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SOVIET MILITARY THEORETICAL JOURNAL
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Table of Contents

	<u>Page</u>
Further Strengthen Troop Discipline, by Col P. Bodenkov (Not translated)	
Problems of Military-Technical Superiority, by Capt 1st Rank V. Kulakov	1
The Augmentation of Strategic Efforts in Modern Armed Conflict, by Maj Gen Kh. Dzhelaukhov	15
Civil Defense in Nuclear-Rocket War, by Col Gen Avn O. Tolstikov	28
Modern Fortifications, by Engr-Col B. Mikhaylov	38
The Question of Economic Costs in Modern War, by Lt Col Yu. Vlas'yevich (Based on materials from the foreign press -- Not translated)	
Basic Stages in the Development of Soviet Military- Historical Science, by Lt Col I. Rostunov (Excerpts only)	48
Some Details on the Automation of Troop Control in the US, by Col V. Sinyak (Not translated)	
The Atomic Round for the 155 mm Howitzer (Not translated)	
Selected Works of a Distinguished Soviet Scholar, by Col (Ret) V. Uskov (Not translated)	
Technical Progress and Militarism, by L. Gruzdev (Book review -- not translated)	
Mathematical Methods of Operations Research, by Col O. Sosyura, Engr-Capt S. Yerebin, and Engr-Capt M. Goryainov	54

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PROBLEMS OF MILITARY-TECHNICAL SUPERIORITY

Captain 1st Rank V. Kulakov

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The revolution in military affairs, of which we are witnesses and in which we are participants, is connected with the appearance of essentially new armament and the sharp increase in the effectiveness of combat equipment in armed conflict. The main, and in fact decisive, element of the material basis of the revolutionary changes in military affairs was the development of nuclear-rocket weapons as a result of the combination of the nuclear warhead with the intercontinental ballistic rocket. The development of strategic rockets of the megaton class was especially important. The tremendous destructive power of a nuclear warhead with a TNT equivalent of millions of tons in combination with a super-long-range ballistic rocket, and especially a global rocket, represents a virtually irresistible weapon. It gives its possessor unprecedented possibilities for the execution of military missions assuring the swift achievement of a decisive strategic effect.

Modern weapons can be created only when there is a very high level of development of science and technology and of all the productive forces of society. Here, naturally, has been demonstrated the indisputable superiority of the socialist method of production over that of capitalism. The Soviet Union in a minimum period of time not only put an end to the monopoly of the US over the atomic weapon, and developed the atomic and hydrogen bomb, but it also in a few years moved ahead of all countries in the development of rocket technology. The achievement by the Soviet Union of military-technical superiority over the US was a historically necessary victory of our economics, science, and technology over the economically and militarily strongest country of capitalism.

A monopoly of the nuclear weapon in the hands of the US militarists, if it had been maintained long enough, in combination with superiority in means of delivery, represented a great threat to peace and social progress. The existence of the powerful modern weapon in the hands of a socialist state confronted the aggressive militaristic forces with the entirely real prospect of being wiped off the face of the earth if they attempted to start a new world war.

But depriving the enemy of superiority in military technology does not mean depriving him of the capability of starting a new world war. Imperialism possesses a strong military machine, many times more powerful than that which it had during World War II, and it is continuing to strengthen it and develop it. The governments of the imperialist states are talking all measures to overtake and surpass the Soviet Union and other socialist countries in the development of military technology and in the combat capability of the armed forces. As Lieut. Gen Trudeau, Commanding Officer,

Research and Development Command, US Army, remarked, scientists, engineers, military strategists and government leaders "are working intensively on programs of research and development to create superior weapons and equipment" and thereby assure "qualitative superiority over the Russians and their satellites." (Army Information Digest, January, 1962.) The author of the book, "A Forward Strategy for America," reflecting the views of the most militant American militarists, seeking ways to "bring Russia to her knees", came to the conclusion that for the attainment of this goal the US must possess "fundamental military components". Chief among them is the establishment and maintenance by the US and her allies of "military-technical superiority over the Communist bloc." (R. Strausz-Hupe, W. Kintner, S. Possony. A Forward Strategy for America. New York, 1961, p. 161.) To attain this goal they are insisting on a sharp step-up of the arms race, assuming that thus they can "break the back of the Soviet economy." (Ibid., p. 357.)

The constant increases in military appropriations and in efforts for the development of the latest combat equipment in the major capitalist countries, along with overt and covert opposition to Soviet proposals for general and complete disarmament, is evidence of the fact that the struggle for military-technical superiority not only has not slackened, but has entered a new, still more intensive stage.

The military potential of a state, its ability to wage war and win victory now is primarily determined by its capability of using the power within the nucleus as the basic source of fire power in combination with highly effective rocket means of delivery. Neither the most intensive economic efforts nor the mobilization of any number of troops can provide the fire power necessary for modern armed forces unless their armament includes nuclear-rocket weapons.

In turn, for the creation of nuclear-rocket weapons, a great economic and scientific potential is necessary. A high level of development of science and technology in combination with a highly developed economy is an absolute necessity for the achievement of military-technical superiority over the enemy, especially in the field of nuclear-rocket weapons.

Thus superiority in nuclear-rocket weapons is the decisive factor of military-technical superiority. At the same time, conventional weapons, which likewise are being constantly improved, will also continue to play their part along with the latest combat equipment--rocket and nuclear.

In itself, military equipment is only one of the elements which make up military-technical superiority, which completely depends on the people who are operating the equipment. The achievement of military-technical superiority presupposes, along with the production of the necessary quantity of the most modern instruments of war, the most thorough and intensive training of a mass of men who are capable of proving their superiority over the enemy in the mastery of combat equipment and its use in all modern forms of combat operations for the winning of victory.

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Lenin, from the experience of World War I, concluded that in war "he will come out on top who has the greatest technology, organization, and discipline, and the best machines." (Collected Works, Vol. 27, p 167). From this thesis of Lenin it follows that superiority over the enemy based on higher technology can only bring victory to those armed forces which are distinguished by the greatest discipline and are best organized. Superior combat equipment, and qualitatively superior personnel who have completely mastered its use constitute an organically single basis of military-technical superiority over the enemy. And in order that this theoretically generally accepted unity may be assured in the every-day practice of military development, military science must in a timely manner put forth the most expedient principles of utilization and forms of organization of the armed forces, corresponding to the latest instruments of war which have become part of their armament. These principles and forms inevitably change with changes in the nature and capabilities of the instruments of combat, with the emergence of new methods of accomplishing military missions and with the raising of demands on personnel. Thus, with the appearance of nuclear-rocket weapons, in Soviet military doctrine was established the principle of the decisive role of strategic rocket troops, now a main branch of the armed forces.

Along with the possession of superior technical equipment and qualitatively superior personnel, the correct and timely carrying out of the organization of the armed forces plays an extremely important part in assuring constant military-technical superiority over the enemy. This in turn requires scientifically accurate solution of the problems of developing existing, and creating new, branches and arms of the armed forces and of determining their place and role in the military organization of the country and the relations and cooperation among them. In the process of solving these important problems, there is determined the total fire power and quantity and nature of the means of delivery for the armed forces as a whole; there takes place a distribution of the means of combat among the branches and arms; and there is worked out a thought out single system of armament that satisfies the needs of the troops for personnel, technical equipment and transport, and for all kinds of supply.

To elucidate the most general principles of this highly complex process it is necessary to abstract from the multitude of details and pick out those things most essential, involving general principles, and characteristic for the process as a whole.

The variety of combat missions and of the ways and means of accomplishing them calls for the existence of various branches and arms of the armed forces, distinguished one from another by the environment in which they operate, by their fire power, who or what carries the fire power, and the degree of operational mobility and maneuverability; and by their mission and the methods and consequences of their combat operations. But there is a more common basis on which is determined the specifics of the organization of branches and arms of the armed forces. This is the completely

defined form, peculiar to each of them, of the combination of men and equipment. Therefore the process of organization of the armed forces is essentially the search for and the establishment of the most rational form of combination of men and equipment.

Within the framework of any component of the armed forces--whether it be an infantry company or a rocket unit, a soyedineniye of ships or planes, a small podrazdeleniye or a large ob'yedineniye--the technical instruments and the men operating them are combined in some organized form for the execution of certain combat missions. Here, naturally, there has developed between the two a certain qualitative and quantitative relationship. It is perfectly obvious that this relationship changes with developments in military affairs, and mainly as a result of the emergence of new, improved military-technical means.

Military-technical progress invariably leads to a growth in the amount of power and the supply of technical equipment available to the armed forces, increasing thereby their fighting power. As a result of industrial and technical development, there is an increase in the combat qualities of the armed forces, and less expenditure of human energy is required to achieve an immediate combat effect thanks to the expanding use of technical equipment. Thus, the most important natural tendency of development in military affairs is the constant change in the qualitative and quantitative relationship between the mass of men and technical equipment, with the latter assuming ever greater importance in this relationship. We emphasize that we are talking about the increase in the relative importance of the immediate combat effect achieved by the weapon as contrasted with the effort of the individual. As an example we may point to the importance in the past of the rifleman-sniper and of aimed fire in general in comparison with automatic fire, and then artillery fire, the means of attack of the air forces, and finally, the nuclear weapon.

In the revolution in military affairs this tendency has been demonstrated very graphically and thoroughly. As a result of the abrupt qualitative leap in the development of sources of fire power and means of delivering it, and also the appearance of other latest technical equipment, there has been created the possibility of decreasing the number of personnel of the armed forces directly engaged in combat operations for the direct destruction of the enemy, without decreasing, and in fact increasing, their fire power. In the period from 1955 to 1960 the number of the Soviet armed forces was decreased by one third, but their fire power, as N. S. KHRUSHCHEV has noted, increased many times during the same period, thanks to the introduction of the latest forms of modern military technical equipment. (N. S. KHRUSHCHEV. Disarmament is the Way to Strengthen Peace and Secure Friendship Between Nations. Gospolitizdat, 1960, p.35.)

However, this tendency, which should operate according to objective law is not always carried out when it should be. We cite the following examples.

In his speech at the conference of officials of industry and construction of the RSFSR on 24 April 1963, KHRUSHCHEV said that our economic leaders concern themselves very little with problems of the organization of labor, and told about the case of the purchase from the US of several plants for the manufacture of cinder blocks. In one of them, built in Kiev, over 100 men were working, while the US had a total of 16 men in such a plant. (Pravda, 26 April 1963) Thus the incorrect determination of the relationship between men and machines resulted in a lowering of the calculated productivity of labor of each man by about six times.

In the US journal, Military Review, there appeared the following typical example. "To support one NATO division of 18,887 men at the front, about 35,000 men are required in the rear." The journal explains this situation by the overloading of the troops with technical equipment, which results in "disturbing the balance between the auxiliary services and the line units." (Military Review, January 1961)

From these data it is difficult to give any accurate estimate of the degree of lowering of the combat effectiveness of NATO troops noted by this journal, but it is perfectly obvious that in this case, too (though for a different reason - overloading the troops with technical equipment), there has not been maintained the most advantageous ratio between men and machines.

The analogy between industry and the military has its limits, for understandable reasons. In industry, as a rule, it is always advantageous to replace the labor of a large number of men with that of a smaller number operating more productive machinery. In the organization of armed conflict such an exchange is not always possible, and is not always useful in view of the specific nature of combat missions. For example, with a heavy machine gun with a crew of three men and a rate of fire of 300 rounds a minute, the fire rate of one soldier amounts to 100 rounds a minute, about ten times that of a soldier with a non-automatic rifle. The extensive use of the heavy machine gun has not displaced the individual soldier, since a variety of combat tasks of the latter cannot be carried out by the machine gun crew. For similar reasons the appearance of the submachine gun with a rate of fire of 100 rounds a minute, in the armament of the individual soldier has not resulted in the elimination of the heavy machine gun.

But just as in industry, in military affairs any new technical means represents progress only if, while having an effectiveness greater than (or equal to) the obsolete means which it is replacing, it requires a smaller number of personnel to operate it. Therefore in peacetime there

is also the possibility, without lowering, or even with raising, the fire power, combat capability and combat readiness of the armed forces, to free human resources needed for the national economy, and when necessary, to create a greater number of well-trained troops.

From the above there arises the conclusion that the results of military-technical progress, which constitute the material basis for development in the military field, are completely utilized only if in the armed forces the ratio between men and technical equipment changes in a timely manner and corresponds to the sharply increasing capabilities of new types of weapons and all the technical equipment coming into use in the armed forces. For practical military development, this means the creation in all branches and arms of the armed forces of such forms of organization as will represent the most advantageous relationship between men and technical equipment, providing the highest combat effectiveness of the armed forces with the maximum possible release of human resources, taking into account probable losses.

Since the development of combat equipment goes on continuously, there should be continuous changes in the ratio between men and equipment in the troops. But important changes in the organization of the armed forces, like in military art, are connected with the appearance of essentially new, qualitatively and quantitatively, types of armament. In military development there are always certain periods of time when certain combat equipment is the basis of the armament of the army, even though it is constantly being improved. For such a period there exists objectively a completely determined optimum relationship between manpower and technical equipment which is most advantageous from the point of view of effective utilization and economy of manpower and equipment. And if this relationship is not maintained within the framework of the existing forms of organization of the armed forces, then it follows that these forms are not in accordance with the level of military-technical development. Here there are possible imbalances of two kinds--either there is a surplus or a shortage of combat and other technical equipment among the troops. The reasons for these imbalances, as is noted in the foreign military press, may be:

--A shortage of manpower, but with adequate industrial and technical capabilities for supplying the troops with equipment.

--Adequate manpower, but a lack of industrial and technical capabilities.

--Inefficient forms of organization of the armed forces, and also incorrectly established correlation among the branches and arms.

Each of these causes some lack of compatibility in the correlation between men and equipment and consequently constitutes an obstacle to the complete realization of the latest military-technical achievements in the military field.

Only with the optimum correlation between the number of appropriately trained personnel and the quantity of the latest combat equipment in all the branches and arms is there opportunity for the full utilization of the results of military-technical progress; only then can the potential power of the armed forces, founded on the organic unity of men and equipment, be manifested with maximum combat effectiveness in the waging of modern war. Strict observance of this correlation, with the increasing supply of the troops with constantly improved technical equipment, provides the basis for the creation of maximum combat capability of the armed forces and at the same time for the observance of necessary economy of manpower and industrial-technical resources.

