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# USSR Report

MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No 10, October 1985

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20 February 1986

USSR REPORT  
MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No. 10, October 1985

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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## AIR SUPPORT TO GROUND TROOPS AT 'CAUCASUS-85' EXERCISE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 4-5

[Article, published under the heading "Air Forces at 'Caucasus-85' Exercise," by Col (Res) A. Khorobrykh: "Above the Iori Plateau"]

[Text] During my years in the service I witnessed on many occasions precision performance by subunits of the various Soviet Air Forces elements and components, including at such large-scale exercises as "Dnieper," "Dvina," "Sever" and "Zapad-81".... At every one of these the aircrews were, as they say, at the peak of their game. Nevertheless I can state without exaggeration that what I observed in the skies over the Transcaucasus exceeded all expectations.

A routine event of the exercise, it would seem: advancing ground troops were to cross a river. The Kura is a comparatively wide, and at that point a swift and treacherous mountain river. The float bridge engineers were the first to reach it, undetected. Carefully observing camouflage and concealment measures, they proceeded to span the river. The banks were joined by a bridge at the designated time, and troops began moving across.

The motorized riflemen did not succeed, however in crossing the river unopposed. Barely had the first fighting vehicles reached the far bank when shells began bursting over the water. The "adversary" had learned of the crossing site and was sending a tank group toward the crossing site. The advance was threatened with stalling. The commander of the ground subunit contacted the command post by radio and requested air support.

Soon a flight of fighter-bombers appeared over the range, led by Gds Sr Lt V. Kolyvanov. Skillfully maneuvering, the pilots delivered sure, accurate strikes one after the other. The "aggressor" group was destroyed. This enabled the advancing forces to cross the river in a prompt manner and most important, without casualties, and swiftly to attack the defending force.

Honored Military Pilot USSR Maj Gen Avn Yu. Vladimirov, who was observing the combat pilots' performance, glanced at his stopwatch and stated with satisfaction: "You can set your watch by Kolyvanov. The strike was delivered precisely to the second."

Behind this laconic praise given by the senior-level officer stands a great deal, and in particular aviation personnel hard work during the summer training period, for the ease with which the fighter-bombers accomplished the difficult mission was deceiving. Success at exercises is born in hard days of combat training routine.

The aircrews of the wing in which Guards Senior Lieutenant Kolyvanov serves of course did not immediately achieve a high level of air proficiency. The pilots also experienced difficulties in the process of training, especially in organizing teamwork and coordination with ground troops. But painstaking, purposeful work carried out in the subunit helped them overcome these difficulties fairly rapidly. The combat aircrews mastered to the requisite degree the tactics of ground subunits: motorized riflemen, tankers, and artillerymen. Aircrews achieved in the process of scheduled training sorties a precision in joint actions in regard to time, lines, and targets.

A great deal of organizational work was also performed on the eve of the exercise. Representatives of aviation and ground subunits endeavored to provide for all nuances. They established in advance marking variations to designate forwardmost friendly positions, identifying marks on equipment, and modes of communication, guidance and target designation. The entire aggregate of measures made it possible to swing into action precisely at a critical moment. It served as a solid foundation for the achieved success.

This is not an isolated incident. There were many such examples. And each was accompanied by brief words of praise by the inspecting officers, who were not accustomed to using effusive praise. Frequently one could hear a brief statement of facts: "Direct hit," "without deviations," "on the first pass"....

And yet the exercise was held in difficult and unique conditions. The men had to operate in mountainous and semidesert terrain, which caused certain difficulties. Air support of ground troops was provided in the dynamics of offensive and defensive engagements, during the engagement of second echelons and reserves, and during crossing of natural and artificial obstacles. In addition the weather, like a tough inspecting officer, was also generous with "scenario changes." It was extremely hot during the entire exercise. The air, heated by the bountiful Caucasian sun, seemed to burn the lungs when breathed in, causing a leaden fatigue to flow over the body. One can imagine what qualities fighting men should possess in such a situation. They include first and foremost iron tenacity, a high degree of stamina, selflessness, composure and naturally most important, superior professional skill.

The exercise for the troops of the Transcaucasus Military District code-named "Kavkaz--85" [Caucasus-85] was a difficult, critically important test of combat maturity, for the men were called upon to operate in an environment maximally approximating that which they may encounter in actual combat and, as we know, anything can happen in combat. Such was the case at this exercise.

A group of helicopters was assigned the mission of knocking out "enemy" strongpoints. After the helicopters had taken to the air and proceeded to

head for the battlefield, a scenario instruction was radioed to one of the helicopters: the aircraft commander had been disabled. The fact is that the helicopter crewmen had not worked on such situation variants. In spite of this, however, the crew did not lose its composure. Lt Valeriy Fomin took over command of the aircraft. The young copilot-weapon officer coped with the difficult situation well, for which he was praised by his flight commander. A news bulletin leaflet soon appeared on the flight line, relating how Lieutenant Fomin was successfully accomplishing his socialist pledges in honor of the 27th CPSU Congress. With his selfless labor and excellent results in combat training, this vanguard aviator is endeavoring to honor in a worthy manner the coming Communist Party congress.

The wave formations of the aviation combined units were reminiscent of a gigantic puff pastry. The helicopter aircrews were masters of the situation just above the ground surface. Skillfully utilizing terrain irregularities, mountain passes, canyons and gorges, they approached their targets undetected and delivered devastating strikes.

"The Helicopters crews," related flight operations officer Lt Col R. Karimov, "for the most part had to fly at extremely low level. This is no simple matter in mountainous country. Nevertheless the absolute majority of aircrews accomplish their assigned missions brilliantly. Many of them have carried out their internationalist duty in the Democratic Republic of Afghanistan. The flight experience acquired there was evident in the aviators' performance at the exercise. This was especially evident in selection of sites to put down tactical airborne assault troops and in suppressing weapon emplacements spotted during the assault troop delivery...."

In the opinion of the senior-level officers, the flight consisting of aircrews led by Capt A. Zhosul, N. Yegorov, Ye. Tuchkalov, and A. Golenkov performed with particular assertiveness and skill at the exercise. The pair with Capt A. Ivanov as leader and Sr Lt G. Sitalo as wingman kept right up with the veteran pilots. These combat pilots had a particularly difficult time of it. The fact is that the tactical situation was changing very frequently in the sector in which they were operating. The crews were repeatedly retargeted while airborne. This was no hindrance, however, to successful accomplishment of their missions. The pilots competently gained their bearings in the conditions which developed, found common ground with the ground-force subunits they were supporting, and accurately knocked out designated "enemy" targets. Time and again the motorized infantrymen achieved superiority over the opposing force thanks to prompt air assistance.

The following layer of the so-called "pastry" consisted of Mi-8 and Mi-6 military transport helicopters, which flew somewhat higher than the helicopter gunships which were providing fire support. The missions of the heavy-payload helicopter crews included delivering combat equipment and assault troops. One of the transport helicopter groups was led by Military Pilot 1st Class Maj V. Filippov. During the mock combat operations the men of this subunit displayed examples of excellent air proficiency. They flawlessly maintained formation and precision in hitting the assault landing zones. The consistency of the aircrews' success was not mere happenstance. Capts G. Popov, Yu. Prokopyev,



and others, genuine experts at their jobs, serve in the squadron. Suffice it to say that all aviation commanders in this subunit are decorated veterans!

The fighter-bombers of the guards Red-Banner aviation regiment commanded by Gds Col A. Pokhodin did a big job. They were truly masters of the air situation. At a certain stage of the exercise the squadron commanded by Military Pilot 1st Class Gds Maj V. Levoshin was assigned the mission to help motorized riflemen repulse a tank assault and to suppress the opposing force's artillery. At the designated time the squadron commander, taking advantage of terrain irregularities, led his group through the "enemy's" air defense zone undetected and accurately brought his aviation into the designated area. The motorized riflemen were attempting to mark the forward edge of the battle area with colored smokes. A strong wind, however, was blowing the smoke to the rear of the defending troops. From the air it was difficult to determine the respective locations of friendly and "hostile" troops. But this turn of events did not discourage the aircrews. They detected "enemy" tanks on the basis of typical telltale signs and swiftly attacked them.

The first part of the mission was accomplished on the first pass. The fighter-bombers then hit artillery positions. A particularly fine job was done by young combat pilot Gds Sr Lt Yu. Finashkin, who quickly spotted and "destroyed" an antiaircraft gun. Thus the "enemy" assault was thwarted.

At approximately this same time a pair led by Gds Sr Lt V. Treukhov was successfully operating in another part of the "battlefield." They were assigned the mission of providing air cover to an attacking ground force. As they were approaching the designated area, the leader spotted "enemy" fighters. Making himself conspicuous, he drew them toward himself. At this moment a pair led by Gds Sr Lt A. Maslyukov reached the target at extremely low level and delivered an accurate strike without a pause.

Totaling up the results of the mission, regimental commander Gds Col A. Pokhodin highly praised the performance of these pilots.

The commanding officer had warm words of praise on this occasion for ground specialist personnel -- the tireless airfield workers. Master-rated officers Yu. Dobrov, V. Melnik, and V. Zaytsev, specialists 1st class V. Roslyakov, V. Anikeyev and others genuinely worked wonders, considerably surpassing performance standards in readying combat aircraft for sorties. Aviation personnel of the guards Red-Banner regiment are worthy successors of those fine traditions which were established by their predecessors -- war combat veteran aviators. During the "Caucasus-85" exercise veterans of the Great Patriotic War frequently visited the units to share their experience and to support with advice or simply with kind words to the young defenders of the homeland.

Aviation personnel remember a get-together with Hero of the Soviet Union M. Kantariya and full holder of the Order of Glory A. Nolov. These get-togethers provided an enormous morale, ethical, and ideological boost to all personnel. The following detail is of interest: combat training results became even better after the veterans spoke in the subunits. The folk saying is quite right: fire ignites fire.

As we know, high morale and good fighting spirit on the part of personnel plays an important role in accomplishing the missions assigned to troops. This was the case in the terrible war years, and it has also determined the course of combat training. At the "Caucasus-85" exercise commanders and political workers endeavored more fully to utilize this moral potential. Thanks to their purposeful work in this area, a strong atmosphere of aggressiveness, businesslike efficiency, mutual assistance, and kindness was maintained in the air and on the flight lines. The following examples attest eloquently to this.

