantages (along with substantial shortcomings) are found on the side of manned means. It may be anticipated that, with the development of equipment for automatic flight control systems and systems for the onboard processing of reconnaissance data, the role and significance of manned means in the system of aerial reconnaissance means will increase significantly. However, in the conduct of reconnaissance, manned aviation is, at the present time, significantly more effective than pilotless systems; and, in spite of the very high cost in its use for carrying out combat tasks, it is more advantageous and economical than pilotless means. Thus, for the time being, under equal conditions, developmental priorities must be given to manned reconnaissance aircraft.

In conclusion, it should be noted that in the leading capitalist countries during recent years, more than 25 types of pilotless tactical reconnaissance aircraft were being developed. The greatest development of pilotless reconnaissance aircraft took place in the United States. However, during the last five or six years, a sharp cutback has been noted there in the means allocated to the development and production of pilotless reconnaissance aircraft.

Calculations made in the US (which, incidentally, are confirmed by our computations) indicate that with the expected density, under modern conditions, of air defense means in a theater of military operations, the probability of American pilotless aircraft accomplishing reconnaissance tasks is near zero. Undoubtedly, this factor plus the high cost of medium and long-range pilotless reconnaissance aircraft were the basis for the curtailment of further work in the US.

The accomplishment of tactical aerial reconnaissance tasks (other than short-range) has been totally levied on the tactical air armies, coordination with which the US ground forces devote much attention.