Thus the creation of military organizational forms which assure the most advantageous relationship between men and equipment is absolutely obligatory in the process of military development. In other words, the establishment of the optimum relationship between the number of personnel and the quantity of technical equipment in the armed forces, corresponding to the level of military-technical progress attained, is a requirement conforming to objective laws of development in the military field. This provides a basis for the conclusion that in military development of military affairs there operates the objective law of obligatory qualitative and quantitative correspondence between personnel and technical equipment, organizationally combined in the system of the armed forces.

Failure to observe this law in the practice of military development hinders the creation of such armed forces as will correspond in their power to the economic and military capabilities of the state.

Inasmuch as for each given level of military-technical development (fixed for a given period by the types of weapons and equipment existing in the armed forces) there exists objectively a certain optimum correlation between the quantity of personnel and equipment in the armed forces, only within the framework of which is attainable the maximum power of the armed forces, this same correlation is one of the most important factors of the military might of the state together with its human and industrial-technical resources. From this it follows that of two states on approximately an equal level of military-technical development, the stronger in a military sense will be that which is able to create quantitatively superior armed forces, organized on the basis of an optimum correlation between personnel and equipment, taking into account the high combat characteristics of the nuclear weapon. Any deviation from this correlation affects the growth of the military might of the state, since a shortage of personnel cannot be made up for by supplying the

troops with a great quantity of technical equipment, just as an insufficiency of the latter cannot be compensated for by an increase in the number of people brought into the armed forces. In both cases there is a violation of the objectively obligatory relationship between personnel and equipment.

In planning any weapons or equipment unit--a tank, plane, ship, artillery or rocket complex, radio-location station, etc.--there is established an efficient correlation between personnel and equipment, determined by the requirements of the most effective servicing and operation of that unit. This establishes a natural limit to the number of personnel assigned to the equipment. Therefore, the supply of technical equipment to the troops at a given level of military-technical development also has its natural limit for each branch and arm, for each method of armed conflict. And since exceeding this limit does not result in increasing the combat power of the armed forces, increasing it further for mobilized deployment is possible only by increasing the number of troops adequately supplied with the combat equipment. The stronger in war will always be that state, not with the greatest supply of such equipment to its armed forces which its industry can provide, but that which has the greatest number of troops, armed and supplied with the most modern combat and other technical equipment in the necessary and adequate amount, i.e., on the basis of the optimum correlation between personnel and equipment.

The imperialist states, having in view the relationship of forces between the two camps unfavorable to them, especially in manpower, are striving to compensate for shortages in the latter by an ever greater quantity of arms and equipment introduced into the armed forces. The emphasis here is on increasing the mobility and fire power of the military units.

Such a way of achieving military superiority might lead to success under two conditions: first, if the level of military-technical development in the socialist countries were much lower than in the capitalist countries, and second, if the technical supply of the troops could be increased limitlessly without thereby lowering their combat capability. But, as we know, these conditions do not exist. The socialist camp certainly does not lag behind the imperialists in level of military-technical development, and in many important types of weapons the Soviet Union is certainly surpassing them. Its growing industrial and scientific and technical capabilities are assuring a constant supply to our armed forces of weapons and equipment meeting modern requirements. This fact has often been noted in the bourgeois press. The well-known American military historian, Walter Millis, wrote in his book, War and Men, that the US has received repeated evidence of the power of Soviet military equipment. It is in many respects equal to our own, and in some, possibly, superior. If the West has been able to replace men

with new weapons, it would be reasonable to suppose that Russia can do the same, and that whatever military advantage we might gain by this means, it would at best be only temporary." (Walter Millis. Arms and Men, New York, 1958, p 303)

The idea of "replacing men with weapons" very inaccurately reflects reality. New weapons increase the combat capability of men, but do not replace them. In modern war equipment plays an extremely great, ever increasing, role. But along with this the role of men, too, in waging armed conflict is constantly increasing. The more effective the means of combat and the more advanced the technical equipment supplied the troops, the more complicated, responsible and effective become the role of men in combat operations, and the greater becomes their capability of affecting the course and outcome of the conflict. In other words, a growth in the role of the individual man in armed conflict is an inevitable consequence, conforming to objective law, of military-technical progress. Therefore, with the increase of the role of the military-technical factor in war, the requirements for physical and spiritual qualities of men in the armed forces, for their combat and political training, and for their general cultural and intellectual development, not only are not decreased but, on the contrary, are increased.

The highly destructive and maneuverable characteristics of nuclear-rocket weapons and the great degree of mechanization, automation, and plentiful supply of the technical means of command and communications makes it possible to accomplish the necessary maneuver of forces, their rapid deployment, an adequate concentration of fire power and a reliable delivery of the means of destruction to the target with much less effort but with better-qualified people. But in a war against a strong enemy, with extensive territory enabling him to use space and time for the organization of active and passive defense, the maneuver of forces and the mobilization of reserves--a single attack with strategic rocket-nuclear weapons is not enough for a complete victory over such an enemy. Therefore large contingents of men will be needed in all the branches and arms of the armed forces to carry out a great variety of missions on an operational-strategic and tactical level.

In a world nuclear-rocket war, deciding the fate of the two opposing social-economic systems, each of the combatants would face the necessity of mobilizing all his available human and material resources in order to attain superiority not only in quality, but also in quantity of all modern instruments of war.

A nuclear-rocket war would require unheard-of straining of efforts, energy and initiative, the greatest courage, steadfastness and discipline, and the highest possible morale and military spirit on the part of every person in any position. With the transformation of the whole territory of the country, essentially, into a theater of military operations, the

demands on the organizational capabilities of the leading party, political and economic cadres of the country would be exceptionally great. Just as in the past, the knowledge and organizing ability of the command and political personnel of the armed forces and their ability to inspire and lead people into battle in the most unbelievably difficult conditions will play a tremendous part in the attainment of victory.

A very essential characteristic of modern weapons and equipment is the fact that their development as well as their use requires the efforts of many highly qualified scientists, engineers, technicians and workers. The economic, scientific, and engineering-technical aspects of armed conflict are now so great that a high level of training and creative ability of the scientific-technical cadres and the workers of industry has become a most important condition for success in such a conflict.

With the growth of the supply to the army of technical equipment, the role of the masses of the people in the achievement of military-technical superiority over the enemy before the war and during its progress steadily increases. The more complex and improved the weapons and technical equipment of the troops, the higher and the more varied are the demands on the personnel in the armed forces. The quality of personnel -- their general cultural level, their combat and military-technical training, and their morale and military spirit -- must meet the high requirements brought about by the nature of modern war and the tremendous combat capabilities of modern technical equipment.

The revolution in military affairs is being carried out by people, and to them remains the decisive role in the utilization of all the possibilities being opened up by this revolution. Along with the sudden growth of the military-technical factor, the decisive role in war will, as in the past, belong to the economic and social-political factors. No matter how high the level of military-technical progress, the basic, objective law of war, formulated by Lenin, will not cease to operate: "He will gain the victory in war who has the greatest reserves, the greatest sources of strength, and the greatest support among the masses of the people." (Collected Works, Vol. 30, p 55). It is perfectly obvious that the expression, "sources of strength and reserves," includes, along with human resources, all types of the latest combat equipment, including nuclear-rocket weapons and that without military-technical superiority over the enemy, achieved before the beginning of the war and maintained throughout its progress, victory in modern war cannot be assured.

Weapons of tremendous destructive power have not justified the hopes of the imperialist militarists, who counted on it to relieve them completely of any dependence on the will and public opinion of the masses of the people in carrying out aggressive military adventures.

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Since the latest types of armament and combat equipment and the mass of conscientious people, full of initiative, who have completely mastered them constitute an organically united material basis for the waging of war, the problem of military-technical superiority does not exist, and cannot be considered, outside this unit. Consequently, it also cannot be considered outside those very closely connected economic and social-political conditions in which take place the industrial and military activities of people.

The moral-political and military qualities of the workers of the socialist countries, called into the armed forces, are incomparably higher than those of the soldiers and sailors of the imperialist countries. This indisputable fact was repeatedly proven by the victorious military experience of the Soviet armed forces. In attaining military-technical superiority, in solving the most important problems of modern war, which "also necessarily demand highly qualified human material, just as does modern technology" (Lenin, Collected Works, Vol. 8, p 35), the socialist countries have a decisive, immeasurable, and indisputable advantage over the imperialist states.

In modern war, as never in the past, the ability of a state to assure the military-technical superiority of its armed forces is determined basically not only by a high level of industrial-technical development and an absolute volume of production, but to a decisive degree it depends also on the nature of the social-economic and political structure of the state. It is perfectly obvious that an economic system, developing on the basis of social ownership of the means of production, constantly increasing the tempo of its development, planning not only within the limits of one country but also on the scale of a number of countries united by a single socialist goal and a fundamental community of interests, not experiencing crises and anarchy of production--that such an economic system naturally has a tremendous advantage over capitalism. This advantage is a decisive factor also in the attainment of military-technical superiority.

Facing the aggressive imperialist powers, who are striving to unite their efforts to attain military superiority over the world socialist system, a comprehensive expansion of the economic relations among the countries of socialism and a strengthening of the close friendship among them is an objective necessity. Therefore the Central Committee CPSU justifiably condemned the so-called theory of "reliance on one's own powers" as having nothing in common with the principles of socialist internationalism. The policy of "reliance on one's own powers", which proposes the creation of self-sufficient national economies, for which economic relations with the other countries of socialism are limited to trade, represent an attempt to undermine the unity of the socialist community and its economic and military strength.

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Military-technical superiority originates in economics, in the economic system, which develops according to its own specific laws. The capitalist economic system has as its goal the increasing of profits for the enrichment of the exploiting upper classes of society. The basic goal of socialism is the maximum satisfaction of the needs of all the people. Scientific and technical progress and the progress of industry under capitalism leads to a sharpening of the class conflict; under socialism--to the strengthening of the psychological-political unity of society.

The world socialist system, beyond any doubt, has greater sources of strength, greater reserves, and greater endurance in the mass of the people as compared with the capitalist system. The military-technical superiority over the US achieved by the Soviet Union is an impressive factor in containing imperialist aggression and an important condition for the achievement of victory in war, if the imperialists should start one. However, this circumstance should not become grounds for self-satisfaction or complacency. In a military respect, the camp of imperialism represents a strong and crafty opponent, forcing on us an arms race and a bitter struggle for military-technical superiority.

The favorable prerequisites being created by the socialist system do not in themselves automatically solve the problems of maintaining military-technical superiority; this is accomplished by constant strained efforts of people, both in producing the necessary quantity of modern combat equipment and in mastering the use of such equipment and using it in armed conflict. The achievement of military-technical superiority is a problem not only for economics, industry, science and technology, but also for military art. The best armament and technical equipment of the army will not bring victory if they are not used in complete conformance with the laws of armed conflict, if the methods and forms of the use of weapons do not correspond to their combat characteristics and capabilities; i.e., if they do not meet the demands of modern military science and military art.

After science and industry have produced combat equipment excelling in quantity and quality that of the enemy, and this has become part of the armament of our forces, the decisive role in establishing and maintaining military technical superiority throughout the war and making it a real factor in the achievement of victory belongs to the military organization of the state, to military science, to combat training, and to the readiness, morale, and military spirit of the armed forces.

For the Soviet Union, just as for the other socialist states which are under the military threat of imperialism, it is extremely important to keep up sufficiently effective armed forces and constantly maintain military-technical superiority with a minimum expenditure of the financial-economic means and the manpower necessary for use in a rapidly developing

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national economy. In connection with this, the task of optimum solutions of all the problems of military development, military planning and the organization of troops becomes especially urgent.

In its modern form and scope, this task may be accomplished on the basis of wide use of mathematical methods of research of military phenomena. The use of electronic computing equipment in military development and planning makes it possible to produce multi-variant calculations which radically facilitate the selection of the most advantageous, optimum variant of military organizational structure of the armed forces as a whole, and also the solution of problems of the most advantageous qualitative and quantitative relationship between the branches and arms, as to what should be their relative weight in the general system of military organization in accordance with their defined military missions and the combat equipment which they have in their armament.

The law of obligatory qualitative and quantitative relationship between personnel and equipment in the troops provides a direct theoretical basis for the mathematization of the process of military development. The objective necessity of establishing an optimum organizational structure of the armed forces arises directly from this law, since only in it can there be realized a complete correspondence of personnel and equipment, based, as noted above, on an optimum correlation between them.

The determination of the appropriate military-technical and military-economic criteria necessary for programming the work of computers, being a subject for special research, does not enter into the scope of this article. We will point out only one of the possible approaches to this problem. As Academician V. Nemchinov says, for the use of computer problem-solving techniques in the field of the national economy, definition of economic indices and categories must be carried to such a degree of accuracy that they would be expressed in strict mathematical form and quantitative definition and thus be suitable for transmission into the input unit of a computer. (Pravda, 20 July 1962) It would be completely possible to form such kind of quantitative definition from the absolute and relative indices expressing the quantitative and qualitative characteristics of the branches and arms, such as their fire power and striking force, mobility and maneuverability, combat capability and combat readiness, controllability and ability to survive, and also the conditions of training and indoctrination and the living arrangements of the troops.

In evaluating the combat capabilities of the armed forces, of great importance, for example, is the relative index of the mobility of the troops, their capability of rapid maneuver, and the ratio of the quantity of motor and air transport, taking into account seating capacity and speed, to the number of personnel. However, for any branch or arm the main index of its combat effectiveness and technical supply is the

absolute and relative magnitude of its fire power. This all the more true for nuclear-rocket weapons which are a single complex of fire power and means of delivery, and in view of their tremendous destructive power, have a limit of accumulation attainable in our time.

Relative fire power is essentially the fire power in a gun crew per each man and therefore has a perfectly exact mathematical expression, suitable for transmission to the input unit of a computer. In combination with other important indices (both absolute and relative) which characterize all the other combat characteristics of branches and arms and also with the use of the established table-of-organization units of the combat composition of troops, there is a complete basis for the selection of the necessary mathematically determined indices for working out corresponding models and programming the operations of computers.