An important event occurred in the lives of young officers O. Vinogradov, S. Morozov, S. Skotsenko, V. Kuznetsov, and I. Sokolovskiy -- they received a rank promotion. The regimental commander, taking advantage of a brief pause in flight operations, assembled the men and, in a solemn ceremony, presented these officers with new shoulderboards with three stars. The new senior lieutenants were warmly congratulated by their fellow soldiers and wished further success in their careers. Some time later combat news sheets appeared in a prominent location, dedicated to those persons honored at this event. Slightly embarrassed by the attention shown by their fellow soldiers, the young officers did not engage in bombast -- they endeavored to demonstrate by deed that they were worthy of their rank promotion. It is not surprising that at the end of the flight operations shift their names were mentioned again, this time as winners of the current stage of socialist competition.

A signal event for military pilot Sr Lt Ye. Poletayev was festively celebrated in the subunit. Upon returning from a mission the combat pilot, climbing down onto the concrete, found himself... once again in the air. Following long tradition, his combat friends proceeded to swing him. When the perplexed pilot somewhat regained his composure, he was warmly congratulated on logging 1,000 hours in the air. On his next sortie Senior Lieutenant Poletayev did an absolutely fine job. Receiving a solid mark of excellent on his performance, he lived up to the high praise for his past accomplishments. One can state without exaggeration that the pilot was helped successfully to accomplish the difficult task by the great enthusiasm he felt following the little ceremony.

Political workers used diversified forms and means of influencing military personnel at the "Caucasus-85" exercise. Squadron deputy commander for political affairs Military Pilot 1st Class Maj S. Panin is a genuine winged commissar. Sergey Ivanovich has the ability to talk to people in a cordial manner, to encourage subordinates, and to unite the men to achieve a common goal. He exerts principal influence on them through personal example. This veteran combat pilot accomplished all air missions with high marks. Other political workers are also a match for him. They constitute those beacons on which the men take their bearings, against which they measure up their actions and deeds.

...Things are now quiet above the Iori Plateau. Aviation personnel and fighting men of other occupational specialties took their combat maturity test here, so that no enemy will disrupt this tranquility. The goals set for the exercise were achieved. Aviation personnel did a fine job. They have amassed invaluable experience, especially pertaining to teamwork and coordination with

ground subunits. Having returned to their regular bases, aviation personnel are analyzing the achieved results. And the following brief phrase will be a convincing certificate of achievement for each and every one of them: "Participant in the 'Caucasus-85' exercise."

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## BETTER COORDINATION BETWEEN AIR SUPPORT, GROUND TROOPS NEEDED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 6-8

[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Maj A. Zhilin: "Contrasts in Coordination"]

[Text] In the course of a tactical air exercise a group of helicopters led by Maj D. Vasilevskiy was assigned a mission to neutralize an "enemy" strongpoint. The aircrews carefully figured the route and flight profile, maneuvers, designated prominent terrain features, and figured time to arrive at the target in the "enemy's" air defense zone. The commander then held a brief tactical drill.

The helicopters lifted off on schedule and proceeded toward the range in a precise formation. The crews were unable, however, to fly the mission according to the plan worked out in advance. They were informed by the command post that the tactical situation on the battlefield had changed abruptly, and the group was assigned a new mission.

The force leader was faced with the problem of analyzing the new situation as quickly as possible and reaching the correct decision. Major Vasilevskiy instructed his weapons officer to calculate a new route and time of arrival at the target. The latter quickly performed calculations and provided the required information.

The group turned to a new heading. Soon there appeared out ahead the prominent landmarks in the vicinity of which the targets were to be found. The leader gave orders to execute an antiaircraft evading maneuver. In the process of maneuvering, the crews spotted the target and carpeted it with an accurate rocket salvo. What was it that helped the aircrews successfully accomplish the mission?

First and foremost it was thorough crew preparation on the ground. We should note that the aircrews did not limit themselves just to their assigned mission. They thoroughly worked out several mission variations in case of a change in the tactical situation, which is quite probable in the dynamics of present-day combat operations, and they made preliminary calculations. They were greatly assisted in this by a representative of the ground subunit, who

related to them in detail on how the motorized infantrymen were executing a march, deploying into combat disposition, and operating according to the terrain topography.

In readying for the tactical air exercise, Major Vasilevskiy devoted considerable attention to matters pertaining to organizing teamwork and coordination with the motorized rifle subunit. A uniform system of mutual recognition and target designation signals was established, employing electronic gear and signaling devices. The aircrews rehearsed everything at a special drill. Thorough preparation of the helicopter aircrews for the tactical air exercise served as a unique foundation for their success.

The road to excellent results, however, was not an easy one for Major Vasilevskiy's men. There was a time when the aircrews were unable to establish adequate contact with ground subunit commanders. This led to actions lacking coordination, and essentially the main objective of combat training was not achieved -- concentration of common efforts on unconditional defeat of the "enemy."

I recall the following incident. During a tactical air exercise a group of helicopters was assigned a mission to support motorized riflemen in the attack. At the designated time the helicopters appeared over the battlefield. They were unable to accomplish their mission, however. The fact is that when the group took off, the leader only had the most general information about the battlefield situation. He knew nothing whatsoever about the depth of the "enemy's" defense, duration of artillery preparation for the assault, procedure of movement forward, deployment and engagement of the second echelon. Nor could he have obtained any such information, since none was communicated to the command post from the motorized riflemen.

The ground subunit commander in turn also had only a vague notion of the helicopter group's mission. His role boiled down to one thing -- to mark the forward edge of his positions in a prompt and timely manner, and that was it. But the battlefield situation changed considerably by the time the helicopters reached the scene. The motorized riflemen, however, did not even think of informing the aircrews of this, which prevented the helicopter crews from effectively utilizing the capabilities of their airborne weapons.

Of course with this kind of organization there was no possibility of solid contact, teamwork or coordination. A legitimate question arose: why is it that these finer points were not considered prior to combat? As they say, it was not necessary to go far afield for an answer. During the period of preparation for the exercise, aircrews and motorized riflemen trained separately, each following their own plan and schedule. Hence the lack of coordination in their actions and the fact that the aircrews were isolated from the actual situation.

Analyzing the deficiencies which were revealed in the course of the tactical air exercise, the conclusion was reached in the squadron that there were several causes. One consisted in the fact that the actions of the aircrews and motorized riflemen were scheduled out literally minute by minute even before the exercise began, and therefore naturally any situation change, even

the smallest, would disrupt the prepared schedule and lead to various coordination problems. Fearing, however, to depart from a schedule and plan approved by higher headquarters, neither the air nor combined-arms commanders endeavored to display initiative, personally to evaluate the developing situation and to reach independent decisions. In connection with this the actions of their subordinates naturally were unoriginal.

Of course one can foresee the argument that a plan and schedule are prepared for the purpose of being executed. Yes, that is so. But the point in question is that a battle plan is not cast in cement. In the course of battle the tactical situation can change quite considerably both in spatial and temporal parameters. Unfortunately coordinating parties sometimes forget this fact. Suffice it to say that during the exercise the battalion commander, for example, did not once request air support, since it had not been planned and scheduled in advance. And yet there were times when the motorized riflemen needed air support badly. As a result the helicopter crews, just as the ground subunits, operated independently and on their own, although they were performing a common mission. As a consequence helicopters flew several strikes on platoon strongpoints when they could have effectively engaged small exposed armored targets, while the strongpoints would have better been suppressed with artillery. It also sometimes happened that aircrews and artillerymen worked on the same targets. The duplication was due not so much to an endeavor to inflict maximum possible damage on the "enemy" as to an elementary lack of coordination.

Practical experience convinces us that coordination should be established first and foremost between those directly executing the plan of higher headquarters, since they are in the thick of events and as a rule possess the fullest and most up-to-date information on the tactical situation, and therefore are able more precisely to gain their bearings in a specific situation.

Certain experience has been amassed in this respect in Major Vasilevskiy's squadron. They used to proceed as follows. Prior to commencement of a tactical air exercise, helicopter crews would fly over the exercise area, in the course of which crews would practice the most advantageous runs on targets, practice aiming, etc. This unquestionably helped them carry out their missions with precision. At the present time, however, this subunit has been refraining from such "rehearsals," and I believe they are correct in doing so, for in this manner one can deceive only oneself, but not the adversary, who in actual combat will be employing military cunning, the element of tactical surprise, and various means of attack and defense. Therefore aircrews must be taught to obtain their bearings proficiently in any situation, even the most unexpected. For this reason the squadron commander coordinates all matters connected with a forthcoming combat engagement with a representative of the combined-arms subunit. During a meeting with him they draw up a plan of joint actions, which is subsequently communicated in detail to flight personnel. Aircrew mission briefings take these requirements into account, and aircrews consider them when modeling possible battlefield situations and forecasting their actions in specific conditions.

Thus each combat pilot can select an optimal variation of flight to the target and air defense penetration. In addition, by maintaining their bearings well in an altered situation, aircrews are capable of intelligently and promptly determining for themselves the primary target and can effectively employ the appropriate weapons.

Combat today is highly dynamic and imposes special demands on coordinating elements. In particular, assignment of new missions to aircrews when airborne and switching their efforts from one target to another directly over the battlefield is a normal and entirely logical phenomenon. Capt A. Bagrov's flight, for example, was to hit "enemy" strongpoints. Reaching the designated area, the pilots proceeded to look for the targets. At this point the leader spotted an "enemy" tank column moving forward from behind a wooded area. Analyzing the situation, Captain Bagrov made the decision to attack the tanks. The leader hit the lead tank with marksman accuracy, while his wingman hit the trail vehicle. The other crews also worked over the tank column. The "enemy" assault was thwarted thanks to prompt and timely air assistance.

The success of Captain Bagrov's flight cannot be called a chance occurrence. In the process of training, this subunit's aircrews devote considerable attention to retargeting when airborne and learn to grasp the ground environment and make an optimal decision in complex situations.