Of course the computer by itself cannot give a complete and comprehensive solution to the problem of creating an optimum military organization and of optimum military planning. But it can give in the shortest time a sufficient number of variants of the solutions of these problems, facilitating the selection of the most advantageous optimum variants which provide for maximum strength of the armed forces with minimum expenditures of means and resources.

For the maintenance of constant and undiminishing military-technical superiority over the enemy it is absolutely necessary to consider carefully the general trends of development of science and technology, and especially to study carefully foreign military technology and the directions of its development. Here it is especially important always to keep in mind the possibilities of using the factor of technological surprise, which with the modern level and tempos of the development of science and technology are very rapidly increasing.

It is known that the US is striving to provide all branches and arms of the armed forces with an ample supply of nuclear weapons by a very substantial expansion of the range of TNT equivalents of nuclear bombs and warheads. In 1962/63 fiscal year, according to a statement by Secretary of Defense MacNamara, the US planned to spend \$15,000,000 for nuclear armament. The plans and already-begun projects of the American militarists encompass all possible areas and means of combat activities, from armed conflict for "supremacy in space" to equipping primary troop podrazdeleniya with nuclear weapons. Our probable enemies have very substantial industrial and scientific and technical capabilities which they are using for the creation of new means of combat.

It is important to keep in mind constantly that the Western states, trying to compensate for lagging behind the Soviet Union in the development of rocket technology, are paying great attention to the development of chemical, biological, radioactive, and other means of mass destruction.

CPYRGHT

The problems of augmenting efforts in a battle and in an operation have always been in the center of attention of practical workers and theoreticians in military affairs: they have been given a prominent place in field and combat manuals and in various theoretical studies.

The necessity for augmentation of efforts arises from the various and complex missions carried out by troops in a battle, an operation, and in armed conflict as a whole. The nature of these missions and their scale require from the troops simultaneous efforts, or efforts in sequence. Usually it is not possible to carry out missions in an operation using only the original operational formation. As a rule there arises the need to change the operational formation by strengthening already formed groups, by carrying out a suitable maneuver, by regrouping forces and materiel, by bringing them up from the depth of the country or the theater of operations, i.e., by augmenting efforts at the place where it is needed and at a definite time.

This situation is observed not only on the tactical or operational level, but on the strategic as well.

The augmentation of strategic efforts was called for by the need to achieve superiority over the enemy in forces and materiel, or, at least, by the desire to maintain the capabilities of the operating groups and the existing relationship of forces, in order to effectively carry out the missions of armed conflict in a given theater of military operations. In the very fact of the original strategic concentration and deployment of forces usually lay the essence of the augmentation of strategic efforts, which could be effected, for example, by bringing up newly mobilized *soyedineniya* and *chasti* from the interior of the country.

In a general sense, the concept of "augmentation of strategic efforts" means the capability of a given state or coalition of states to increase the strength of its resistance and at any given moment of the war to be stronger than the opposing side, skillfully using all its resources, all its economic, psychological-political, and military potential.

What are the sources, directions, constituent elements and degree of augmentation of strategic efforts? What indices determine this phenomenon of armed conflict in modern conditions?

The experience of the world wars provides rich material for the illustration and theoretical analysis of these indices. Thus the following indices were and, we are convinced, will be in the future, the effective sources or premises for augmentation of strategic efforts of states during a war:

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-- an increase in military-industrial production as a whole on the basis of utilizing the economy of the country and technical progress; an increase in the output of armament and creation of new models of armament;

--- a growth in the total numerical strength of armed forces and of the number in them of basic soyledineniya, weapons, and combat equipment;

--- the existence and the establishment of strategic reserves of armed forces and of materiel and technical means for uninterrupted supply of the operating troops in the theaters of war.

--- the capability of all types of transport to handle an ever-increasing volume of transportation of troops and freight to the theaters of military operations in the period of immediate preparation for war and during the war.

--- a growth in the number of military-trained cadres and a well-ordered system for accelerating their training.

-- an efficiently organized higher military leadership, capable of effectively utilizing the material possibilities and the political-psychological state of the personnel of the armed forces in decisive periods of the war for the attainment of victory.

As is obvious from the above list of indices, the sources of augmentation of strategic efforts do not fit within the framework of military art; economic, psychological-political, scientific-technical, and other factors are present here. The sources listed, it seems to us, might be the constituent parts of three basic interrelated (and only conventionally separated one from another) directions (or fields) of the augmentation of strategic efforts.

These fields are the following: military-economic, including a wide range of problems, from the military-economic potential of the country as a whole to the supplying to theaters of operations of weapons, technical equipment, food, fuel and other supplies; scientific and technical, creating the theoretical and the industrial bases for the appearance of new kinds and types of weapons (tanks, jet planes, radar, rocket and nuclear instruments of destruction, atomic submarines, etc.); and finally, the military-organizational field, which in the general plan provides, in particular, for the augmentation of strategic efforts by the strategic maneuver of forces and materiel, utilization of reserves, creation of new strategic groups, opening up of new fighting fronts, increasing the number and the combat personnel of the armed forces, etc.

In the system of fields listed above, the economic capabilities of the country and its achievements in science and technology -- its military economic potential -- are decisive. Without them no kind of augmentation

of efforts in a war is possible. However, this is most concretely revealed in the sphere of armed conflict; this is where are manifested the results of the efforts of the political leadership of the country in the utilization of economics and scientific and technical thought for the all-round supply of the growing needs of the armed forces in war. So, without going into a detailed study of the first two fields, let us examine more in detail the third.

An obvious concrete indicator of one of the sources of the augmentation of strategic efforts is the successive increases in the number of armed forces in comparison with their original peacetime composition, or with that of the first months of the war. The change in the number of armed forces of certain states during the preparation for and in the course of World War II is shown in Table 1.

Table 1

<u>Countries</u>	<u>Numerical strength of armed forces (in thousands)</u>			
	1939	1940	1941	1945
Germany	4600	5600	7200	10,938
Great Britain	2223	3291	3291	4,683
USA	341	411	901	12,245

The possibilities for the augmentation of strategic efforts is graphically shown by the quantitative increase in various arms and combat technical equipment -- for example, in the air forces (Table 2) and in the navies of these same countries.

Table 2

<u>Countries</u>	<u>Increase in the air forces</u>					
	1940		1941		1945	
	Personnel (in 1000's)	Planes	Personnel (in 1000's)	Planes	Personnel (in 1000's)	Planes
Germany	757	6,000	1,350	6,500	1,726	7,000
Great Britain	118	2,300	665	6,900	963	12,000
USA	84	2,300	--	---	2,340	34,000

In the British navy in 1939-40 there were 373 combat ships, and in 1945, 1172. For the corresponding years in the US navy there were, respectively, 387 and 1442 ships.

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Naturally, in addition to materials, equipment and weapons, military-trained personnel are required, which is one of the main sources for the augmentation of strategic efforts.

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By the beginning of World War I Russia had 5,650,000 trained reservists. This was considered completely adequate for successfully carrying on a war. However, by the end of 1914 it was already necessary to call up for mobilization 5,115,000 men; i.e., the supply of trained reserves was practically exhausted. In 1915 an additional 5,010,000 men were mobilized. Altogether during the war Russia mobilized 14,000,000 men, not counting the regular army at the beginning of the war. (P. V. Sokolov. War and Human Resources. Voenizdat, 1961, p. 53)

A similar situation existed in the other belligerent countries. Table 3 (Ibid.) gives a graphic representation of the augmentation of efforts and the replacement of losses by reserves.

The experiences of the wars shows that the number mobilized is usually two to three times the number of trained reservists at the beginning of the war.

Along with the quantitative aspect of the augmentation of strategic efforts, the qualitative aspect has assumed great (and in some cases primary) importance. In the army, fighting a just war, high morale and political awareness superior to that of the enemy, well-knit combat organization of ob'yedineniya and soyedineniya, and efficient and flexible operation of the organs of command exerted very substantial influence on the augmentation of efforts and the attainment of victory. It should be emphasized that also the improvement of the combat characteristics of various kinds of weapons and the appearance of qualitatively new armament (tanks and planes of new systems, rocket artillery, etc.) to a great degree led to the achievement of superiority over the enemy. It is generally known that Soviet tanks and artillery were superior to the similar weapons of Fascist Germany.

It is true that the qualitative changes in weapons and combat equipment did not lead to the achievement of victory on the strategic level, but they may have contributed indirectly by gains on the tactical and operational levels, and thus later affected the strategic results of the armed conflict.

Let us stipulate in advance that now the very concept of "augmentation of strategic efforts" has acquired a somewhat different meaning. Actually, as a result of massed use of nuclear-rocket weapons and other means of destruction, which obviously will inflict serious losses on the belligerents, it is hard to imagine that subsequent efforts by either side will prove to be more powerful than the preceding ones, especially the initial one.

Replenishment of Armed Forces by Reserves (in millions)

Countries	World War I			World War II		
	Popul- ation	No. mobi- lized	% of mo- bilized to population	Popula- tion	No. mobi- lized	% of mobi- lized to population
Germany	67	13.3	19.7	69.3	17.0*	24.5
USA	100	3.8	3.8	131.7	14.0	10.6
Britain (with- out dominions & colonies)	46	5.0	10.8	47.8	6.0	12.6
France (with- out colonies)	39	6.8	17.2	42.0	5.0	12.0

*Including some contingents of Austrians, Frenchmen, Poles, Czechs and other peoples of countries occupied by Germany.

Nevertheless there is required certain efforts on the part of the political and strategic leadership of the country or coalition of countries directed toward maintaining, by consecutive commitment to action of various forces and instruments of war, the superiority over the enemy existing from the beginning of the war, or achieving subsequent strengthening of their groups of armed forces for the most rapid execution of the strategic missions of the beginning period of the war.

In explaining the idea of "augmentation of strategic efforts in modern conditions," we proceed from the following principles of Soviet military doctrine: first, recognition that even in modern war massive armies are required; second, the position that victory over a strong enemy can be achieved by the joint efforts of all the basic types of armed forces with close cooperation among them, and with the decisive role of strategic rocket troops.

Obviously, in elucidating the essence of the idea we are examining, it is necessary to take into account the differences and the specific characteristics of the different types of armed forces. In particular, the idea of "augmentation of strategic efforts" as applied to strategic nuclear weapons means their constant readiness to inflict repeated blows on various enemy targets, especially his means of nuclear attack. The strength of subsequent blows may turn out to be much less than that of the first ones; however, the capability of inflicting them contributes as a whole to an augmentation of the totality of nuclear effectiveness against the enemy.

Therefore, if we are talking about the use of strategic nuclear weapons, the position expressed, it seems to us, should be understood not in the sense of an increase in the force of each successive attack in comparison with the preceding one, but as an augmentation of the total power of all the nuclear attacks as a result of their being launched one after the other. Such an augmentation of the power of rocket and nuclear attacks makes it possible to constantly maintain the strategic initiative, which we will speak about in somewhat more detail below.

With regard to the "augmentation of strategic efforts" as applied to Ground Troops, PVO strany troops, the Air Forces and the Navy, it seems to us that, despite the existence of nuclear weapons in their organization, the augmentation of strategic efforts for these forces will be achieved mainly by a quantitative increase and a qualitative improvement of their forces and equipment. A similar position is noted in the military doctrine of all the major powers of the world and in theories of military strategy. In them is foreseen the necessity of creating massive armed forces and subsequently increasing their numerical strength by mobilizing and deploying in theaters of military operations large strategic groups by the beginning of the war and during its beginning period.

The term, "augmentation of strategic efforts," we must assume, will keep its former meaning (when subsequent attacks exceed previous one in their force) in a case where the warring sides are drawn into a nuclear war gradually--let us say, after some military conflict, local war, etc. In such a case the augmentation of strategic efforts is possible by a continuously increasing inclusion of troops and materiel in military operations.

Finally, we note that we consider a third peculiarity of the use of this term in modern theory of strategy. While it is difficult to imagine the most "classic" form of the augmentation of efforts in the war as a whole, specifically this form may occur in the study of the military operation in one of the theaters where the operations develop in the course of the war.

The problem of the augmentation of strategic efforts in modern conditions, just as formerly, has two sides--the qualitative and the quantitative. Both are closely inter-related, but for convenience and depth of understanding, let us consider them separately.

The qualitative side is connected with the preparation of armed forces still in peace time and is the most economical, and consequently the most essential. It includes the qualitative improvement of the weapons and combat equipment, the attainment of military-technical superiority over the enemy on the basis of very rapid development of modern science and

technology. Among factors involved in the qualitative side of augmentation of efforts are combat readiness, higher than that of the enemy, and well-knit organization of ob'yedineniya, soyedineniya, and organs of command, and their great mobility, and capability of executing a rapid maneuver.

The problem of qualitative augmentation of efforts primarily depends on a conscientious attitude of personnel toward carrying out combat missions--in the final analysis, on their moral-political attitudes, their readiness to sacrifice themselves in the name of the great ideals of Marxism-Leninism. Brought up on Leninist ideas, the soldiers of the Soviet Army and the armies of the other socialist countries are capable of assuring the high combat readiness of the armed forces. There are many instances from the history of the wars when, thanks to high moral, steadfastness and combat organization, soyedineniya and ob'yedineniya achieved superiority in a battle or operation over a numerically superior enemy. In modern conditions nuclear-rocket weapons enable even individual smaller units to actively carry on the fight with the enemy.

There remains the other side of the augmentation of strategic efforts --the quantitative increase in the number of soyedineniya, of operational rocket installations, of planes, of ships of various classes, of the supplementary forces and materiel of the PVO troops and PVO strany troops, and the increase of the material and technical means which provide for the carrying on of armed conflict.

Both aspects of the augmentation of strategic efforts are closely connected with the whole system of building up and preparing the armed forces for war. During the preparation there takes place in good time an accumulation of various reserves: material and technical means, various weapons, ammunition, and, in addition, trained military cadres. The composition and quality of these reserves must provide for the complete mobilization of new formations in short periods of time, and also thereafter, the timely replenishment of ob'yedineniya and soyedineniya which have suffered losses at the beginning of the war.

In the matter of the degree of augmentation of strategic efforts, this depends, in our opinion, on such factors as the situation and immediate prospects for development of the military-economic potential of the country, the table-of-organization structure of the basic components of the armed forces, the smooth and efficient organization of the system of control of forces and equipment in the armed forces and in the government as a whole, and, finally, on the moral-political attitude of the personnel and the combat readiness of units of the armed forces.