Practical experience indicates that most frequently lack of coordination between air and combined-arms subunits involves time, locations, and targets. What is the problem here?

As we know, successful coordination depends in large measure on clear and precise understanding by personnel of their mission, marking of the forwardmost troop positions, and location of friendly and "enemy" subunits. The forward edge of the battle area can be designated by means of pyrotechnic devices: flares, colored smokes, and identifying markings can be placed on equipment. All this of course helps aircrews spot the "enemy." At the same time the experience of Major Vasilevskiy's squadron indicates that at times, especially in adverse weather, these measures are insufficiently effective. It is precisely here that the question arises of special preparation of a forward air controller, whose job would be to control the actions of airborne aircrews according to development of events on the battlefield and the needs of the supported subunits.

We should state that considerable influence is exerted on organization of teamwork and coordination by aviation personnel knowledge of ground forces tactics and the combat capabilities of their weapons. In the squadron in question, for example, they endeavor to organize, to the extent possible, exchange of experience and know-how with motorized riflemen, tankers, and artillerymen. Familiarity with their equipment, weapons, and changes in tactics proves highly beneficial, especially when preparing for a field exercise.

Military Pilot 1st Class Capt A. Bagrov has the following opinion on this score: "Various situations can develop when working with combined-arms subunits, situations where full mutual understanding is required. Let us say

that my radio goes out on me during combat: I rock my aircraft, release a red flare, and switch on my rotating beacon. The other pilots will immediately know that my radio is out. But will the combined-arms commander understand? I think not, for he is not acquainted with such specifics. This might seem to be an unimportant example, and yet the whole is made up of small parts. Therefore it is necessary to discuss, coordinate, and clarify everything in advance.

"Here is an example of a different kind. I shall put it bluntly: neither I nor my comrades have ever seen a combined-arms commander's working map, just as I am sure that few motorized riflemen or tankers are acquainted with ours, and yet they reflect the initial battle plan. In order to coordinate all unclear or debatable items, teamwork and coordination classrooms should be maintained. We would have established such a classroom long ago, but the fact is that it is not specified by any documents, and therefore no money is allocated for setting one up."

We should note that efforts are being made in the subunit to arrive at a solution. In particular, they have improved the tactics classroom, which contains posters, books, and pamphlets on ground forces operations. This unquestionably helps aviation personnel in their training. But it is interesting to note that this classroom, just as organization of get-togethers, is a matter of unofficial activity by aviation personnel, grounded solely on their initiative and imagination. A question legitimately arises: is it not high time to think about supplying helicopter crews in a centralized manner with appropriate training aids and documents and legitimating joint training classes with aviation personnel and motorized infantrymen, who will be carrying out a common mission in combat in close contact with one another.

Problems which the squadron command authorities cannot resolve with their own resources include the following: who should perform the role of forward air controller at a field exercise? The battlefield situation is constantly changing, and pilots must be continuously informed on changes, targeted to the strike objective, be given an attack vector and a target breakoff heading. Many questions arise in combat, and the forward air controller is precisely that element which should combine knowledge of the ground situation, an understanding of air operations, and the ability to control them.

Unfortunately practical experience demonstrates that not all forward air controllers meet these requirements. There have been cases where some FACs have done a poor job of briefing helicopter aircrews and performing target designation. And yet airstrikes are delivered precisely in support of ground subunits. Consequently, a forward air controller should possess equally thorough knowledge of air tactics and ground forces tactics. But who should perform the function of forward air controller? A motorized rifleman, tanker, or aviator?

Opinions differ on this score. Combined-arms commanders are of the opinion that target designation should be provided by a ground forces officer, arguing that he has a better understanding of development of the battle and can more easily make the right decision. Of course this argument is correct to a certain degree. But the problem is that this officer does not know how



certain landmarks appear from the air and how targets project, especially combat equipment. This naturally results in guidance errors.

The squadron was working on a variation where the function of forward air controller was performed by an aviator. Things went better, but the principal shortcoming lay in the fact that a pilot is first and foremost an air warrior, and his place is not in a foxhole or armored personnel carrier but in the cockpit of a helicopter. What is the solution? In the squadron they hold that aviators grounded from flying can be designated to handle battlefield tactical control of helicopters. As a rule these are officers with a great deal of practical experience and know-how, which they can fully utilize in tactical control of air. In addition, assigned to specific duties, they are capable of thoroughly studying the tactics and equipment of motorized rifle and tank subunits, taking part in devising exercise plans and schedules, and of suggesting to the commander of a ground subunit when and how air can best be employed.

All this should also have a positive effect on flight safety. Since helicopters operate for the most part low over the battlefield, live fire by tanks, howitzers, and mortars sometimes presents a considerable danger. If he is familiar with the battle scenario, the forward air controller will be able promptly to issue the command to cease fire, to ensure safety for air operations, and subsequently to back up an airstrike, with that same artillery, for example, to achieve maximum neutralization of the "enemy."

There should be a specific system employed in training forward air controllers, just as other military specialists: regular scheduled classes, briefings, and exchange of know-how. Both air and combined-arms commanders should be committed to this, for one can scarcely count on success without joint efforts.

Analysis of the experience amassed in the subunit commanded by Lt Col Vasilevskiy (he was recently promoted to this rank) attests to the fact that it is essential to resolve a number of problems, and not only at the squadron level, in order to achieve further teamwork and coordination between air and ground forces.

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## NEW BOOK 'EXPOSES' U.S. MILITARY BUILDUP PLANS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) p 12

[Article, published under the heading "Assisting the Propagandist," by Sr Lt N. Gudzyuk: "Sinister Plans: Calculations and Miscalculations"]

[Text] A policy aimed at gaining military superiority over the USSR and the other countries of the socialist community is a most dangerous manifestation of the criminal policy of U.S. imperialism. It constitutes a large-scale, coordinated and long-range program of action, which encompasses a broad aggregate of interlinked military-political, economic, diplomatic, and ideological actions on the part of U.S. ruling circles both within their own country and beyond its borders. The criminal policies of U.S. imperialism and its war preparations, which are dangerous to all mankind, are discussed in a book entitled "SShA: kurs na voyennoye prevoskhodstvo" [The United States: Aiming for Military Superiority] (by V. V. Serebryannikov, Ye. I. Rybkin, I. P. Slivin, and S. V. Korshunov, Moscow, Voenizdat, 1985, 111 pages, 30 kopecks).

As we know, the United States and its NATO partners are counting on coercive pressure in settling disagreements and disputes on international issues. Appropriating "special rights" for itself, Washington is claiming the role of hegemonic power in the world and is undertaking acts of aggression against and riding roughshod over other countries. The authors note that just since the end of World War II the United States, according to figures in the U.S. press, has used military forces on more than 200 occasions to achieve its foreign policy objectives.

Vast appropriations have been channeled toward achieving U.S. military superiority over the socialist countries. In 1982 such appropriations totaled 226 billion dollars, approximately 300 billion in 1985, while the total will reach two trillion dollars in the period 1985-1989.

The authors persuasively reveal the ideological foundation under the anti-Soviet war hysteria. For example, in order to wrest from the public money for military needs, and to the detriment of social programs, bourgeois ideologues are persistently drumming into the heads of the Americans the insane notion of a "Soviet military threat" and that it is "better to be dead than Red." This

ideology, which expresses the striving of U.S. imperialism toward world domination, seeks to justify an extremely reactionary goal: not simply the "pushing back" of communism, as was once the case, but its total "eradication."

The authors stress that U. S. imperialism relies first and foremost on the armed forces in its adventuristic policy. The foundation of U.S. military power and nuclear potential is comprised of strategic offensive forces, which encompass intercontinental ballistic missiles, strategic bombers, including 617 nuclear weapons delivering bombers, and missile-armed nuclear submarines.

Essentially the Pershing II ballistic missiles and land-based cruise missiles which are deployed in a number of countries in Western Europe also count as strategic offensive forces. They are capable of hitting strategic targets over a considerable portion of the European part of the USSR and are intended as first-strike weapons. Plans call for deploying a total of 108 Pershing II launchers, with deployment to be completed this year. Plans call for deploying 464 cruise missiles in 1988.

The authors report that an all-encompassing program to increase strategic arms right up to 1990, devised by the present Administration, pursues the aim of implementing the adventuristic plans of U.S. imperialism to establish world domination. In particular, it calls for a buildup of efforts in the area of strategic air forces. For example, the new B-1B bomber will enter service with the U.S. Air Force this year. According to reports in the foreign press, its range is 12,000 kilometers, and it carries a maximum combat payload of 56,700 kg. It is capable of carrying up to 30 strategic cruise missiles. The Pentagon plans to purchase 100 of these aircraft to augment its B-52 bomber force. Plans also call for building improved second-generation air-launched cruise missiles.

A fundamentally new strategic bomber, the ATB, is presently on the drawing board. It is believed that air defense assets currently in service are incapable of detecting it, and therefore it can be employed to deliver nuclear sneak attacks. Plans call for building more than 130 of these bombers in the 1990's.

Militarization of space has become an important component part of the overall policy of the U.S. Administration aimed at "rearming America." The authors discuss in detail stepped-up U.S. efforts to develop space weaponry, including advanced means of antiballistic-missile defense. For example, it is reported that special space commands have already been formed within the U.S. Air Force and Navy and that the decision has been made to create a joint armed forces space command. Utilization of the multiple-mission manned space shuttle is developing a candidly military directional thrust. It is planned to use space shuttles to launch into orbit laser and other weapons to destroy space, air, and ground targets.

A special place in Washington's plans is occupied by a "comprehensive" antimissile defense system with elements of space basing. The United States' decision to prepare for "Star Wars" is not simply a quantitative leap forward in the spiraling arms race. Advocates of military ventures are counting on

obtaining the capability to deliver a nuclear first strike with impunity, hiding behind an ABM shield.

The authors emphasize that current U.S. military doctrine is aimed at launching a first strike and focuses on victory in a nuclear war, which U.S. ruling circles are planning to achieve both in a "limited" war and in the case of a global thermonuclear confrontation. U.S. military-political leaders are placing on that country's armed forces the obligation to be prepared to inflict a defeat on the Soviet Union at any level of military conflict. The authors stress that this is the objective of an aggregate of measures aimed not only at developing qualitatively new weapons but also at a sharp quantitative buildup of nuclear arms, at increasing the flexibility, efficiency, and survivability of the armed forces command and control system.

The clear and bright realities of today convincingly demonstrate, however, that U.S. imperialism's policy aimed at intimidating the USSR with military force and exhausting it economically is illusory. No efforts by imperialism are capable of altering the correlation of military forces in its favor. The approximate military equality between the USSR and the United States, between the Warsaw Pact and NATO objectively confirms that the socialist states are capable of rapidly solving the most complex economic and technical problems. The economy, science and technology in the Soviet Union are presently at a level whereby the USSR is capable of developing in the very shortest period of time any weapon on which the enemies of peace and socialism would place their cards.

"In a complex international situation," stresses CPSU Central Committee General Secretary Comrade M. S. Gorbachev, "it is more important than ever to maintain our homeland's defense capability at a level whereby potential aggressors will be well aware that any encroachment on the security of the Soviet Union and its allies, on the peaceful lives of Soviet citizens will be met with a devastating retaliatory strike. Our glorious Armed Forces will continue in the future to have at their disposal everything they need to accomplish this."

This applies in full measure to the Soviet Air Forces. Ideologically conditioned fighting men who are totally devoted to the homeland and who possess a skilled mastery of potent aircraft and weapons serve in the Air Forces, which have modern hardware at their disposal.

The materials contained in this volume remind military aviation personnel of the growing military danger presented by imperialism and call upon them to boost their level of combat proficiency, discipline and vigilance.

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AN-12 FLIGHT TECHNICIAN AND CREW UNDER FIRE IN AFGHANISTAN

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 14-16

[Article, published under the heading "Pre-Congress Competition Leaders," by Col I. Svetlichnyy: "Winged Flight Technician..."]

[Text] The thundering aircraft turbines fell silent. The aircraft door opened, and Capt G. Bogdanov sprang lightly to the ground. The military transport aircraft, on which the officer was flying as senior flight technician, had just returned from a flight to the Democratic Republic of Afghanistan, where the Soviet aviators had been delivering food and medical supplies.

His thickset, athletic figure was clad in a light tan flight suit, and the ironed collar of his green shirt stood out in contrast against his tanned, cleanly-shaven face. It was as if they had not just experienced those long hours of flight in the night sky and the sinister muzzle flashes from dushman [bandit=Afghan rebel] machineguns. In spite of his fatigue, Gennadiy Sergeyeovich was composed and confident. As a rule this ability to take oneself in hand at the necessary moment is characteristic of persons with a strong will and firm character.

At this morning hour the air was already filling with the sweltering, exhausting breath of an airfield which has been thoroughly scorched over the course of a long summer. Bogdanov did not seem to notice the oppressive heat, however. While the aircraft commander, Military Pilot 1st Class Capt A. Druz, was completing cockpit shutdown procedures together with his copilot, Lt S. Glukhov, and navigator Lt M. Saleynikov, Bogdanov made ready for an exterior inspection of the aircraft. There was a reason for this. After landing, when the aircraft commander had taxied the ship to the ramp and shut down the engines, the aircrew's sensitive ears caught a strange sound in the dying roar of one of the engines. It sounded like somebody was playing a drumroll inside the engine.

Gennadiy Sergeyeovich instructed the flight technician for airborne equipment, Capt A. Chugunov, to put a ladder to the engine and remove the engine inspection covers.

"Let's find out where this noise came from," he said, concern in his voice.

Chugunov tried to reassure the senior flight technician. Why get so worried over a trivial matter? There was really no problem. The engines had operated normally during the flight, and as for that lousy knocking sound, fatigue can cause one to imagine anything. But Bogdanov would not budge.

"Anatoliy Stepanovich," Bogdanov stated with firmness, as if he had not heard what his subordinate had said, "we shall begin our inspection with the number two engine."

This experienced specialist's intuition was right. Following a thorough inspection, Captain Bogdanov discovered excessive play in one of the prop blades on the number two engine. It had apparently been struck by a bandit bullet. Two securing pins seemed to have sheared off.

"What shall we do?" asked Captain Druz after hearing the senior flight technician's report. "We are scheduled to go out again in a few hours. How long will it take to replace the prop?"

Bogdanov replied. The aircraft commander looked at his watch and smiled: "I was under the impression that much more time was specified for this operation. Will you be able to get it done, Gennadiy Sergeyeovich?"

"Everything will be ready by departure time, comrade commander," replied Bogdanov, hesitating only a second.

After he left, Captain Druz said to the other members of his aircrew: "Since Bogdanov has given his word, everything will be accomplished on time and done right."

Anatoliy Yemelyanovich knew what he was talking about. In recent years, in the most varied situations, he had seen convincing proof of the high degree of professionalism of his senior flight technician. The crew members knew that in readying for flight operations Gennadiy Sergeyeovich conscientiously performed each and every preflight procedure on the aircraft, following a rigorously-defined sequence and doing everything prescribed by rules and regulations. On this occasion as well, Bogdanov reported to the aircraft commander precisely on schedule that the aircraft was in readiness to go out again.

This officer frequently gives assistance to his comrades. I recall an incident which occurred some time ago, when a ramp-adjacent aircraft, which was taking off on a flight to a distant destination, continued around in the pattern and landed. The left main gear had failed to latch on retraction. And yet this aircraft had been up several hours prior to this time and all systems had operated normally. They proceeded to look for the cause of the malfunction. Bogdanov also pitched in. He applied light pressure to the left gear door, and it yielded readily.

"Probably the cylinder seal is leaking," the officer surmised.

An inspection confirmed that he was right. The problem was quickly corrected, and the aircraft again departed.

A serious discussion was devoted to this incident at a party meeting. Addressing the meeting, Gennadiy Sergeyevich commented that if the officer had inspected the aircraft more carefully, it would not have been necessary to abort the flight.

Bogdanov's love for aviation dates from his youth. His father, Sergey Nikolayevich, a diesel locomotive engineer, gave his approval to his son's dream of becoming a career military man. After graduating from secondary school, Gennadiy applied to the Daugavpils Military Aviation Technical School imeni Yan Fabritsius. He successfully passed the competitive entrance examinations. He studied hard, avidly acquiring knowledge. Upon graduation he was made a fighter technician. At first officer service seemed totally to lack tranquility: there were practice alerts, flight operations day and night, and hard work at the airfield.... He quickly became accustomed to it, however, and became genuinely attached to the aircraft. And very soon he had groomed his own aircraft to a state of excellent.

A great many years have passed since then. Bogdanov is now flying as a senior flight technician, and he services his aircraft conscientiously and with the same old zeal.

Yes, Gennadiy Sergeyevich loves his occupational specialty, a difficult, honorable field of endeavor which is greatly needed by others. He, just as the other crew members, is well aware of how impatiently the people in distant Afghanistan await the nonmilitary cargo they haul to that country. At times these flights involve an element of danger.

...The incident occurred at an altitude of about 3,000 meters, when the AN-12 was headed for the airfield at the town of Shindant. 30 minutes out from their destination, Lieutenant Glukhov, the copilot, who was scanning to the right, shouted: "Skipper, a missile! Over there! It's heading toward us."

Now everybody spotted the exhaust flame of the swiftly-approaching missile. A fatal outcome seemed inevitable. But Captain Druz was alert: he immediately determined evasive maneuver initiation point and abruptly banked the heavy aircraft. The missile flew past harmlessly. Soon the navigator, Lieutenant Saleynikov, spotted a second missile. Fired by bandits, it was heading straight for the aircraft. And once again the aircraft commander's piloting skill saved the day. Anatoliy Yemelyanovich throttled back all the way, to drop engine temperature, and abruptly applied full left pedal. Simultaneously he ordered the navigator: "Pop flares!"

The crew members watched in nervous expectation as the defenseless military transport aircraft sought to outwit the missile. The dushman failed this time as well. Scarcely had the Soviet aircraft returned to its enroute heading, however, when it began to take heavy-machinegun fire from a nearby hill. Maneuvering evasively, the pilot succeeded in getting out of range and safely reaching the destination with his nonmilitary cargo.

And there were many such flights. The difficulties merely toughened the will and character of the aviators and developed such important moral-psychological qualities as mental sharpness, ingenuity, and resolute determination to achieve the stated goal. Following one such flight, Bogdanov submitted an application to Communist Party membership.

Gennadiy Sergeyeovich maintains that this was one of the most important moments in his life. The squadron Communists accepted him to probationary membership in the CPSU. That moment brought back a rush of memories. Tears of joy in his parents' eyes when they saw him in his new officer's uniform for the first time. Memorable tactical air exercises, at which he earned his first commendation. At formation the commanding officer had commended the young officer for flawless performance of duty, excellent preflight readying of his fighter, and presented him with a valuable memento in honor of the occasion. Gennadiy Sergeyeovich also recalled something else.

In 1963, as his 14th birthday approached, when he was preparing to join Komsomol, Gennadiy read a speech by Vladimir Ilich Lenin entitled "Tasks of the Unions of Youth." It is unlikely that at the time he was fully aware that he was encountering a great and wise doctrine. And he certainly had no inkling that he would become an armed defender of the homeland, an aviation specialist, that he would hone his intellect and draw inspiration from the life-giving wellspring called communism, that he would take in and generously pass on to others his own understanding. Bogdanov was reading at the time a speech by the leader of the revolution presented at the Third Komsomol Congress, and he had this feeling that Vladimir Ilich was chatting personally with him and telling him how one should live, work, and struggle. Gennadiy was already dreaming about becoming an active fighter in the ranks of the Leninist Party.

It is not surprising that the detachment Communists have been electing Bogdanov their leader year after year. He shows the men a personal example in all things, mobilizes aviation personnel to achieve additional success in combat and political training, and assists the command authorities in organizing socialist competition to greet the 27th CPSU Congress in a worthy manner. Recently officer Bogdanov was awarded the Distinguished Service Medal for flawless performance of military service and exemplary performance of his job duties, and received a rank promotion by order of the USSR Minister of Defense.