The modern conception of augmentation of strategic efforts does not have to be bound up with just a simple quantitative increase of forces and materiel, by which to attain quantitative superiority over the enemy,

though this is an important aspect of the problem. It is connected with such successive commitment of new forces and materiel to armed conflict as would maintain the strength of existing groups and a favorable correlation of forces, or would provide for the launching of attacks by these groups, with the neutralization of various strategic targets in the different theaters of operations, and of superior forces and materiel of the enemy in a given sector. Implied here is the expedient use of the combat characteristic of the various arms and their close coordination on a strategic level.

Thus there enters into the concept of "augmentation of strategic efforts" a complex of strategic measures leading to a quantitative and qualitative strengthening of strategic groups and making possible the launching against the enemy in short periods of time of simultaneous or successive attacks with nuclear and conventional weapons, the seizure and maintenance of the strategic initiative, and the achievement of a substantial superiority over the enemy in the interests of effectively carrying out the strategic missions of the beginning period of the war.

The augmentation of strategic efforts in a modern world war, obviously, is a coalition problem, since it is impossible to solve this problem on a scale of just the armed forces of single nations, especially if the states involved are limited in size and capabilities. A constant and dependable augmentation of efforts is within the power of a state or a coalition possessing great economic and military capabilities and having a variety of state and strategic reserves for the constant replenishment of the armed forces with everything needed.

From the nature of modern war it follows that the use of nuclear-rocket weapons as a decisive means of armed conflict makes it possible to achieve immediate strategic goals in a short time in the beginning period of the war.

The most probable way of unleashing a world war, as they write about it in foreign countries, may be by a sudden attack with strategic nuclear weapons against targets in the border zones and in the interior of the country. At the same time one must expect that there will be drawn into military operations all other kinds of armed forces in the land and sea theaters, on a global scale.

Under such conditions only a high state of combat readiness of the peace-time armed forces and their ability to repulse and frustrate the first nuclear strike of the enemy will make it possible to begin the first operations of the branches of the armed forces, seize the strategic initiative, and create favorable prerequisites for further waging of the war.

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Executing the missions of the beginning period of the war may be accomplished by strikes with strategic nuclear weapons, and the conduct of strategic operations in continental and ocean theaters of operations with the participation of all the basic branches of armed forces and with the decisive role of strategic rockets. The nuclear strikes and the active military operations, obviously, will encompass the territories of all the countries making up the enemy coalition, as well as ocean areas.

Naturally, each of the warring sides in the very beginning period of the war will successively have to commit its forces to action, both those existing in peacetime as well as those mobilized before the war or at its beginning; i.e., there will be required a systematic augmentation of efforts of strategic groups of the armed forces. In the light of this, obviously, there will arise the necessity first of all to strengthen from the beginning of the war the troops of the first strategic echelon by transferring forces and equipment to the zone of military operations from the neighboring regions, and subsequently from the depth of the theater or even from other continents (as, for example, the US military command is planning).

From an analysis of the nature of modern war it is evident that a constant and rapid augmentation of strategic efforts will be one of the essential factors in the execution of such missions of the beginning period as, for example, the seizure and maintenance of the strategic initiative.

The seizure of the strategic initiative in the initial period of the war is usually connected with the surprise use by the aggressor of forces and equipment and the opening up of military operations on a wide scale. The experience of wars graphically emphasize this principle. For example, as a result of a surprise attack of the German-Fascist troops on Poland, Yugoslavia, Greece, Norway and other countries at the beginning and during World War II, Germany's military command seized the strategic initiative and achieved a quick victory over the armed forces of these countries.

The sudden and treacherous attack of the German armed forces on the Soviet Union in June 1941 likewise enabled the German command to seize the strategic initiative and achieve a major initial strategic success. The enemy maintained the initiative in strategic operations for a long time. The Soviet Supreme Command and the Armed Forces had to wrest this initiative from the hands of the aggressor under difficult conditions and in a stubborn struggle. It required almost a year and a half for a break in the strategic situation in our favor. As a result of the great battle on the Volga in the period from August 1942 to January 1943 when large forces of German-Fascist troops were defeated and taken prisoner, there was provided a beginning of a transfer of the strategic initiative into the hands of the Soviet command.

But the seizure and maintenance of the strategic initiative in the initial period of a modern war will, obviously, be incomparably more difficult. A sudden and massed use of nuclear weapons by the enemy even under conditions of an effective repulse of this strike and the infliction of an immediate strike upon the enemy, cannot completely guarantee, we must assume, against major destruction of economic and military targets and losses in the armed forces and among the population. Therefore, with a sudden beginning of a war by the enemy, seizure and maintenance of the strategic initiative will proceed in the very complex circumstances of a war begun with mutual losses on both sides.

The great destruction and losses from nuclear-rocket weapons in the very first hours of the war will result in the necessity of replacing the groups of armed forces in the theaters of operations. Accordingly, the problems connected with the accomplishment of augmentation of strategic efforts and the attainment of superiority over the enemy in the initial period of the war will retain, it seems to us, real importance even under conditions of nuclear war.

In our opinion, after the timely frustration of the first attack of the enemy and the infliction on him of a crushing rocket and nuclear attack in return, there will be required very aggressive activity by the existing forces and equipment deployed in the theaters of operations at the beginning of the war, and likewise of those arriving from the border regions and from the interior of the country, which will first of all promote the maintenance of the strategic initiative. This increase of efforts will make it possible to successfully carry out the operations of the initial period of the war in the main theaters of operations--continental and oceanic.

Thus the initial augmentation of strategic efforts is intended for retaining the strategic initiative of operations from the beginning of the war and at the same time is directed toward the achievement of subsequent or simultaneous execution of strategic missions in the initial period of the war.

Let us examine what, in our opinion, are the basic elements of the augmentation of strategic efforts. They are as follows:

The maneuver of strategic rocket weapons for the augmentation of strategic efforts is a completely new form of maneuver. No army in the world has yet any experience with the mass use of nuclear-rocket weapons. Nevertheless, a decisive part in the augmentation of strategic efforts has been attributed to them. The augmentation of efforts by strategic rocket weapons may be accomplished by a maneuver of trajectories or by redeploying part of the rocket weapons to the necessary sectors (theaters of military operations). The great speed of rockets, the possibility of extensive changes in their trajectories and of repeated launchings,

independent of weather conditions, makes it possible to attain most rapidly the greatest effect in the augmentation of strategic efforts, especially, it seems to us, in the initial period of the war.

The maneuver of strategic air forces and of rocket-launching naval forces is likewise a very effective means of augmentation of strategic efforts. This maneuver is accomplished by re-directing planes in the air, or by re-deploying them from one air-fields network to another. At the same time one must take into account the great vulnerability of modern aircraft to weapons of active anti-aircraft warfare. However, under certain conditions of war the strategic air force may be a most dependable and effective means of augmentation of strategic efforts. This may be especially true when the enemy has started the war without resorting to nuclear weapons. In such a case the augmentation of efforts will mainly take the same form as in past wars, by the use of conventional weapons.

Rocket-launching forces of the navy, like the air forces of a front, under certain conditions are able, in our opinion, to make a substantial contribution to the augmentation of efforts.

The maneuver of forces and materiel of branches of the Armed Forces from one theater of operations or strategic sector to others, especially by maneuver of land forces, air forces, and naval forces (especially rocket-launching submarines), and also the maneuver of strategic reserves, is an old form of maneuver, extensively used in the past, and at the same time one complicated and very difficult with regard to scope and scale under modern conditions. Such augmentation of efforts is carried out for the creation of new strategic groups and a new strategic front of armed conflict or for the purpose of strengthening existing strategic groups.

The experience of wars, particularly of World War II, has shown that skillful use of the partisan movement in occupied territory is an important element in the augmentation of strategic efforts. The goal of organized attacks of partisans is to inflict damage to the military-economic potential of the enemy, to disrupt his commercial and operational transportation, and to draw sizeable forces away from the main battle front by combined attacks against rear targets of the enemy and against his strategic groups. Naturally, all these operations are carried out on the basis of a general plan of armed conflict in a given theater of operations.

The active operations of Soviet partisans in the rear of the enemy during World War II are generally known. Hitler's command was forced to divert several tens of divisions to fighting the partisans and to weaken his groups on the Soviet-German front. As Gen. Eisenhower recognized, after the invasion of France in 1944 by the British and Americans, the French partisans with their operations took the place of up to 12 divisions.

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Partisan warfare may assume especially large portions in areas contiguous to the main theaters of military operations.

The use of the armed forces of states which have entered the war after its beginning on the side of a certain coalition may play a substantial role in the whole system of augmentation of strategic efforts. For example, during World War II, when Rumania, Bulgaria and Hungary were put out of the war, their armed forces were drawn into the fight against the German-Fascist troops. However, this situation, in our opinion, may occur only under very favorable conditions.

Most probably the joining of the coalition by such states would have a purely symbolic character, since the augmentation of strategic efforts by the armed forces and materiel of these new allies will prove to be very minor. The moral effect of such joining might be exceptionally great, and it would serve as a positive example to other states who were in a vacillating position.

One should take into account the potential resources and the advantages of strategic position of the territory of countries which have joined the coalition--the existence of various kinds of strategic raw materials, the possibility of bases for the air or naval forces of the coalition--and at the same time try to prevent the enemy from using these possibilities in his interests. In all cases there is required a realistic consideration of the existing international situation, so as to avoid a situation where the joining of the coalition by the new allies would entail a deterioration of the strategic situation of the whole coalition.

Measures for weakening the active strategic groups of the enemy by partial or complete isolation of them from the rear, destruction of strategic reserves, and an aggressive fight to destroy his ocean, sea, air and land communications occupy a prominent place in the general system of augmentation of strategic efforts.

This method of attaining superiority over the enemy leads to an augmentation of strategic efforts, as it were, indirectly, since this takes place not as a result of a qualitative and absolute quantitative increase of one's own forces and materiel, but as a result of weakening the enemy, achieved by a sharp curtailment of his bringing up of reinforcements and of reserves in general.

Finally, a very important source for the augmentation of strategic efforts is the skillful manipulation of the existing material-technical means by redistributing them among the groups of armed forces in the theaters of operations and bringing them up from the rear of the country. This is necessary not only for the supply of sovedineniya and ob'yedineniya arriving in the theaters of operations, by way of augmentation of strategic efforts, but also for the replenishment of materiel, especially of nuclear ammunition, to the operating groups of the armed forces.

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Thus, an analysis of the nature of nuclear war and of its initial period, and also of the possible strategic missions which can be accomplished in this period, logically leads to the necessity of augmentation of strategic efforts. The basic elements of such augmentation are the maneuver of nuclear-rocket weapons and of forces and materiel of the branches of the armed forces.

Each of the elements of augmentation of strategic efforts listed in this article is a subject of special study and is of very great importance for the further deep study of the nature of the initial period of modern war. The problems connected with the augmentation of strategic efforts are assuming great theoretical and practical importance.

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By Col Gen Avn O. TOLSTIKOV

The appearance and rapid development of nuclear weapons and their means of delivery against targets radically changed the role and importance of civil defense in strengthening the defense capability of the country. This was the result in the first place of changes in the strategic objectives of armed attack. In the past, it was necessary to destroy the enemy's armed forces in order to force an enemy to capitulate. This was the primary objective of strategic plans. Under conditions attending a nuclear-rocket war, foreign military leaders add to this strategic objective the factor of armed force against the most important economic, and administrative and political centers and the task of completely disorganizing the administration of the national economy and demoralizing the population in the principal economic areas if not in the entire country.

The glorious Armed Forces guard our country against the attack of imperialist aggressors; they are always ready to give a crushing strike against any enemy which dares to attack the Soviet Union and the countries of the socialist camp. The might of our Armed Forces which have available the most perfect rocket and nuclear and other modern weapons is known to the entire world. Their power is directly dependent on the complete readiness and efficient operation of the rear of the country. Therefore, the creation of conditions for its vital activities during a nuclear-rocket war is at present a very important state mission. That is precisely why our party and government pay great attention to civil defense, to strengthening the Armed Forces and enhancing their combat readiness, and to conducting country-wide defense measures intended to protect the population and increase the stability of the national economy, including agricultural production, primarily against the effects of nuclear weapons. It is difficult to overestimate the importance of these measures and consequently the role of civil defense in questions of preparing the country for that situation which would occur were a war to be unleashed against the USSR.

During a nuclear-rocket war, not a single measure related to the defense of the urban and rural population or to the operation of industry, communications, or transport, could be executed without considering civil defense requirements. It has been called upon to create conditions required for the normal operation of organs of state control under that complex situation which could arise in the country at the very onset of war. The solution of many military problems depends to a degree on the thoroughness of the manner in which civil defense measures are carried out. These problems include mobilization, preparing reserves, ensuring the successful conduct of operations by armed forces, damage control measures following nuclear attack, and certain others.

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CPYRGHT

the population and ensuring the stability of the economy is not new. These measures were executed by Civil Defense when it was called Local Air Defense during World War II. Civil Defense has always directed its efforts to increasing the defense capability of our country. The defense and rescue measures which it conducted facilitated the defense of the stable operation of rear installation against German-fascist occupation troops during the years of the Great Patriotic War. Civil defense personnel under the supervision of party and Soviet organs persistently and selflessly struggled against the effects of enemy aerial attack, restored industrial enterprises and communication lines destroyed by bombardment, extinguished fires, and rendered medical aid to the population.

Many local air defense formations at the front lines during the war, hand in hand with the soldiers of the Soviet army, retained the honor and independence of our Motherland. For their heroism, thousands of militant personnel and civil defense commanders were awarded orders and medals of the Soviet Union. The civil defense organization of the heroic city of Leningrad was awarded the Order of the Red Banner. However, during the last war, civil defense measures as compared with modern requirements for the defense of the population had a restricted nature. They were conducted only in large cities and at certain, very important installations located within the range of operation of enemy aircraft. These cities and installations, as is known, were comparatively few and the planning of civil defense measures had an exceptionally local nature. The plans of civil defense for cities and installations were not related since it was thought that they were able with their own forces and means to conduct damage control following an aerial attack. Therefore, the supervision of the civil defense operations or local air defense operations, as they were previously called, was decentralized.