"There are no trivial items in our work," says Captain Bogdanov. "Some people, for example, consider maintaining technical documentation a simple formality. And yet this is a serious business...."

He then related an incident from his own experience. Flight operations were in progress. Gennadiy Bogdanov, a young officer at the time, was readying one of the aircraft. Completing preflighting procedures, he reported this fact to the flight technician. The latter inspected his work and said: "Why is it that you have readied the aircraft, and yet there is not a single notation in the documents?"



Gennadiy's cheeks turned red: "Sorry, comrade senior lieutenant, I forgot."

"Your forgetfulness could be costly...."

After some time Bogdanov became convinced that his older comrade was right. He realized how important and necessary are the log entries which specialist personnel make when preflighting an aircraft.

Time.... Months and years pass, and each leaves its memorable mark in this officer's biography. New and distant air journeys, encounters, calls by orderlies, and calls to assembly lie ahead for party member Bogdanov. It is this which constitutes officer service. A rigorous, but most honorable profession -- that of defending the homeland.

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## KHARKOV AIR-FORCE ELECTRONICS SCHOOL

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[Article, published under the heading "Military Educational Institution Affairs," by Col V. Obukhov: "Taking Experience Into Account"]

[Text] There is an Air Forces higher educational institution which has twice been awarded a challenge Red Banner of the Air Forces Military Council in the last two years. It is the Kharkov Higher Military Aviation School of Electronics imeni Ukrainian Komsomol. Established almost half a century ago, over the years it has trained thousands of highly skilled, ideologically conditioned signal troops and electronic flight operations support officers.

Many of its graduates today hold high command and engineer positions in signal units and Air Forces electronic services. The school's graduates recall with a deep sense of gratitude those commanders, political workers, and instructors who ushered them into military life, introducing them to the amazing and complex world of military electronics.

These days, when preparations for the 27th CPSU Congress are in full swing in the Air Forces, a great deal is being done at the school toward the development of future officers. The training and indoctrination process focuses on ensuring that the young communications and electronics specialists, reporting to their new duty assignments following graduation, feel sufficiently well informed and knowledgeably set about the work of training and indoctrinating their subordinates.

Carrying out the requirements of the CPSU Central Committee and USSR Council of Ministers decree entitled "On Further Development of Higher Education and Improving the Quality of Specialist Training," the school's command authorities, political section, teaching faculty, and party organization have improved teaching and indoctrination work with enrolled personnel. There has been an appreciable increase in activeness on the part of commanders and instructors in political and military indoctrination of the future officers. Recently work has been done at the school to strengthen party influence on the curricular process and to improve the quality of specialist training. The political section and school council have taken specific measures to improve communist indoctrination of enrolled personnel, to achieve further development

of teaching faculty initiative in party-political work, and to boost the ideological content of lectures and seminar classes. The school council gave recommendations to department heads on scientific organization of the curricular process taking into account the students' level of knowledge of theory and applied skills.

A great deal has been done at the school to improve quality of planning. Recommendations on a problems approach to teaching and on improving teaching facilities taking into account scientific and technological advances in the field of communications and flight operations electronics services have been drawn up and are being successfully implemented. The pace in this area is being set by leader-Communist L. Shelegov, A. Safronov, V. Novichkov, V. Vendrov, V. Bondar, A. Kitach and others.

Research studies and methods materials in the social sciences are being effectively utilized at these schools. A good many monographs, theoretical studies and visual aids, deep in content and valuable in conceptual layout, have been prepared at the school, fostering further development of theory and practice of party-political work in the school's departments and courses of study. Authors include party members V. Fedorov, V. Seleznev, A. Dobritskiy, V. Taranenko, B. Fuksman, S. Vasilyev, and other methods specialists.

The political section and party committees of the faculties and the party buros of the departments have increased demandingness on instructors regarding quality of indoctrination of students. Party buro discussions of summaries and reports by instructor-Communists on their activities pertaining to instilling in the students communist consciousness, moral staunchness, and class hatred toward the enemies of the socialist homeland have become regular practice. This has produced results in improving the quality of teaching of the social sciences and publicizing party and Soviet Government decisions.

The agitation and propaganda team attached to the school's political section is doing a great deal to strengthen unity of the curricular process and indoctrination work. Members include the best-trained Communists -- administrators and teaching faculty. Recently they have presented lectures for the students on the following topics: "The CPSU -- Guiding and Directing Force of the Soviet People"; "Communist and Worker Parties in the Struggle for Peace"; "The CPSU -- Organizer of Organizational Development of the Soviet Air Forces"; "Development Prospects of Electronics in the 12th Five-Year Plan"; plus others. These lectures have generated considerable interest and approval on the part of students and members of the agitation and propaganda team.

In the course of competition to greet the 27th CPSU Congress in a worthy manner, school personnel have appreciably heightened interest in mastering Marxist-Leninist theory and practical party-political work. At the initiative of party member-students, a scientific-practical conference was held for graduating-year students on exchange of experience and know-how in political indoctrination work, to which representatives from line units and school veterans were invited. The students listened with great attentiveness to valuable advice on matters pertaining to political and military indoctrination of enlisted personnel, noncommissioned officers and warrant officers.

Command authorities, teaching faculty, the party and Komsomol organizations are devoting serious attention to instilling vigilance and moral staunchness in the future officers. Administrative personnel party members regularly present lectures and reports in the subunits, conduct discussions on the moral countenance of the Soviet serviceman, and explain the party's demands on further increasing Air Forces combat readiness.

Work on technical publicity is being conducted very well at the school. It has become a tradition here to hold military-technical conferences, at which graduating-year students give addresses. Topics addressed include love for the chosen profession, principles of combat employment of communications and electronic services facilities and equipment, utilization of advanced techniques of operation, servicing and maintenance of electronic equipment, and promising directions of development of science and technology. Candidates of technical sciences officers V. Blednov, V. Vinogradov, and A. Chumakov, candidates of military sciences officers B. Baybakov, A. Saliy, and others have organized such conferences.

At these conferences paramount importance is attached to forming in each student professional knowledgeability, political vigilance, and pride in the achievements of Soviet science and technology. Party measures to implement the general-curriculum and vocational school reform are widely reflected in the indoctrination of future officers. The CPSU Central Committee and USSR Council of Ministers decree on this matter is of enormous general political significance and is helping boost the students' level of education and overall educational awareness, their professional qualifications and civic activeness.

Scientific and technological advance in military affairs has helped not only enhance the role of military-technical knowledge but has also imposed more stringent demands on the tactical training of future officers and their ability most effectively to employ communications and flight operations electronic support equipment in today's complex combat. Moral-psychological fortitude and initiative in conditions of a rapidly changing air and ground environment are today demanded of each and every one of them. The tactics department teaching faculty, under the guidance of Candidate of Military Sciences Col A. Saliy, working together with cadet subunit officers, are purposefully instilling the requisite fighting and moral-psychological qualities in the cadets. In this department all practical class activities in tactics and military topography are conducted in the field, frequently by the training camp method. This broadens the capability maximally to approximate the training environment to actual combat and makes it possible to combine to a greater degree class activities in the tactical subjects with protection against weapons of mass destruction. Such classes in the field are highly beneficial and help develop in the cadets command skills as well as the ability to organize and conduct party-political work in the dynamics of performing complex mock combat missions.

Quality training facilities, which greatly support and aid in improving cadets' knowledge of theory and requisite skills, are the pride of the school's staff. Half of the lecture halls are equipped with TV, and more than one third of the classrooms are equipped with technical teaching and learning aids. Use of computers in the curricular process and equipping of

laboratories with the latest teaching, learning and monitoring devices are the main directional thrust in further developing the teaching facilities of this higher educational institution.

A training communications center, a teaching skills laboratory, a methods complex for teaching the social sciences subjects in the department of Marxism-Leninism, a senior project consultation center, a flight safety classroom, plus other unique training facilities have been established here just in the last two or three years alone. Computer centers are being set up in the faculties.

Innovators have devoted particular attention to equipping lecture halls, the interior appointments of which meet today's ergonomic and aesthetic demands. Each such lecture hall has been equipped with a set of technical teaching and learning devices, including TV cameras, TV projection equipment, monitors, working in concert with LETI and Proton slide projectors, as well as VCR equipment and tape recorders. Efficiency innovators Lt Col K. Pesterev, Majs V. Danilenko, Yu. Kurilov, and Ye. Tertyshnyy, Capt A. Klimenko, Sr WOs A. Novitskiy, P. Demin, and others took active part in equipping the lecture halls.

The party committees of the faculties seek continuously to improve training devices and simulator equipment. Party members, and Komsomol activists, emulating the former, keep a constant eye on the process of equipping new training class and practice drill facilities, support innovative efforts by skilled innovators, prompting them toward personal exemplariness in the campaign for technical sophistication, and instill in them a feeling of responsibility for prompt movement of training equipment on-line.

Innovators see their task as not only displaying concern about the adoption of efficiency innovator suggestions originating at the school but also in borrowing all new and advanced innovations appearing at neighboring facilities and at the Exhibit of Achievements of the USSR National Economy.

More than 50 invention applications have been filed, 11 certificates of invention have been issued, approximately 1,500 efficiency innovator suggestions have been adopted at the school during the years of the 11th Five-Year Plan, and industrial enterprises have proceeded with setting up manufacture of one simulator. Activist efficiency innovator Capt Yu. Kirilenko was awarded a Diploma and Bronze Medal by the Exhibit of Achievements of the USSR National Economy for a unique display submitted to the Exhibit.

For the school's innovators the campaign for technological advance and extensive adoption of the principles of scientific organization of the training and indoctrination process has become a mandatory element of one's daily life and work.

Cadet military-scientific work is also becoming broader at the military educational institution with each passing day. In the last 4 years the number of cadets who are military scientific society members has more than doubled. They have prepared more than 1,000 papers and reports to be presented at

military-scientific conferences, and have coauthored with faculty members 25 interesting, content-filled articles.

More than 300 papers were submitted in the school competition on military science and technology, and 50 of these were submitted to the All-Union Competition for student scientific papers in the natural and applied sciences and the humanities. Three cadet authors of papers were awarded diplomas of the USSR Ministry of Higher and Secondary Specialized Education and the All-Union Komsomol Central Committee. The authors of 32 papers were awarded certificates of the All-Union Competition organizing committee. Eight interesting and original projects were selected for the republic touring exhibit.

All this has become possible thanks to the initiative and purposefulness on the part of cadets and a high degree of methods expertise on the part of their teachers. A university of pedagogic knowledge and a novice instructor seminar have been functioning at the school for about 10 years now, and a program of methodological training and pedagogic self-education for teaching faculty is being drawn up and implemented, providing for the holding of seminars and graded papers at the end of each school year. Scientific-methods conferences are also held each year. Conferences have been held at the school on the following topics: "Leninist Principle of Communist Party-Mindedness and Its Implementation in the Training and Indoctrination Process in Light of the Demands of the 26th CPSU Congress"; "Theory and Practice of Methods of Active Cadet Teaching and Learning"; "Scientific-Methods Fundamentals of Senior Project Guidance"; "Optimizing the Process of Teaching and Indoctrinating Cadets"; plus others.

Problems-approach and programmed learning, stage-by-stage forming of knowledge and skills, and the games method of learning are being more and more extensively incorporated into the curricular process. A teaching manual entitled "Theory and Practice of Cadet Active Learning" has been produced to aid instructors.

Lecture halls extensively employ television, sound recording and reproduction equipment, as well as static projection equipment. This makes the teaching process more graphic, enhances the emotional content of lectures, seminars, and other training activities, and substantially improves the quality and effectiveness of the teaching and indoctrination process.

Cadets at the Kharkov Higher Military Aviation School of Electronics mature and their professional skills and ideological conditioning grow in the course of a hard, intense training routine. Competing to honor the coming 27th CPSU Congress in a worthy fashion, they are filled with the endeavor to gladden the homeland with additional successes in mastery and skilled employment of communications equipment and CPSU Air Forces electronic support services.

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SOVIET POLICY OF PEACE AND DISARMAMENT CLAIMED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 18-19

[Article, published under the heading "At the Fronts of the Ideological Struggle," by Candidate of Philosophical Sciences Col E. Korsakov: "Policy of Peace Against Military Confrontation"]

[Text] In the struggle for peace and social advance the CPSU follows a consistent policy line directed toward all-out unification of the forces of socialism, the international communist and worker movement, the national liberation and mass democratic movement throughout the world. Many recent party documents emphasize that we are championing the historic righteousness of the great ideas of Marxism-Leninism and, together with all revolutionary, peace-seeking forces of the contemporary era, stoutly advocate the security of peoples. The defense of peace requires unified, coordinated and active efforts by all peace-loving forces against the aggressive, adventuristic policy line of imperialism. It is essential to increase the vigilance of peoples, to preserve and continue to build upon the achievements of socialism.

This is especially important today, in conditions of an international situation which has become sharply aggravated through the fault of the aggressive forces of imperialism, and in conditions of heightening of a genuine danger of war. Reactionary imperialist circles, particularly the United States, ignoring the lessons of history, have declared a new "crusade" against socialism and are attempting to shatter the established military balance and to achieve military superiority over the USSR and its allies. In so doing, they hide behind the lying myth of a "Soviet military threat." The facts, however, indicate something quite different. For example, the arms race which the United States unleashed has taken on an unprecedented character. Military appropriations are snowballing. The following figures attest rather eloquently to this: the Pentagon plans to spend more than 332 billion dollars on the military in 1986, that is, almost 13 percent more than this year. This is the largest military budget in U.S. history. For comparison we should note that direct U.S. military expenditures in 1945 totaled 81.2 billion dollars.

U.S. strategists give absolute priority status to first-strike nuclear weapons systems. These include the MX intercontinental ballistic missiles, B-1B

strategic bombers, Trident nuclear-powered fleet ballistic missile submarines, and other nuclear missile weapon systems. In addition to building B-1B strategic bombers and upgrading B-52 bombers, development of the ATB, a fundamentally new strategic bomber, is growing in scale. There is continuing growth in the production of neutron warheads, as well as new types of chemical weapons. Stockpiles of U.S. Army, Air Force, and Navy toxic chemical agents total at least 150,000 tons.

Alongside the NATO nuclear missile weapons first-strike scheme, the NATO Defense Planning Committee has approved a Pentagon-proposed military doctrine called "Deep Strike," which calls for conduct of combat operations deep behind the potential adversary's lines, with employment of "weapons of the future," that is, new, powerful nonnuclear weapons. As the British newspaper GUARDIAN explains it, strikes would be delivered deep in the operational dispositions of the Warsaw Pact member nation forces, knocking out their second echelon.

These and many other topics are rehearsed at numerous exercises. The following facts attest to their scale. Maneuvers conducted by combined NATO forces, code-named "Autumn Forge-84," were the largest exercise since World War II. Over a period of more than 2 months, covering a vast area of the European continent, NATO strategists rehearsed variations of preparation for, unleashing and conduct of war against the socialist countries. As many as 2,000 combat aircraft took part in this exercise. The world community assessed as a dangerous phenomenon the fact that U.S. Pershing II missiles already deployed in Europe, which constitute a nuclear first-strike weapon, took part in this exercise for the first time. In addition, according to reports in the Western press, E-3A AWACS aircraft, which are capable of guiding bombers and cruise missiles to targets located deep in the heartland of the Warsaw Pact member states, were extensively employed in these maneuvers.

Numerous exercises by the national armed forces of individual NATO member countries, and the United States in particular, were also held on a gigantic scale and with no less provocational objective. They all constitute undisguised militarist displays, frequently conducted in the immediate vicinity of the borders of the Soviet Union and the other nations of the socialist community.

As history attests, military exercises and maneuvers by the armed forces of imperialist powers can escalate into outright intervention.

"The United States openly claims the 'right' to intervene everywhere, ignores and frequently outright tramples the interests of other countries and peoples, the traditions of international intercourse, existing treaties and agreements," stressed CPSU Central Committee General Secretary Comrade M. S. Gorbachev in his address at the April (1985) CPSU Central Committee Plenum. "It is constantly creating arenas of conflict and military danger, heating up the situation in one part of the world or other." For example, anger and indignation are aroused by Washington's great-power policy in Central America, where an undeclared war is being waged against Nicaragua, as well as by threats directed toward the Republic of Cuba, U.S. support of Israeli



aggression against the Arab peoples, and open support of aggression by the Republic of South Africa against Angola and other African states.

The U.S. military is causing death and destruction and is trampling the sovereignty and independence of the peoples of other countries. The acts of aggression perpetrated against Korea, Vietnam, and Grenada will go down in U.S. history as pages of shame.

Particular and ever increasing alarm within the world community is being aroused by the present U.S. Administration's course of policy aimed at using space for military purposes. The Pentagon plans to carry the arms race into space by building an extensive antimissile defense system containing elements of space basing. The "Star Wars" program seeks not only to make nuclear arms limitations and reductions impossible but also to give the entire arms race a qualitatively new dimension, fundamentally to undermine the very idea of stability, equality, and equal security. Hundreds of U.S. military bases scattered throughout the world area also destabilizing the world situation.

These and other facts attest that the world situation is becoming increasingly more complex, troubled and dangerous, that international tension is growing, and that the threat of war, particularly nuclear war, is intensifying. Mankind is faced with a choice: either further escalation of tension and confrontation or a constructive search for mutually acceptable understandings which would halt the process of material preparations for a nuclear conflict.

As a counterbalance to this dangerous development of events, resolve on the part of peoples, of all progressive and peace-loving forces to bring an end to a policy of force and confrontation, to guarantee the preservation of peace, strengthening of international security, and firm establishment in relations between states of the principles of respect for national independence and sovereignty, inviolability of borders, noninterference in internal affairs, repudiation of force or threat of force, equality, and other universally recognized principles is being increasingly more persistently and firmly manifested. "Uniting of the efforts of all peoples and states, all peace-loving forces, regardless of their political orientation is more essential in the present international situation than ever before, in order to keep the world from slipping further toward a nuclear catastrophe," it was stressed at a meeting of top-level party and government leaders of the Warsaw Pact member nations, held in Warsaw in April 1985. This process is grounded first and foremost on growth in the might and authority of the socialist world and on the aggressive and consistent peace-seeking policy of the Soviet Union and of the entire community of socialist states.

A purposeful and consistent struggle to prevent war, to strengthen the security of the USSR, its allies and friends, to strengthen the foundations of peace and affirm the principles of peaceful coexistence has been and continues to be the pivotal direction of Soviet foreign policy. Convincing confirmation of this is the more than 100 constructive Soviet initiatives concerning limiting and reducing arms of every type and category. Our country made a most radical proposal calling for total and general disarmament in combination with comprehensive verification. Special efforts by the USSR and the countries of the world socialist community are directed toward limiting,

reducing, and totally eliminating weapons of mass destruction -- nuclear, chemical, and bacteriological. Of enormous significance in the matter of preventing a nuclear catastrophe was the Soviet Union's decision to make a unilateral pledge to refrain from first use of nuclear weapons. A unilateral moratorium (on the part of the USSR) on first introduction of antisatellite weapons into space has been in effect since 1983.

A new evidence of the peace-seeking policy of the USSR is a Soviet initiative proposing talks with the U.S. Government on all issues concerning nuclear and space arms. These talks, encompassing offensive space weaponry, strategic offensive arms and intermediate-range nuclear weapons, fully take into account the realities of the present strategic situation and reflect our striving for peace and security. One more confirmation of this is the unilateral halt on nuclear testing.

The Soviet Union and the countries of the socialist community seek superiority neither on earth nor in space. They are firmly resolved, however, to prevent implementation of the sinister schemes of imperialism and are therefore keeping their powder dry.