All this can be explained only by the fact that the level of development of attack weapons of the Hitlerite air force did not at that time urgently require a change in the nature or the volume of civil defense measures or the system of controlling civil defense or local air defense. Strikes against rear installations were delivered by the enemy only by means of aircraft whose range was not great as compared to modern attack means. Therefore, it was absolutely not required to divert state funds, for example, for the construction of numerous protective structures or for the conduct of other civil defense measures in the depth of the country. It was completely understandable that during this period, civil defense or local air defense was not called for in the strategic plan.

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CPYRGHT The nature of modern warfare and its conduct are assigning new and ever more serious missions to the country's civil defense. The basic principles of its conduct which were completely spelled out in the CPSU Program, the decisions of the 22d Party Congress, and the basic tenets of Soviet military doctrine are radically changing. The Party Program said that the CPSU considers the defense of the socialist fatherland, the strengthening of the defense of the USSR and the might of the Soviet Armed Forces as the devoted duty of the party and the entire Soviet people and as the most important function of the socialist state.

The Communist Party and the Soviet government not only have assigned civil defense ever new and responsible missions but they have given it a harmonious organizational structure. Modern USSR civil defense is a system of country-wide defense measures to be implemented in advance for the purpose of safeguarding the population, enhancing the stability of the economy against the effects of weapons of mass destruction, and also for the purpose of implementing rescue and priority emergency restoration work in damage centers.

The country-wide nature of civil defense lies in the fact that its measures presently are executed not in certain cities as was the situation during World War II, but throughout the entire country. The interests of the cause of defending the country require that each city, each workers settlement, and rural populated point be readied for civil defense and that each Soviet citizen have firm skills and knowledge required for defense against the devastating effects of modern weapons. This is one side of the matter. The other lies in the fact that in order to implement civil defense missions both in peacetime and in wartime, not only civil defense staffs and services but all organs of state power must be concerned: Councils of ministers, departments, sovnarkhozes, organizations, and establishments. Based on the instructions of the party and government and also on the recommendations of civil defense organs they are obliged to be concerned in a practical manner with the problems of guaranteeing the defense of the population and also the materiel to carry out this responsibility. This distribution of responsibility for the supervision of civil defense makes it possible to take into account in the best manner the peculiarities of each republic, oblast, city, rayon, or installation.

Moreover, modern warfare requires that all organs of state and national economic control be basically readied for operation under the complex conditions of wartime. That is why it is necessary that the appropriate organs, namely, ministries, departments, etc., create conditions even in peacetime for the stable control of organizations and establishments within their jurisdiction and ready their apparatus for implementing missions under a complex combat situation.

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it is necessary to keep in mind that at the same time it is a national matter and its practical activity depends on the personnel and the material resources of the entire country. The national character of USSR civil defense is a sharp expression of the socialist nature of the Soviet society in the defense of which all our people should be interested.

It is necessary to stress the role of public organizations in civil defense matters. Now, Dosaaf, Red Cross, and Red Crescent organizations are conducting enormous and useful work in this field. However, it is necessary to stress that trade-unions and Komsomol organizations have for a long time refrained from aiding civil defense organizations. And this is absolutely not the correct thing. This situation does not correspond to the general course of our Lenin party which is to enlist the public on a wide scale in controlling the state and raise the role of trade unions and the Komsomol in the period of advanced development of Communism in our country. All these public organizations under the supervision of the party can give exceptionally enormous aid to civil defense organs in readying the population and civil defense formations, in creating and stockpiling means of defense, in organizing rescue work, and in executing other missions.

The primary mission of civil defense is the protection of the population. In implementing this in peacetime, it is necessary above all to train the population of the country in defense measures against weapons of mass destruction. And this is completely logical. Under conditions attending a nuclear-rocket war, the entire population must know of the devastating factors of nuclear, chemical, and bacteriological weapons, study the means and methods of defense against them, and learn how to skillfully perform in a complex situation and quickly render self-aid and mutual aid, and assist in damage-control measures.

This is an enormous country-wide measure. It is being implemented by civil defense staffs, and Dosaaf, Red Cross, and Red Crescent organizations. Under a coordinated plan with them, cultural and other organs explain to the population the measures of defense against means of mass destruction. No small role in implementing this mission belongs to military units of the Soviet Army and Navy which have great capabilities for organizing and conducting classes with the population. If the efforts of all organizations connected with the training of the population are coordinated and united and if, in addition, all reserve officers were engaged in this matter, it could be said with confidence that the training of the population would be significantly improved.

It is interesting to note that civil defense measures now have acquired a somewhat practical importance in that literally all countries in the world are now paying very great attention to it. In the US, for example, the Civil Defense Regulations have been issued in which the nature of the coordination between the army and civil defense has been

outlined. The Regulations present the official views of the US government regarding this problem. It states that in addition to the spiritual and humanitarian values which form the model of American life there are certain basic factors in the national power: a healthy economy, powerful armed forces, and a strong civil defense. Great importance is being assigned civil defense in West Germany. General Erich Hampe, the former chief of civil defense in West Germany writes in his book, "In the Power Plants of the Great Air Powers," that even if all other factors were equal, a future war would be lost if civil defense were lacking.

In order to better understand the role of civil defense in a nuclear-rocket war, it is necessary to look at certain missions which it is implementing under the new conditions.

A very important aspect of the activities of the civil defense organs and of scientific research establishments is the development of theoretical tenets upon which are based practical recommendations for the immediate protection of the population against nuclear weapons. Now, two points of view are being expressed abroad on the way to solve this problem. Advocates of the first points of view are recommending the dispersal or evacuation of the population from large cities into rural areas; and advocates of the second point of view recommend the creation of shelter and cover to protect the population directly within the cities and populated areas and providing the population with individual protective equipment.

It is thought possible to provide the most effective defense of the population during a nuclear attack in large cities by means of promptly evacuating the population. If under conditions attending a threat of enemy attack, the evacuation of the population from large cities is implemented rapidly and in an organized manner, this will be the best method of safeguarding the population. As is known, the evacuation of the population was executed during World War II primarily in remote rural areas without thorough preliminary preparation. Now, in order to execute this mission, it is recommended that one proceed from a principally different position which takes into consideration the conditions under which a nuclear war may arise. Above all, evacuation must be conducted according to plans worked out in advance, and the most efficient way to conduct it within the shortest possible time must be employed. With this objective, it is necessary to plan for the utilization during evacuation of all transport not in use -- vehicular, railroad, city, maritime, river fleet transport, etc. This requires all civil defense organizations, national economic organs, and the military command to coordinate operations. Certain problems connected with the evacuation of the population have at the same time enormous importance to the national economy. This applies to the development of highways and suburban rail transport. In solving this problem, the interests of civil defense and the economy undoubtedly coincide.

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Given the availability of mobile transport with good loading capacity, the dispersal of the population of large cities then becomes a practical matter even in peaceful conditions. If industrial installations of large cities would locate certain branches in suburban areas with good approaches, the transport of workers to and from work could be implemented within a relatively short time. This could create not only healthier conditions for tens and hundreds of thousands of people, but could considerably facilitate the mission of protecting them in the event of a nuclear-rocket attack. It should be noted that under developing conditions, a specific portion of the workers of a number of industrial targets of large cities would permanently live in suburban areas.

The problem of evacuation of the population has presently great significance in almost all the countries of the world. For example, this is how problems of evacuation are solved in Sweden. In May 1961, Regulations for Swedish Citizens were issued which said that evacuation is planned for all cities whose population exceeds 10,000 and also for certain less populated points which can be likely targets of attack. It is intended to execute evacuation gradually if the situation permits, or hastily if military danger erupts. Recommendations are given on how to conduct oneself if evacuation is announced.

However, there are many in the West who think that it is complicated to execute evacuation under conditions attending a surprise unleashing of war. It is noted that this measure will be, in fact, difficult to implement given the extremely limited time. Therefore, in most of the countries of the imperialist camp, together with the planning of evacuation measures, the construction of shelters for safeguarding the population in cities is being conducted.

In such countries as the US, West Germany, and England, the problem of the construction of shelters has now been posed more intensively than ever before. Not only military specialists and civil defense organs are involved with them, but also the ruling circles of the country. For example in 1958, the US adopted the "National Program For the Construction of Shelters." Enormous funds were assigned for its implementation. When President Kennedy assumed power, this program was considerably expanded. According to the press, the new program provides for cover by mid-1968 for approximately 240 million people against radioactive fallout.

The organization of the protection of the population is closely related to the problem of the most efficient deployment of productive forces in the country. It is completely obvious that the correct deployment of industrial targets on the territory of the country and also the arrangement of cities with a view to the requirements of civil defense, has not only political and economic but also highly important strategic significance.

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An important method of limiting the growth of large cities is to remove enterprises and establishments not related to the vital operation of the city. The execution of these missions makes it possible under conditions of nuclear-rocket war to best ensure the protection of the population and increase the stability of the military-economic potential of the country. It should be noted that these civil defense requirements coincide with the national economic requirements of the country. Comrade KHRUSHCHEV, in a 19 September 1963 meeting with agricultural supervisors and specialists of Astrakhanskaya Oblast said: "The construction of new enterprises is required in Siberia, and in the Eastern areas of the country, that is, where power is cheap. And it would even be economically feasible to move to the Eastern areas even certain old-established suppliers of power for production."

Together with limiting the growth of large cities, the problem of dispersing material resources and reserves requires immediate solution. Considering the enormous destructive force of nuclear weapons, it is not now feasible to concentrate the state's material reserves in large centers. They must be dispersed to suburban areas.

Modern warfare poses a different problem regarding the protection of agricultural production. As is known, it supplies the population and army with food and industry with raw materials. In the past, the defense of agricultural production has been paid little attention since it was in the rear of the country and did not directly sustain the means of destruction employed by the enemy. Now the situation has changed sharply. Rocket and nuclear weapons can inflict varied types of damage against agricultural production over enormous areas. In relation to this, civil defense has been assigned the mission of carefully preparing agriculture for operation under conditions of wartime. Here, it is above all necessary to designate such measures as the defense of livestock, plants, water resources, and food reserves, and the notification of the population of radioactive danger, among others.

In addition, civil defense is developing scientifically-based methodological recommendations on regimens of behavior of the population in contaminated areas, and the operation of industrial and agricultural installations in the areas which have sustained nuclear strikes. It will establish the length of time in which personnel may remain in contaminated areas, depending on the level of radiation. The recommendations of civil defense will make it possible to more correctly organize production activity; regulate production shifts, the procedure for public catering, the withdrawal of the population from cover, their movement, etc.

The problem of the coordination of civil defense with the Armed Forces requires particular examination. The complexity of the measures which civil defense will execute in nuclear-rocket war requires not simple coordination with Armed Forces but joint operations in executing missions to strengthen the defense capability of the country.

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Therefore, in modern conditions the close coordination of Armed Forces and civil defense is required. First of all, both the Armed Forces and civil defense will execute missions related to strengthening the defense capability of our socialist country. They have a single goal and joint interests which are directed to the defense of the Soviet people and their spiritual and material values against an aggressor attack.

In connection with this, the primary forces of civil defense and the Armed Forces in a future war must be closely coordinated and directed to the execution of one mission: namely, the destruction of the aggressor were he to attempt to attack us and the protection of the stability of the rear areas. This is required by the nature and peculiarities of the conduct of modern warfare. It is necessary to stress that in the past, the problem of coordinating MPVO (Local Air Defense) operations with the Armed Forces was paid extremely little attention. Organs for supervising civil defense and their commanders and staffs were poorly coordinated. The military chiefs often were not at all concerned with civil defense. Life has shown that this condition is not permissible. Not a single commander must stand apart from civil defense problems. This conclusion arises from the nature of modern warfare in which the borders between front and rear are eliminated. Under the new conditions were the imperialists to unleash war, the Army, the Navy, and civil defense would simultaneously enter armed warfare. This extraordinarily important situation must be considered by the military command and civil defense leadership at all levels. Victory in a nuclear-rocket war will depend on the readiness of the Army and Navy for the decisive destruction of the enemy, on the stability of the rear, and on the moral and physical qualities of the entire population, its organization, discipline, and ability to promptly employ all the measures required to protect the population and installations of the national economy.

Since the efforts of civil defense are closely related to the efforts of the Armed Forces, the best effect may be attained by the coordinated and planned solution of all problems in strengthening the defense of the country. This will permit the coordination of operations in the best way and the concentration of forces in the primary, decisive areas. The planning of measures of civil defense on a country-wide scale is one of the urgent requirements which make it possible, given the modern level of development of economic and defense capabilities of the country, to ready civil defense on a foundation of coordinated principles.

Which are the measures which can be conducted by the coordinated forces of civil defense and armed forces and which are not connected with the conduct of combat operations in wartime? From our point of view the measures include: warning the population of the threat of attack, ensuring the evacuation of the population, organizing radiological and other types of reconnaissance, conducting rescue and priority emergency-restoration work, combatting air drops and diversionary groups of the enemy, etc.

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CPYRGHT In the initial period of the war, prompt warning acquires extremely important significance both for the armed forces and for civil defense. To ensure the transmission of the required signals within the shortest possible time means that more time can be allowed for conducting various measures intended to safeguard the population and thus create those conditions which reduce the effectiveness of the weapons of mass destruction employed by the enemy. In order to successfully implement this mission, the military command and civil defense organs must maintain constant coordination and centralized, automatic control for warning the population must be widely employed. It is also important to stipulate the use of all country-wide and departmental means of communication for the constant control of troops and civil defense forces.

There are many points of contact between the military command and civil defense in conducting evacuation measures; for example, the utilization of suburban areas to deploy the evacuated population and personnel of civil defense formations, the utilization of transport means, highways, etc., could be included in this.

In a future war, transport will have enormous importance. Civil defense can render enormous aid to the military command, in this area. Damaged bridges, railroad centers, and other communication installations can be quickly restored by civil defense forces. All this will facilitate the successful movement of troops into designated areas and will make it possible for troops to implement the required maneuver. This does not exclude a circle of problems which can and must be implemented by the close, continuous coordination of civil defense with the armed forces.