The armed forces of the Warsaw Pact member nations stand side by side with the Soviet Armed Forces guarding the peace and security of peoples. In May of this year the fraternal alliance celebrated its 30th anniversary. The most recent period has convincingly demonstrated the influential and noble function performed by the activities of the Warsaw Pact Organization in European affairs and in international affairs in general. The states of this great community possess invaluable experience and a finely-honed mechanism of coordination of policy. They present a united front on international issues and consistently champion the cause of peace and disarmament and the principles of peaceful coexistence. A special role in this is played by the Joint Armed Forces of the allied states. And until such time as the threat to peace and security is eliminated, declare the Warsaw Pact member nations, they will continue in the future doing everything necessary to protect themselves against any and all encroachments by imperialism. Extension of the Treaty, unanimously approved by all participants, serves as confirmation of this.

To strive in close unity for the triumph of Communist ideals, firmly to protect the achievements of socialism, and to defend peace -- these principles of international communist policy were passed down to us by V. I. Lenin. The Communist Party and Soviet State are unflinchingly faithful to these great Lenin behests.

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## FIGHTER PILOT FAILS INTERCEPT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) p 20

[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Maj A. Lukashov: "Two Intercepts"]

[Text] Vladimir Borodin's uniform jacket bears the military pilot 1st class emblem. On more than 150 occasions he has scrambled his jet to intercept an air "adversary." And every one of these engagements was different and unique.

...With a rapid motion Captain Borodin closed the zipper of his high-altitude partial-pressure suit. Helping the pilot dress, the high-altitude gear specialist solicitously asked: "Is it too tight, comrade captain?"

"No problem."

As he put on his high-altitude gear, Borodin was in his thoughts already in the air. He was about to fight a mock air-to-air engagement in the stratosphere. And although he had thoroughly thought through the mission and calculated every last detail, nevertheless the unexpected was always possible, for the "aggressor" was also readying for departure, had no less thoroughly modeled and calculated his route and flight profile, methods of penetrating through to the target and techniques of evading an encountered fighter, and had determined the procedure and sequence of employment of his airborne defenses. For this reason he would do well to go through things in his mind once more and in the air to be at maximum attention, constantly scanning and listening.

After receiving a readiness report from his aircraft technician, Borodin, following procedure, inspected the aircraft and climbed into the cockpit. The canopy lowered into place with a light hissing sound. The MiG taxied to the active precisely on schedule and stopped across from the tower. Takeoff clearance was given, and the silence over the airfield was suddenly shattered by the powerful turbine roar.

Precisely maintaining configuration, Borodin executed climbout. He saw a mental picture of how his combat jet appeared at that moment on the ground radar plan position indicator. The tactical control officer was closely

following the blip representing his aircraft. He was ready to come to the pilot's assistance at any moment, to cue him or give a correction if necessary. But everything was proceeding well. From time to time his three-digit callsign would sound in his headset.

The MiG's powerful engine was carrying the aircraft steadily higher and further. From time to time Vladimir would take his gaze off the instruments and make an external visual scan. Feeling a total love for his job, he noted that the sky is especially beautiful at high altitude. Its bright, transparent blue was softened by a light whitish haze at the very edge of the horizon.

The aircraft of his mock adversary was somewhere out there ahead. Invisible radar tentacles had already taken him into their tenacious embrace. In his pressurized-helmet headset he heard the calm voice of the tactical control officer: "365, afterburner."

"Afterburner, roger."

Borodin performed the familiar procedure. A slight push from aft -- and the force of inertia pressed the pilot back into his seat.

"365 climb... heading..." came instructions from the command post.

The rate of closure between fighter and "aggressor" exceeded Mach 3. Tension was growing. Suddenly Borodin was able to distinguish a return from the target on his weapons radar. An immediate IFF interrogation went out. Yes, it was a "hostile" aircraft. The pilot adjusted his aircraft to set up favorable conditions for lockon and pushed the button. A target mark appeared on the screen. Smoothly manipulating the controls, he moved the target onto the pipper. Everything was ready for firing the missiles. The deadly sword was raised; all that remained was to strike.

Attack! A pilot's entire experience and knowledge, self-control and composure, his ability to counter the adversary with his own will and skill are compressed into the brief instants of attack. Missile away! The aircraft was rocked slightly by the firing missile. Within seconds it would find its target in the blue expanse of the heavens. The pilot broke sharply and headed for home.

Back on the ground, Captain Borodin reported mission accomplished to his commanding officer. A bit later, following analysis of the data recorders, his performance was evaluated by the senior-level commander. Vladimir Borodin received the highest mark.

Air-to-air engagements. There have been a great many of them. And each has left its specific mark, has taught something, both to Vladimir and to his colleagues, for flight personnel and command post officers are constantly learning: the successes and failures of each are lessons, and not only in combat maturity but also in something more, which is evaluated by moral criteria. Nor could it be otherwise, since without this it is impossible to form and shape the character of the genuine air warrior.

...Borodin was once readying for a medium-altitude intercept mission. He personally considered such a mission easy. And the part of the "aggressor" was being played by a pilot from the neighboring squadron, whom Vladimir knew well.

Takeoff and flight to the designated area proceeded normally. The interceptor pilot manipulated with a sure hand the radar sight switches during closing and was already anticipating an excellent result on film, when suddenly... an instant before the simulated missile firing, Borodin noted with alarm unusual behavior by the target blip on his screen. He pressed the firing button. But it was too late. When the specialist personnel processed the data recorder tapes, results proved disappointing. The pilot had failed to accomplish the mission.

When Borodin emerged from "upstairs," all the pilots already knew about his failure. Many could not figure why one of the most highly-proficient combat pilots, the successes of whom were accepted as routine by everybody, suddenly had failed successfully to accomplish a routine training mission. The pilot heard far from flattering comments at the subsequent performance critique. At the same time he had to look into the matter for himself, thoroughly analyze what had happened, and reach some conclusions.

Some time later Borodin was approached by his recent "opponent."

"I am to blame for the fact that you failed the intercept," he said. "Forgive me, but that is a fact."

"What are you talking about?" Borodin asked, perplexed.

"Just what I said! I decided to make things easier for you and reduced my speed."

The "opponent" did not know what kind of turn he was doing for the interceptor pilot. So this was why, when Borodin was setting up optimal conditions for firing his missiles, the rate of closing on the target suddenly jumped abruptly, and he did not have time to bring the electronic pipper onto the target. Of course he had to forget about firing at that point. He had to break away immediately in order not to endanger the aircraft. The "aggressor," while trying to make the task easier on the interceptor pilot, in fact had unintentionally put the fighter pilot's vigilance to the test. Only now did Captain Borodin fully realize that he himself was to blame for what had happened, not his comrade, who had tried to assume the blame with such determination and solicitude.

No, the "adversary" was not to blame! He did what he should do every time, bearing in mind that in actual combat a real adversary will not set himself up but will do everything possible to be able to make the kill himself. In mock combat engagements one must employ diversified, unexpected countermeasures, learn to fight not following unimaginative routine but innovatively, aggressively, inventively, like the famed Soviet air aces fought during the Great Patriotic War.

We have discussed only two mock engagements. And it is hard to say which of them is more important. Both left a mark in his memory and heart.

"Nevertheless the latter is much more instructive," concluded Captain Borodin. "It forced me to take a fresh look at my training. To look at it more seriously, and to think...."

This pilot is now himself training young pilots. Once I happened to hear him relating to his pilots the story of that failed intercept. He was most likely correct in doing so. As they say, you learn through mistakes. And it is a bad thing if you learn only from your own mistakes. This should always be kept in mind.

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## REDUCING LABOR IN READYING AIRCRAFT FOR LIVE-FIRE TRAINING SORTIES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 30-31

[Article, published under the heading "Know-How of the Best Into Aviation Engineer Service Practice," by Capt I. Storozhko: "How Can Labor Expenditures Be Reduced?"]

[Text] I was motivated to write this article by a statement made by Col V. Verzilov at a round-table get-together at the journal's offices (AVIATSIYA I KOSMONAVTIKA, No 6, 1985). He essentially stated that labor expenditures have increased greatly today in connection with an increase in the combat workload on every aircrew and the increased complexity of the operations and procedures involved in readying helicopter and fixed-wing aircraft weapons for live ordnance delivery. This includes transporting ordnance and ammunition to the flight line, unloading it, readying it and, finally, mounting it or loading weapons. In short, in our time of rapid scientific and technological advance, expenditures of human labor in general and on preparation and utilization of aircraft weapons and ammunition in particular have increased immeasurably in military aviation. The correctness of these statements is unquestioned.

A question arises, however: how can they be reduced? How can we ensure that every aviation specialist is able to accomplish maximum work on a fixed-wing or rotary-wing aircraft with minimum labor outlays?

Unquestionably increasing the number of aviation personnel in weapons servicing and preparation groups is far from the best solution. A more reasonable solution to this important problem suggests itself -- an all-out improvement in the level of scientific and technical knowledge and professional skills on the part of aviation engineer service specialists of all categories, in their technical knowledgeability and discipline. Intensification of military personnel labor can be continued on this basis through extensive incorporation of various means of mechanization and automation into the process of preparation of aircraft armament for flight operations.

Here too, as was correctly emphasized in statements by participants in the round-table discussion, a broad area of activity opens up for efficiency innovators and inventors of aviation units and subunits. I believe that

without their active participation in this important activity aimed at increasing combat readiness, it is impossible fully to mechanize the entire process of loading-unloading operations both when readying ordnance for mounting and during transport to and mounting on fixed-wing and rotary-wing aircraft.

But I feel strongly that even this is not enough. When discussing specific ways to reduce labor outlays on the airfield by aviation engineer service specialist personnel, I believe that it is also appropriate to raise the question of well-equipped areas in the subunits for readying ordnance and ammunition for use. Incidentally, according to the requirements as specified in aviation engineer service guideline documents, every aviation squadron must have such areas. But it one thing to have them and another thing altogether to organize operations intelligently in these areas.

In the unit in which Capt V. Kozoliy serves as deputy commander for aviation engineer service and Capt V. Okhezin heads the weapons service, they approach resolving this important matter in a thoughtful manner. Unit handymen have set up a unique munitions preparation area equipped with special power loading and unloading mechanisms, work stations for readying rockets for loading, ammunition feed belts, as well as bomb fuzes; this area, which is now successfully operating, is one of the first in the air forces of the Turkestan Military District. It also contains several devices fashioned by unit efficiency innovators, which make it possible significantly to reduce the time required to uncrate and remove packing grease from aircraft bombs and other aircraft ordnance.