We shall dwell on another problem, namely, rescue operations. Now, it is well known that were an enemy to succeed in employing nuclear weapons, great destruction would occur in cities and even entire industrial areas. The volume of rescue and priority emergency-restoration work in damaged cities and installations will be enormous and very complex in nature. To eliminate the centers of nuclear destruction requires an enormous number of special civil defense formations; and the assistance of the population as well as that of army and navy units is required. Therefore, it is no accident that at the present time, the problem of creating voluntary civil defense formations composed of public and their combat training is creating a stir. It is possible to say without exaggeration that in order to rescue the injured, formations composed of multimillions of personnel are required. This situation makes it obligatory to expand the foundation for their recruitment. If in the past war these formations were created only in cities and industrial installations, they are now required in rural areas. Given this situation, the mission is to prepare personnel to conduct complex rescue and priority

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emergency-restoration work which must be conducted at a high rate of speed and within a relatively short time period. Assistance to the injured population must be given immediately following a nuclear blast. A delay in rendering assistance can lead to additional fatalities among the population. Considering this situation, it is expedient to create formations at each enterprise, and at each kolkhoz and sovkhos.

Rescue work in nuclear damage centers will be enormous in scope. In fact, they will have the nature of rescue operations. Their scale can be most varied. In a number of cases, it will be required to mobilize not only all civil defense forces but also to engage military units. The rate of work in rescuing persons and materiel will be relatively intensive. Under these conditions, civil defense staffs will execute the wide-scale maneuver of forces and means in order to ensure the execution of primary missions in the basic areas of civil defense operation. The complexity of this maneuver consists in the fact that it can occur under complex conditions of radioactive contamination of the terrain and in the winter season. These conditions must be carefully studied and considered in appropriate plans and reviewed during exercises conducted in peacetime.

The civil defense rescue operations at the oblast and republic level are unthinkable without close coordination with the military command. The detailed coordination of plans with the Armed Forces is a primary condition for the correct supervision of civil defense under the complex conditions of a combat situation. This is why it is extremely important that civil defense staffs, even in peacetime, strengthen relations and develop problems required the execution of missions jointly with units of the Armed Forces and coordinate the required plans for conducting rescue and priority emergency restoration work in centers of nuclear destruction.

Civil defense undoubtedly will be required to assist the Armed Forces in conducting certain measures. Thus, in the period of conducting rescue work, Military Transport Aviation, together with Civil Air Fleet, can render civil defense unestimable aid, particularly in evacuating the injured, supplying food and required necessities to the population in destroyed areas, etc. At the same time, civil defense is readying its formations so that they may be ready in the event of necessity to fulfill rescue and priority emergency-restoration work in a number of installations of the Ministry of Defense.

The CPSU Program stipulates concrete and scientifically-based missions to strengthen the Armed Forces and the defense capability of the Soviet Union. The party proceeds on the basis that as long as imperialism exists the danger of aggressive wars also exists.

Under these conditions it is necessary to constantly strengthen and perfect USSR Civil Defense which has become under modern conditions one of the primary factors in the defense capability of the country.

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MODERN FORTIFICATIONS

by Engr-Col B. MIKHAYLOV

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When armed conflict first originated certain means of supporting and protecting troops appeared and became the property of combatant sides, depending on the state of development of military technology. This is confirmed by numerous historical facts of the building and use in war of castles, fortified villages, camps, forts, and various fortified bases and regions. Due to the improvement of means of conflict and the increased numbers and improved quality of these types of installations, the theory of erecting and using them in war was created -- fortification was born. In the past it was defined by prominent military scientists as the science and practice of building military strongholds.

As is known, fortification was divided into field work and permanent structures depending on the mission and the time required to erect the strongholds. In various forms each of them was for a specific purpose -- to ensure high combat effectiveness for weapons and subsequently the troops as a whole or for protection of personnel and combat equipment from the enemy's means of destruction. The permanent fortification, as M. V. Frunze wrote, was primarily for strategic purposes, especially when the states had sufficient time to prepare their territories for war, and the field fortification was used by the troops to support tactical and operational missions directly in the course of combat operations. A basic feature of the development of both types of fortifications is their continuous improvement depending on changes in the means and methods of armed conflict, the organization of troops, and other factors.

Until not too long ago the fortification was primarily used to support the combat operations of ground troops directly in the course of a battle or in border areas of theaters of military operations, and to a lesser degree it was used to support the activities and protect the rear of the country, including the population.

This situation changed radically in our + a result of the rapid development of weapons of mass destruction their means of delivery, changes in the methods of conducting war, and the appearance of new branches of the armed forces.

The ability of combatant sides to inflict surprise massive nuclear strikes and to accomplish large-scale assault landings in the rear in a short time, the higher mobility of troops, and the large scope and swiftness of modern operations unavoidably necessitated a new look at the place and significance of fortifications in modern warfare.

Today it is generally agreed that if war is unleashed because of the aggressive actions of imperialist countries it will bear a universal nature and involve vast territories and their armed forces, economics, and populations. Necessary measures to ensure the combat readiness of and provide protection for these elements will positively be required.

The changed nature of potential military operations makes it possible to consider that modern fortification will serve its purpose not for the sake of a certain unit, but in the interests of all branches of the armed forces, the preservation of military and government control, and protection for the country's economic targets and the population.

Modern fortification can be defined as the science of planning and building military engineering installations and their complexes to ensure the effectiveness of actions, to ensure combat readiness, to protect weapons, equipment, and personnel of all branches and arms of the armed forces, and to protect economic targets and the population in a war. This definition does not pretend to be a final wording. However, it seems to us that it reflects the significance and the role of fortification in modern conditions.

Inclusion of protection for the country's economic targets and the population as a purpose of fortification is necessitated by the transfer of the sphere of modern strategic combat into the depth of the states where it is necessary to ensure not only the effectiveness and stability of strategic rocket positions, surface-to-air missile sites, and regions of ground troop mobilization, but also the preservation of strategic industrial targets which supply them, and the population. Fortification is the most important element of strategic preparation of a country for war. NATO countries are conducting this type of preparation under the widely known name of infrastructure using construction and engineering troops, civil defense formations, and special construction organizations.

Another feature of the development of fortification is the dependence of its changes on qualitative leaps in the economy and in technology, especially construction technology.

The high level of mechanization of ordinary construction work, its industrial nature, and the numerous, varied, and powerful modern construction techniques open broad possibilities for mechanizing fortification work and, consequently, for cutting down their completion time.

The quickness and mechanization of this work make it necessary to unify fortified installations, to increase their technical qualities, and to industrialize their production and erection. Moreover, the widespread use of new, modern, superstrong and light materials in civilian and industrial construction and the rapid development of their production creates favorable conditions for using these materials in the field of fortification.

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Another feature of the development of modern fortifications is the dependence of its changes on the nature of the struggle between weapons of destruction and methods of defense, which F. Engels graphically described as "the struggle of the wall and the shell." The appearance of nuclear weapons that possess new, multiple destruction and affect tremendous areas required radical changes in the protective characteristics of fortified structures and their complexes. The NATO countries, for example, are widely developing large, strong, completely airtight, shockproof installations, etc. The use of fortified installations becomes efficient only when combined with a whole complex of defense measures -- organizational (dispersion, alternates, selection of appropriate building sites, conducting defense regimens, etc); technological (increasing the protective characteristics of armament and equipment); and engineering and technical (camouflage, use of individual protection means, etc.). Without these it is impossible to obtain the necessary survivability of the installations.

All these objective circumstances of present-day realities pose problems on the theory and practice of fortification concerning the development and creation of installations that are effective in combat and defense aspects, expedient from a technological point of view, and that are quick to erect; concerning the development of rational forms and methods for the broad use of means of mechanization, and concerning the the determination of trends in their development.

The modern theory of fortification is called upon to develop scientifically based positions enabling all arms and branches of the armed forces to use fortifications in the course of combat operations and for the purpose of protecting targets of military economic potential, organs of state control, the population, and to develop reasonable ways of planning and building installations.

Modern means of conducting armed conflict sharply increase the role of permanent fortifications that will chiefly be used on a strategic scale.

The military press of many highly developed countries has often noted that the characteristics of potential armed conflict, particularly in the initial period of the war, requires that rockets be kept in constant combat readiness so they can be launched quickly and surely. The foreign press writes that in view of the complexity, large dimensions, and vulnerability of modern strategic rockets it is possible to create the best conditions for maintaining them in continuous combat readiness for launch only in specially equipped, hardened silos. It is known that attempts in the US to provide the necessary conditions for rockets openly erected in positions did not yield positive results, and the Department of Defense had to undertake the broad construction of hardened missile

silos. It is believed that these silos will make it possible to create the necessary conditions for constant and prolonged launch readiness, high combat effectiveness, and survivability of large strategic rockets.

According to US information, rockets in these silos can be preserved for many months and can be launched in several seconds at any time. The degree of protection for the whole complex rises sharply in accordance with this since the target is only slightly vulnerable to an inter-continental nuclear rocket strike. (Civil Engineering, April 1962; Journal of the Construction Division, No 401, January 1962)

To repulse rocket strikes directed at positional regions and hardened missile silos and to counteract assault landings it is also considered necessary to have hardened antimissile and antiaircraft positions and a minimal fortified land protective belt of obstacles and pill boxes as components of the positional region.

Thus the theory of fortification in modern conditions can be said to include the fortified fire installation complex in the form of reinforced positional regions or bases of large strategic rockets with a permanent garrison, special armament and equipment, a control system, fortified installations, and a network of roads. A system of such reinforced positional regions of large strategic rockets certainly does not exhaust all possibilities for modern fortified installations in rocket troops. Hardened bases for atomic missile submarines, launch aircraft, railroad trains used for launching Minuteman missiles, and field bases for mobile units of medium range strategic rockets will no doubt be widely discussed as varieties of them.

Protection of strategic targets by antimissile and antiaircraft resources that must also be maintained in constant combat readiness is a very important problem in a nuclear war. As numerous accounts in the foreign press testify, the positions for such modern antimissile and antiaircraft missiles as the Nike-Zeus and the Nike-X must ensure prolonged preservation, continuous readiness for instantaneous launch, fastest possible second launches, guidance accuracy, and finally positive rocket effects despite numerous enemy countermeasures. To furnish all these conditions needed for combat effectiveness and protection for large-scale air defense rockets in open positions is recognized as difficult. Obviously, such conditions can only be created in specially equipped hardened surface-to-air rocket fire installations.

According to US information, a certain increase in cost for the engineering equipment of hardened installations in comparison with expenses for open-position equipment is compensated for by the sharp decrease of numbers of service personnel, transports, and lower operational costs associated with this. It is recognized that groups of these reinforced surface-to-air rocket fire installations might

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hardened PRO and PVO zones of certain directions of hardened PRO and PVO regions to protect important targets. It is thought that these types of fortifications will include positions for combatting assault landings, a system of hardened control centers and shelters for radar stations, and all types of engineering equipment. Thus we have another type of fortification -- a system of hardened PRO and PVO areas and zones.

Obviously, in addition to these fortified static positions, more durable types of fortified positions for mobile antiaircraft and anti-missile defense weapons will be found.

Foreign military specialists, especially of the NATO countries, are expressing views on using certain types of permanent fortifications to secure conditions for ground troops conducting combat operations in border zones. As is known, in past wars the task of stopping surprise invasions of enemy forces was placed on the troops situated in border areas having permanent fortifications on the primary strategic axes. However, during World War II this type of fortification often did not justify the hopes placed on it. Fortified areas, as is known, were skirted by the enemy. Frequently being without support of troop soyedieneniya, they did not play the role of a sustained strategic barrier for the highly mobile troops of the attacking side.

At the present time, as apparent from the foreign press, in a number of places, on the Maginot Line and in Belgium fortifications, for example, they are attempting to modernize some fortified areas and use them for control posts, depots, bases, etc. Apparently, this type of fortification will have a local significance only.

It is not thought possible to create systems of deeply echeloned permanent fortified strong points which are to a certain extent attached to such key positions as road junctions, defiles, bridges, tunnels, mountain passes, crossings, etc. in the main lines of border zones. A system of such permanent combat ready reinforced strong points in the main lines in a border zone could be supplemented by prepared positions for deploying tank groupings, by sudden erection of large obstacles and by destruction. The subsequent rout of the enemy will be accomplished by prepared nuclear rocket strikes and strikes of ground troops from reinforced initial positions or areas.

It is known, for example, that in a nuclear-rocket war previously prepared reinforced build up areas in mountainous or forrested areas are a new type of fortification providing stability of basing and mobilization and deployment of ground troops. These build up areas include dispersed towns, arsenals, depots, road systems, camouflage, etc. The Pfaltz, Rhine and other build up areas mentioned numerous times in the US and West German press relate to these.

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The growing role of surprise attack and the enormous destructive power and great range of nuclear-rocket weapons whose targets, as the foreign press often writes, could be large administrative, industrial, power, material, and transportation centers, and the most important military targets throughout the country are definitely reflected in the content of the theory and practice of fortification. In these conditions it is recognized as especially important to preserve the constant effectiveness and survivability not only of the troops, but also control systems and communications organs of the country and the armed forces, inasmuch as they are chiefly located in large populated centers that are known to the enemy and that are relatively vulnerable.

Destruction of control of the country and the armed forces in a modern war, especially in its initial period, is fraught with serious consequences. The most important control centers and communications nets in certain countries have already been duplicated and concealed in reliable fortified installations. The latter create favorable conditions for operating the modern apparatus of communications control organs and provide them with a high level of survivability. Being connected by highly stable lines of communication, alternate centers of control will prove to be extremely effective in a nuclear war. (Western Construction, December 1961, Detroit Free Press, June 3, 1963)

A system of these fortified installations for command posts and communications centers, dispersed and well protected, represent a new form of permanent fortification. From foreign press materials it is evident that the wide use of industrial mining excavations, tunnels, subway stations and lines, etc., for this purpose make it possible to substantially reduce the cost of creating a highly stable alternate system of control and communications.

The types of fortifications mentioned above may be supplemented by a system of fortified stations equipped both in peacetime and during war as mobile control posts on railroad cars or trucks. (Western Construction, October, 1961).

Also considered extremely important in modern conditions is the use of complexes of fortified structures in a country's overall system of measures for protecting the populations of large cities, and reducing the damage which might be inflicted on industry and strategic reserves by enemy strikes. Judging from information in the foreign press, fortifications are being built into many new industrial enterprises and homes and are being installed in many existing structures. For example, to provide temporary shelter and evacuation of the population of a number of large cities, the USA intends to use systems of connected basements, tunnels for city utility lines, subways, etc.

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Naturally, Soviet military science, faced with the threat of a world war unleashed by imperialists, must also develop the theory and practice of modern fortification in the interest of strengthening the defense capability of the country. In this light and especially in connection with the danger of a surprise attack by the enemy, the role of permanent fortifications has increased greatly. They make it possible to provide in advance, during peacetime, the necessary conditions for maintaining constant combat readiness and the effectiveness and reliability of the operations of the country's armed forces.

Protection against the powerful and combined nature of a nuclear attack requires widening the sphere of using systems and complexes of fortified installations, their intelligent and economical combination with other methods and means of protection (dispersion, camouflag, duplication, maneuvers, and increasing the stability of armament and equipment), and also coordination with civilian construction.

The development of armament and military equipment and progress in the construction industry make it possible to create fundamentally new types of fortified structures and complexes which are economical and quickly constructed, and also to develop structures which provide protection against the effects of nuclear weapons.

Changes in the armament and organization of troops and the character of modern military operations and war inevitably lead to actual changes in the area of field fortifications.

It is well known that modern ground troops are vastly different from those of the past: they are well equipped with combat vehicles -- tanks, armored transports, rocket transporters, etc., and also technical and transport vehicles. Their operations are characterized by great striking power, high maneuverability, and swiftness. They are well suited for independent operations along different axes and can conduct an attack largely from vehicles.

This feature of ground troops requires that modern field fortifications take into account first of all, the swiftness of combat operations and, secondly, the presence of a large number of well protected combat vehicles among the troops. In view of this, it is necessary to create simple and quickly constructed fortified field installation, using the mechanical durability and tightness of the bodies of covered combat and transport vehicles.

Moreover, tank, armored carriers, and other types of combat machines can, with a minimum of additional work, become the base of a position, providing the high effectiveness of their weapons and protection. The total of these positions, located according to the battle decision and with regard to protective terrain features, represent a new form of operations and during a quick switch to the defensive.

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A possible variation of this defense can be created from deeply echeloned positions in the form of a system of dispersed weapons emplacements, covered positions, and "fire pockets" calculated to draw in the enemy so that it may be destroyed by nuclear strikes readied in advance or by other means. Wide maneuvering of fire and mobile reserves within the combat formations is possible in such a belt.

The basis of the fortification of positions will apparently consist of trenches for combat machines (tanks, self-propelled guns, armored carriers with antitank guided missiles, armored rocket transporters, etc.) and covered positions consisting of entrenched technical and transport vehicles with hermetically sealed bodies or covered positions made from pneumatic or other portable structures carried with the troops (Ordance, November - December 1958).

Under conditions of fast-moving battles and operations, a system of such weapons emplacements and covered positions can be supplemented by only a limited number of trenches. Since each podrazdeleniya will have its own entrenching equipment, creating these positions will require very little time. The creation of these fortifications consisting of a system of entrenched transport and combat vehicles differs greatly from the construction of former systems of trenches, dugouts, earth-and-timber pillboxes, and communications trenches which required much time, a large amount of materials, transport vehicles and manpower.

This makes it possible for combat detachments and other podrazdeleniya to create their own fortified installations without the assistance of engineer troops, or at least with only limited help from them.

In our opinion, all-around protection against the devastating effects of nuclear weapons can be reliably provided only by the hermetically sealed bodies of combat and technical vehicles or prefabricated structures.

The character of modern defensive zones and positions created during offensive operations results from the existing means and methods of battle and the organization of ground troops. The presence of armored combat vehicles (tanks, armored carriers, armored rocket transporters, etc.) in combat formations enables the latter to establish a sufficiently powerful system of fire.

In our opinion, the type of fortification indicated above might be one of the variations, since it creates conditions for the most effective use of modern weapons and provides a high level of troop survivability in the complex with camouflage and dispersion. The creation of such fortified positions and defensive zones can be accomplished without expenditures for materials and transportation and with a minimum amount of manpower and machinery.

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A highly original form of modern field fortifications is the formation of fortified field positions of mobile rocket and antiaircraft rocket units of ground troops consisting of quickly established strong points. With very short preparation periods and requirements for high mobility, armored rocket transporters, technical vehicles with hermetically sealed bodies, and portable pneumatic shelters can be entrenched with the use of special earth-moving equipment.

Promoting the survivability of mobile control posts and communications centers is considered an important form of field fortification. In view of the short-term nature of the stations of these organs, the use of underground reinforced concrete or metal field installations for their protection during modern operations involving extensive maneuvering will, in all probability, be limited. Judging from information in the foreign press, stations of control organs will more often be protected by entrenching control vehicles with armored bodies ("tortoise-type" vehicles, "control tanks," and others) and carefully camouflaging and dispersing them.

Thus, drastic changes in the means and methods of combat operations of ground troops result in the appearance of new forms and types of field fortifications and new methods of erecting them during fast-moving combat operations.

The types of manufactured items and work methods in modern construction industry will, in our opinion, have a real influence both on the methods of erecting fortifications and on the types of fortified installations. The construction time of fortifications will be greatly reduced, and the amounts of materials, manpower, machinery and transportation required will decrease. Practically no construction will be involved, except for digging pits and cushioning layers of earth for solid, hermetically-sealed vehicles and portable shells. The search for methods of rapidly setting up field fortifications is considered very important in view of the swiftness of modern operations.

Scientifically based operational, technical, mathematical, and economical methods of analysis for finding new forms and types of fortifications are being developed on the basis of the latest views on strategy and military art, the rapidly developing mathematical methods

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of researching and evaluating the effectiveness and survivability of protective complexes, the successes of applied physics, the theories of designing economical structures to withstand dynamic loads, and modern science.

Study of the devastating properties of modern weapons will make it possible to find theoretical and practical bases for developing new protective structures and the principles of using fortified installations in the complexes of all modes of protection.

Progressive methods of complex organization and mechanization are making it possible to develop the theory and scientifically based methods of rapidly and economically constructing fortified complexes. This is being done in the interests of all branches of the Armed Forces and to conserve the military-economic potential of the country.

The successes of chemical sciences and solid-state physics make it possible to develop the theory of creating new fortified materials -- special kinds of concrete, polymer-concrete, etc.

Successes in the fields of electronics, automation, and other technical sciences are making it possible to find new solutions to problems of the theory of equipping the interior of fortified installations to ensure the constant combat readiness of weapons and equipment.

Mar Su R. Ya. MALINOVSKIY, in his speech at the 22nd Congress of the CPSU, stated: "Despite the fact that in a future war nuclear rocket weapons will play the decisive role, we nevertheless come to the conclusion that final victory over an aggressor can be achieved only as the result of the combined operations of all branches of the Armed Forces."

To ensure the success of the operations of all branches of the Armed Forces, the efforts of modern fortification must be included in a complex of many measures.

BASIC STAGES IN THE DEVELOPMENT OF SOVIET MILITARY-HISTORICAL SCIENCE

by Lt Col. I. ROSTUNOV

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"The necessity for a thorough study of the history of wars and military art has repeatedly been stressed in the orders of Mar SU R. Ya. MALINOVSKIY, Minister of Defense USSR, and in a number of speeches by other Soviet military leaders -- Mar SU A. A. GRECHKO, Mar SU S. S. BIRYUZOV, and Army Gen A. A. YEPISHEV (Voyenno-istoricheskiy zhurnal, No 2, 1961; No 1, 1963; Voyennaya Mysl', No 9, 1963). It is universally recognized that the experience of the past has not lost its significance in an age of nuclear-rocket weapons. Military history helps solve the theoretical and practical problems of building and training armed forces. Its further development meets the requirements of the Soviet Army and Navy and the interests of the ideological struggle with reactionary bourgeois historiography....

"Soviet military-historical science, like Soviet historical science in general, has to do with the field of superstructure, the development of which is determined by the development of the basis. Consequently, its periodization must be done with regard to the periodization of the history of Soviet society.

"The discussions which appeared on the pages of the journal Istoriya SSSR in 1961 and 1962 presented well-founded modern views on the principles of the periodization of the history of Soviet historical science, its division into large periods and more fractional internal stages, and also analyzed the factors which determined the development of the science at each stage (M. V. NECHKINA. "Summarizing the Discussion of the Periodization of Soviet Historical Science," Istoriya SSSR, No 2, 1962). Therefore, these problems are not discussed in detail in this article. The history of Soviet historical science is divided into three periods approximating the main periods in the development of Soviet society -- the period of transition from capitalism to socialism and the establishment of the basis of a socialist society, the period of completing the building of socialism and the beginning of the gradual transition from socialism to communism, and the period of the extensive building of communism. The first of these covers the time from the victory in the Great October Socialist Revolution to the middle of the thirties; the second, from the middle of the thirties to the 22nd Party Congress; and the third, from the 22nd Party Congress to the present....

"The Commission for the Analysis and Utilization of the Experience of the War of 1914-1918 (Military History Commission) was established in August 1918. It consisted primarily of former generals of the Russian Army who voluntarily went over to the side of the Soviet Government and

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expressed a desire to devote their knowledge to the strengthening of the Red Army. They included A. A. SVECHIN, D. P. PARSKIY, V. N. KLEEMBOVSKIY, A. M. ZAYONCHIKOVSKIY, A. A. NEZNAMOV, and others. The outstanding Russian military leader A. A. BRUSILOV was a member of the commission for some time.

"The work of the commission was carried out under difficult conditions. The membership changed frequently as a number of members were called to the fronts of the Civil War. Archive documents were not examined and put in order. Nevertheless, the commission achieved well-known results during their five years of work....

"With the development of the history of World War I, there arose an urgent need for the study of the history of the Red Army and the history of the Civil War. The analysis of the armed struggle of the first socialist state, which represented a qualitatively new stage in the development of military affairs, was of great importance and was assigned to the commission. The commission was unable to make a serious analysis of this subject, however, since the necessary documents were still located in the headquarters of *chasti*, *soyedineniya*, and *ob'yedineniya*. Also, the members of the commission, most of whom had served in the former Russian Army, did not understand the essence of the Civil War and did not consider its experience valuable for military science. Only with the liquidation of fronts and the conversion of the army to a peacetime status were certain improvements noted in the work of the commission. The collection of documents and memoirs of participants in the events was begun, resulting in the publication of the first volume of *Grazhdanskaya Voina* (The Civil War). Two more volumes of this work were published in 1923 and 1924....

"Generalized military-historical experience, especially the experience of World War I and the Civil War which was examined with regard to new tendencies in the development of armament and military equipment, was the basis of works on military art. *Mar SU* A. A. GRECHKO rightfully points out: 'The broad and, on the whole, expedient use of the experience of World War I for the development of military theory in the new conditions would have been impossible, of course, if military history had been underrated in the Red Army in the 20's and 30's. Military-historical work in those years was at its proper level. It was not just a narrow circle of specialists who were engaged directly in military history, but also many officers and generals, including prominent military leaders, from whose pens came a number of solid theoretical works.' (*Voyenno-istoricheskiy Zhurnal*, No 2, 1961, page 7)

"The work of Soviet military historians at the given stage would have been more useful if it had not been for the pernicious effect of the Stalin personality cult which began to manifest itself at the end of the 20's. In 1929 an article by K. Ye. VOROSHILOV, "Stalin and the Red Army,"

was published to please the cult in which events of the civil war were incorrectly discussed, and the role of the party and the people as the real defender of the victorious October Revolution was minimized. This article had an adverse effect on subsequent military-historical works. Under the influence of the personality cult Leninist estimations and analytical methods in the study of military history began to be violated and citation-illustrative methods became widespread in literature. Concrete historical research of events and facts was frequently replaced by simple description of them without profound generalizations or conclusions, which seriously lowered the quality of military-historical works.

"In spite of this, Soviet military-historical science achieved great successes in the first period of its development. Research of the experience of the World War I and the Civil War, which was widely used in training and educating the troops, yielded the greatest results. Other wars were studied to a lesser degree, including the historic struggle of the Russian people against foreign invaders. The views of M. N. POKROVSKIY, who was then head of a number of Soviet historical institutions, undoubtedly had an effect here. This outstanding Bolshevik scientist played an important role in the creation of Marxist historical science. However, he made many mistakes in his scientific activities, including negation of the patriotism of the national masses in the wars of pre-revolutionary Russia. Moreover, the possibilities of military history for the patriotic education of soldiers of the armed forces and the whole Soviet nation were not used to the fullest extent. In addition, the creation of generalized works on the history of military art became difficult. Books which attempted to resolve this problem were a rare phenomenon. (A. SVECHIN, Evolyutsiya voyennogo iskusstva, The Evolution of Military Art, Vols 1-2, Moscow - Leningrad, State Publishing House, 1927-1928; V. SUKHOV, Kratkiy cherk istorii voyennogo iskusstva, A Brief Essay on the History of Military Art, Moscow-Leningrad, State Publishing House, 1929)

"Soviet military-historical science was born and developed in the sharpest struggle against anti-scientific concepts. It had to endure serious attacks from Trotsky and like-minded persons who denied the possibility of using Marxist-Leninist dialectical methods for analysis of military-historical events and facts, rejected the existence of military science, and tried to prove that in the field of military affairs only the practical profession, the military leader, has the decisive significance. They regarded the experience of the Soviet Armed Forces in the Civil War with scorn and ignored the very fact of the birth and development of Soviet military art, though at the same time they bowed to bourgeois military art in every way possible. The exposure and ideological rout of Trotskyism favorably affected the development of military science, including military history.

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"Simultaneously, a struggle was conducted against the erroneous views in the works of several historians, predominately the old military specialists. Thus, the works of A. A. SVECHIN were distinctly influenced by the German bourgeois historian Hans Delbruck. A thorough criticism of the military-strategic and military-historical views of SVECHIN was given at an open meeting of the plenum of the section on the study of problems of war of the Leningrad Department of the Communist Academy attached to the Central Executive Committee USSR on 25 April 1931. (Protiv reaktsionnykh teoriy na voyenno-nauchnom fronte. Krtika strategicheskikh i voyenno-istoricheskikh vzglyadov prof. Svechina, Against Reactionary Theories on the Military-Scientific Front. A Criticism of the Strategic and Military-Historical Views of Professor Svechin, Moscow, Voenizdat, 1931. A. I. VERKHOVSKIY's attempt to question the scientific significance of F. Engels' works in the field of military theory and history received a decisive rebuff. (Zapiski, Notes; Communist Academy; Section on the Study of the Problems of War; Vol 1, Moscow, Publishing House of the Communist Academy, 1930, pp 55-61.) At a discussion held in the Military Academy imeni Frunze in April 1931, serious deviations from Marxist-Leninist methodology were noted in the works on military theory and history of B. I. GOREV, an instructor at this academy. (Protiv men'shevistvuyushchego idealizma v voprosakh voyny i voyennogo dela, Against Menshevist Idealism in Questions of War and Military Affairs, Moscow, Voenizdat, 1931) By the middle of the 1930's anti-Marxist concepts on the military theoretical front had been overcome. Marxist-Leninist methodology completely triumphed in the field of military science....

"During these years military historians acquired their first press organ, Voyenno-istoricheskiy zhurnal (Military History Journal). It was published regularly beginning with August 1939. The last double issue appeared in June-July 1941. After the outbreak of the Great Patriotic War, it was combined with the journal Voyennaya Mysl' (Military Thought). A total of 23 issues was published. The predominant subjects were on the history of the Soviet Armed Forces and on the Civil War and World War I. The journal was popular among wide circles of Soviet military cadres and played an important role in working out a number of scientific problems and in the propaganda of military-historical knowledge.

"Consequently, in the years preceding the Great Patriotic War, our military-historical science had been raised to a new level. The range of scientific research subjects had increased. Great attention was given to studying the practical experience of modern wars and making the facts available to the troops, even though this kind of work was not conducted in a sufficient volume or with sufficient effectiveness. The role of military history in the patriotic education of Soviet people and of Army and Navy personnel had grown more important....

"The study of military history, which developed on a large scale during postwar years, required an increased number of scientific cadres. The training of these cadres was successfully solved by establishing military history faculties at the Military Academy imeni Frunze and the Academy of the General Staff. During a relatively short period, these military educational institutions graduated a sufficient number of qualified military historians to satisfy the requirements of our Armed Forces.

"The development of Soviet military-historical science during the second period was characterized by undeniable achievements. Our literature was enriched by valuable research and popular scientific works. A new direction in science was conceived, i.e. historiography of the Great Patriotic War and of World War II. However, during this period the negative influence of the Stalin personality cult on military-historical science became fully evident. B. N. PONOMAREV, secretary of the Central Committee CPSU, stated in a report at the All-Union Conference of Historians in December 1962: 'If we are to sum up the negative consequences of the personality cult for historical science, they can be reduced to three principal factors: 1. depreciation of Lenin's role and the role of the masses and the party in the history of our country, and the exaltation of Stalin's role, thereby distorting historical truths; 2. publicizing a non-Marxist approach to the study of historical processes, as well as subjectivity and arbitrariness in evaluating historical events and figures; and 3. bureaucratic administration and unconscientious criticism in scientific working groups, and the indiscriminate use of various labels.'

"The above statements may be fully applied to military-historical science. The Stalin personality cult hindered the work on problems of military history, particularly the history of the Civil War and the Great Patriotic War. However, this cult could not turn the development of military-historical science from its correct course. Soviet military historians, founding their research on Marxist-Leninist methodology, were able even during the period of the personality cult to overcome its negative influence and to make new progress in studying the history of wars and of military art....

"The period following the 20th CPSU Congress is noted for an unprecedented upsurge in the development of military-historical science. This became evident specifically in the growth of scientific research. Military historians engaged in large-scale research on a number of subjects which previously, during the personality cult, could not be studied deeply and extensively. One of the most important topics of research was the study of the guiding and organizing activities of the Communist Party in building the Soviet Armed Forces and the defense of our country. The publication of the comprehensive work, Istoriya Kommunisticheskoy partii Sovetskogo Soyuza (History of the CPSU) was a great achievement. This work gave a

truthful account of the heroic history of the CPSU. Many questions of party history were formulated and discussed in a new way, in accordance with decisions of the 20th Congress; and errors, which had been made in historical literature during the personality cult period, were corrected. A number of monographs and collections of documents were devoted to the glorious Leninist party as organizer and inspirer of victories of the Soviet people during the Civil War and the Great Patriotic War....

"Further progress was made in the field of studying the history of World War II. One should note the work by a group of generals and officers of the military-historical section, Military-Scientific Administration of the General Staff, who published the book Vtoraya mirovaya voyna 1939-1945 gg. (World War II, 1939-1945). A great contribution to the study of this subject was made by V. M. KULISH, V. A. SEKISTOV, G. A. DEBORIN, and D. M. PROEKTOR....

"Studying the history of the Great Patriotic War and World War II as a whole Soviet military historians waged a relentless struggle against reactionary bourgeois historiography. Flagrant falsification of history, contained in the works of military writers in the US, England, West Germany, and other capitalist countries, is aimed at belittling the decisive role of the Soviet Union and its armed forces in the defeat of Hitlerism and the liberation of the peoples of Europe from fascist enslavement. It was necessary to disprove the false contrivances of the bourgeois historians, to contradict them with an objective portrayal of events. With this objective a collection of articles Protiv fal'sifikatorov istorii vtoroy mirovoy voyny (Against the Falsifiers of the History of World War II) was published in 1959. It must be recognized that military historians did not always speak against the falsifiers of history in a timely manner and with sufficient decisiveness and did not always give a deserved rebuff to the slanderers of the imperialist camp....

"Military-historical literature published after the 20th Party Congress was characterized by significant broadening of its source material base. This was made possible by the statement of the Soviet government of 13 August 1958 'Regulation on the State Archive Fund of the USSR.' Military historians were permitted freer entry to archive material which allowed much new documented information to be made accessible to scholars....

"The revival of military-historical work, which followed the 20th Party Congress, was characterized by increased interest in the study of military history by servicemen of our Armed Forces. This to a great degree resulted from decrees of the Minister of Defense USSR No 168 (1958) and 171 (1962). They clearly emphasized the importance of a thorough study of the history of wars and of military art in modern conditions, which is to contain concrete instructions for the relatively wider use

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of the experience of it in the practice of teaching and training troops. Instructions for military-historical work in the USSR Armed Forces were elaborated and stated.

"The revolution in military affairs, which is connected with the introduction of nuclear-rocket weapons, exerted great influence in the development of Soviet military-historical science during the third period. Radical changes in the structure of the armed forces and the forms and methods of conducting military operations required military historians and theoreticians to turn their attention mainly to researching such experiences of the past which had not lost their significance for new, changing situations. In particular, a more detailed study of the operations of the beginning period of the war was begun.

"In addition to successes, basic shortcomings existed in the work of our military historians. As it stated in the decree of the Minister of Defense USSR No 171 (1962), several works on the history of the Great Patriotic War and World War II are not yet on the desired ideological-theoretical and scientific level, are primarily of a descriptive nature, and lack sufficiently thorough general conclusions, particularly on questions having actual significance for solving contemporary tasks of building and training the armed forces. Questions of the development of military art in the postwar period are little studied."

Mathematical Methods of Operations Research

by Col. O. SOSYURA, Candidate of Technical Sciences, Docent; Engr-Capt S. YEREMIN, Candidate of Technical Sciences; and Engr-Capt M. GORYAINOV

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The publication of a translation of the book by T. L. Saati, Matematicheskiye metody issledovaniya operatsiy (Mathematical Methods of Operations Research, translated from English by Yu. M. PEVNITSKIY, V. S. TOMZHEVSKIY, and N. F. TRUBITSYN; under the editorship of A. P. GRISHIN, Doctor of Technical Sciences, Prof; Moscow, Voenizdat, 1963, 420 pages), was received with interest, principally by persons who encounter operations research in their practical activities.

The author states in the preface that, unlike other works in this subject, he has attempted to show the many different mathematical methods being used in operations research. To a certain degree the author has been successful in this undertaking.

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2 OF 2

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The book by T. L. SAATI is the only book in translation, which describes and illustrates the principal mathematical methods used in operations research. It discusses various methods of optimization (gradient, variational, as well as linear, quadratic, and dynamic programming), principles of the theory of games, the queueing theory, the theory of probabilities, and mathematical statistics. The book is commendable for its description of the great variety of mathematical methods used in operations research.

One must agree with the editor of the translation who pointed out that there is a considerable lack of balance in the discussion of problems brought up in this book.

The first part of the book gives a general idea about operations research.

The author briefly introduces the readers to the subject, including the history and long-range development of operations research (Chapter 1). Scientific literature does not yet have a definitely established definition of the concept "operations research." The book under review offers three definitions. In our opinion, the most appropriate is the last one which defines operations research as "rendering assistance to administrators in the adoption of decisions by providing them with the necessary quantitative information obtained by scientific methods" (page 11). Referring to one odd definition, the author states that the "incomplete idea" is the most valuable part of that particular definition. In our opinion, an incomplete idea cannot be accepted as a merit of a definition.

In discussing scientific methods of operations research, the author refers to the principal stages of research and their content (Chapter 2). He also gives practical advice, which is useful not only to researchers, but also to persons who direct the research activities and who make use of the results of completed research.

In the following chapter the author tells his readers about a very important concept in operations research, i.e., the existence of a solution to problems, and the methods of proof. T. Saati quotes interesting examples for this concept. However, in our opinion, he gives too much attention to mathematical logic and the use of truth tables (pages 53-67), even though their practical application is very limited. Usually such questions are solved without the use of special symbolism.

The fourth chapter is entitled "Elementary, Classical Methods Used in the Structure of Mathematical Models." The word "elementary" is not quite accurate, since the problems under discussion are by no means elementary; for example, differential equations, linear difference equations, integral equations, operators, analysis of dimensions, method

of steepest descent, and method of least squares. This chapter contains useful reference material. The examples given by the author are not equally valid. Some of them are clear and interesting to read (pages 69-70), while others are too sketchy.

The principal mathematical content of the book is included in its second and third parts. The second part of the book (chapters 5, 6, and 7) is devoted to methods of solving problems of optimization. It is known that problems of the determination of optima occupy a central position in operations research. Therefore, these pages are the most valuable part of the book. They contain a discussion of the following subjects: methods of solving different equations (methods of Newton, Gauss-Jordan, method of steepest descent), methods of solving inequalities (method of elimination of variables, relaxation method, exponential method), optimization methods with or without restrictions (Lagrange's method, gradient method, variational method), dynamic programming, linear programming, quadratic programming, and theory of games.

It may be noted that many of these questions have been discussed in previous works, and some of them in more detail than in the book under review. For example, we may list the following: Bellman, on dynamic programming; Gass (or Hass?), on linear programming; McKinsey, on the theory of games; a brochure by E. S. Wentzel, and others.

The book by T. Saati gives an idea of the great variety of mathematical methods of operations research and shows how much mathematical training and erudition specialists in operations research must have. At the same time, the book cannot be considered as a textbook, since the greater part of it is too condensed. It would be more correct to regard it as a reference book on mathematical methods of operations research and on some examples of their application.

Part 3 of the book discusses the following subjects: elements of the theory of probabilities (Chapter 8), principles of statistics (Chapter 10), and a review of the queueing theory (Chapter 11). Readers who have some experience in the solution of problems will be most interested in Chapter 9, "Some Supplements." In this chapter the author cites 20 examples of various problems to illustrate the use of methods described in preceding chapters. These examples are interesting in their formulation and in the applied criteria, which may be useful in the solution of other problems. The review of methods of the queueing theory is brief, but convincing. The author gives many formulations of problems and solutions, which are also valuable mainly as reference material.

The chapters on the theory of probabilities and on mathematical statistics may also be used mainly for reference purposes. The material presented by the author will not suffice if a reader wants to become completely familiar with the methods under discussion.

It should be noted that the book would gain considerably in value if it would contain a more detailed discussion with examples of optimization methods, as the latter occupy an important place in the solution of problems in operations research. The important question of selection of criteria has also been given insufficient attention, although it is known that a correct formulation of a problem and correct selection of criteria amounts to a halfway solution of the problem.

The author should be commended for his great attention to bibliography, which is appended to each chapter and lists the titles of 526 foreign books. Unfortunately, the author mentions only three Soviet authors, i.e., A. N. KOLMOGOROV, A. Ya. KHINCHIN, and B. V. GNEDENKO, and the translators and editor of the translation failed to supplement the book with a Soviet bibliography and a list of works translated into Russian.

It may be noted that a shortcoming of the translation is the large number of printing errors which make it difficult to absorb the material, and sometimes even distort the meaning. For example, page 275 cites the following formula (8-42):

$$M[(X_1 - \bar{x}_1)^2 (X_2 - \bar{x}_2)^2] = \sigma_{x_1}^2 \sigma_{x_2}^2 + \sigma_{x_1}^2 \sigma_{x_2}^2 + \sigma_{x_1}^2 \sigma_{x_2}^2,$$

where X_1 and X_2 are independent, random variables. Here, in addition to misprints in the symbols (the first product includes $\sigma_{x_1}^2$ instead of $\sigma_{x_2}^2$, and the third product gives $\sigma_{x_2}^2$ instead of $\sigma_{x_1}^2$), a serious mistake was made, since the right side equals the dispersion $D(X_1 X_2)$, and the left side equals simply $\sigma_{x_1}^2 \sigma_{x_2}^2$.

In addition, there are inaccuracies and omissions on page 162 in the formula (5-149), and on pages 92, 169, 193, 231, 273, 278, 302, 335, and 343. These and other misprints should have been listed under errata.

As a whole, the book by T. L. Saati is undoubtedly useful, both for beginners and for more experienced workers in operations research of a military and non-military character. It is mainly interesting as a reference book on mathematical methods of operations research and contains a large number of examples. The readers may check their knowledge by solving the problems and analyzing the solutions of these examples.

We would like to make two suggestions which, we believe, will be supported by many other people. First, one should begin with the publication of overt, fundamental, Soviet works of a specialized, educational, and popular-scientific character, which could be used both by specialists in operations research and by workers using the results.

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Secondly, it is time to think about the publication of an overt journal for operations research. During the initial period, one could start with the publication of a supplement to the journal Voyennaya Mysl'.

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