I shall cite the following example to illustrate. At one time considerable time was required to uncrate and prepare one piece of exterior-mounted ordnance. The fact is that grease would be in every nook and cranny of lugs, mounts, and other parts, and at times it was very difficult to remove, wash out or dissolve it. This required considerable time as well as excessive labor expenditure.

Tasked by the methods council, a group of aviation personnel, which included Capt Ye. Panikhidkin and WOs Yu. Somskiy and V. Sidorov, designed, built and incorporated a general-purpose device to remove packing grease from the mounting hardware of various types of aircraft bombs. As a result, much less time is now required for this operation. In addition, labor outlays on the part of aviation engineer service specialist personnel have been greatly reduced.

The ordnance preparation area is also equipped with special visual aids, appropriate display stands with process documentation, documents and tables, specifying the principal requirements pertaining to maintenance of aircraft armament, safety precautions to follow when working on aircraft armament during intensive flight operations, plus excerpts from aviation engineer service guideline documents. All this unquestionably helps develop in engineer and technician personnel who maintain weapons and equipment a strong sense of responsibility for readying each and every piece of ordnance, for each and every operation performed, and helps develop the habit of observing all safety procedures and a high level of job knowledgeability. The result is



a substantial decrease in time required to ready aircraft armament for the day's first and subsequent live-fire training sorties.

In addition to the above-discussed area, special supports are maintained at each flight-line position in every aviation squadron, to hold munitions ready to mount for the day's first sortie.

What do these devices, fashioned by unit innovators, look like? Essentially it is an elementary suspension-mounting system consisting of four supports, between which munitions are suspension-mounted on special hooks. This system is very lightweight and convenient to use, since a cart can be rolled under each munition, and it can easily be removed from the hooks and moved to the aircraft without additional labor expenditures.

The first in the unit to apply this experience in readying aircraft for the day's first sorties to the range were the specialist personnel of the aircraft armament servicing group headed by Sr Lt V. Grebenkin. It is now being applied in all groups, since the above-described support devices make it possible to store right by the aircraft munitions ready for immediate mounting. This method of weapons servicing increases the degree of subunit combat readiness many times over.

While noting positive experience in servicing and maintaining equipment and weapons in the aviation unit in which officers V. Kozoliy and V. Okhezin serve, we cannot ignore matters pertaining to manning, instructing and training non-T/O technical crews and availability of special devices and tools at the disposal of these crews for loading aircraft weapons and mounting munitions.

Also characteristic of this collective is the fact that, in addition to a smoothly-functioning system of mechanizing work involving aircraft armament, well-organized technical instruction is being widely adopted, and pledges pertaining to mastering the military occupational specialties essential for performing these jobs are being efficiently distributed.

As we know, due to the fact that aircraft armament servicing groups are small in size, it is not always possible to ensure sufficiently fast and high-quality readying of the modern weapons with which combat aircraft are armed. Situations arise where it is necessary to enlist personnel of other MOS to serve on non-T/O technical crews to prepare and mount aircraft ordnance. This is done as follows. Several such crews are formed in each subunit on the basis of a unit order. They sequentially ready each flight of combat aircraft for live-fire training sorties. Determining the makeup of a technical crew, however, is only one part of the job. Another and most important part consists in training the aviation personnel, providing them with everything they need to perform the task, and appropriately to equip their work stations.

Such forms of instruction as, for example, holding training drills on servicing days with aviation personnel of all services are employed in this unit to provide theoretical training of specialist personnel assigned to technical crews. They are conducted as a rule by the technical crew ranking NCOs, under the supervision of the squadron deputy commanders for aviation

engineer service, with the participation of the aircraft armament servicing group chiefs and the occupational specialty unit engineer. Flight personnel are also enlisted to participate in the training drills, which enhances the effectiveness of this form of training. Checklists and flowcharts on readying ammunition and ordnance for loading and mounting on aircraft are prepared in advance for each technical crew in order to increase training effectiveness.

In addition, regular theoretical training classes are held in the unit, for studying the design and construction of all types of armament and the specific features of weapons servicing and maintenance in the most varied conditions. Safety procedures applied when readying ammunition and ordnance for live-fire training sorties are also thoroughly studied at training classes.

Practical experience in using non-T/O technical crews following the example of this aviation unit has demonstrated the high degree of effectiveness of this method of servicing and readying aircraft armament for live-fire activities. The advanced know-how of the technical crew led by Sr Lt A. Pudov, a thoroughly-trained aviation specialist, has been widely disseminated and adopted in the collective. This officer has the ability, methodologically correctly and on a rigorously scientific foundation, to direct the actions of his subordinates toward achieving high results in military labor. Aviation personnel of various occupational specialties under Pudov's command have repeatedly demonstrated at tactical air exercises models of selflessness and diligence, readying aircraft armament for live-fire activities quickly with the least expenditure of labor.

The experience of vanguard performers confirms that all-out improvement in the level of the scientific and technical knowledge and job skills of aviation personnel, their technical knowledgeability and discipline, in combination with a high degree of organization of military personnel labor, its mechanization and automation, not only increases many times over the effectiveness of combat employment of aircraft and weapons but also reduces the labor expended by aviation engineer service specialist personnel on readying aircraft and aircraft armament for training sorties. It is gratifying to note that this beneficial process is progressing. In our military collectives, however, there still exists considerable innovation reserve potential, utilization of which could produce considerable positive effect. In particular, our skilled efficiency innovators and inventors have not yet fully swung into action in all units. We need a substantial qualitative improvement in organization of theoretical training of aviation engineer service specialist personnel. There are also other problems connected with capable employment and utilization of military personnel labor at the airfield.

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## OVERHEATING CAUSES IN-AIR JET ENGINE FAILURE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) p 32

[Article, published under the heading "Innovative Search," by Lt Cols B. Kuzmichev and Yu. Koptev and Maj Yu. Kuzmin: "Why Did Overheating Occur?"]

[Text] Training flights were in progress. Swiftly climbing to altitude, Military Pilot 1st Class Capt A. Popov reported to the tower that he was ready to proceed with maneuvers in the practice area. Suddenly a warning light ignited in the cockpit, indicating a vibration warning. The experienced pilot instantly scanned his instruments. They confirmed the warning indication. He reported to the ground that his engine was shaking.

We must comment on this pilot's precise, knowledgeable actions in an emergency situation. "I've got to reduce power," Popov said to himself. Instructions to this effect immediately were radioed from the ground. He throttled back somewhat, but the vibrations continued to get worse, and soon one of his instrument needles began to go off scale.

"I am shutting down my engine," the pilot radioed the tower and throttled down all the way.

The instruments showed a drop in rotor rpm and exhaust gas temperature. "I have altitude and airspeed. I must try to save the aircraft and get back to the field," the pilot said to himself. Immediately a query came from the tower: "What are your intentions? All airborne aircraft stay off the air, monitor frequency only!"

"I am going to land.... Runway in sight, altitude 900."

Everything proceeded smoothly: Popov lowered his gear, using his airspeed and altitude reserve, set up a precise final approach glide, and landed the aircraft.

On the ground maintenance personnel thoroughly inspected all engine and aircraft systems, carefully listened to the pilot's description of the problem, and ascertained the circumstances under which the vibrations had begun. They then went into the engine and discovered that a turbine rotor

blade had failed. Further investigation revealed that the failure had been caused by metal fatigue in conditions of operation at a high level of stresses.

There were no metallurgical flaws, however, at the point of failure. The blade was made of the prescribed alloy. They failed to discover any geometric deviations in the dimensions of the remainder of the blade or other turbine components. What changes had taken place? Microanalysis of metallographic specimens taken along the trailing and leading edges indicated that the blade material in the maximum temperature zone had overheated. Maintenance personnel ascertained that other blades in the same stage had experienced the same phenomenon. The identical nature of the pattern of distribution of overheating zones on the destroyed and intact blades and the absence of overheating at the blade root suggested that it could have occurred in the process of engine operation prior to failure.

The maintenance people naturally could rightly expect that the blades might prove to be overheated. But the determined temperature changes along the blade puzzled them.

What was the reason for the blade overheating? Before answering this question, Maj. Yu. Sokolov and P. Ivanov analyzed the flight recorder tapes containing data on this and preceding flights. And they reached the conclusion that the aircraft's circuits were without power for a certain time during preflighting procedures, when the emergency engine control system was being checked. This was indicated by a brief loss of all signals on the tape. This could have caused excessive engine EGT. The flight recorder tape confirmed this conclusion by the maintenance people. It became obvious that overheating had resulted in elongation of the turbine blades and subsequent blade failure.

Elevation of turbine exhaust gas temperature and blade failure due to this is also possible during engine startup. This involves excessive injection of fuel during low air consumption, which can result from errors by engineer and technician personnel.

One can conclude that the following circumstances, for example, can lead to engine overheating and surging during startup: advancing the throttle beyond the idle (MG) detent and adjusting the throttle position during startup when the engine is slowly reaching idle. In both cases excessive fuel is automatically injected due to the fact that the throttle is advanced beyond the idle detent, leading to surging. To prevent these things from happening when the throttle is advanced beyond the idle detent, a throttle position engine startup interlock has been incorporated. But since it allows for certain throttle movement from the idle detent, placing the throttle between the idle detent and the interlock actuation angle can lead to engine surging.

Setting the throttle below the idle detent and sharp throttle advance also can cause overheating and engine surging. This occurs during taxiing and landing rollout, when the pilot suddenly shuts down his engine by mistake. As we know, retarding the throttle beyond the idle detent causes flameout in the combustion chamber. Hurriedly correcting his mistake, the pilot involuntarily

returns the throttle to the idle detent or attempts a restart. A sharp throttle advance, however, always leads to excessive injection of fuel into the burner can and may cause autoignition of the fuel and engine surging.

Other errors include auxiliary power unit startup and operation with closed air duct door, engine startup with retarded compressor rotor (freezing or contact by compressor and turbine blades against the engine case, etc).

One should bear in mind that engine startup is abnormal precisely when inadequate attention is paid to monitoring turbine exhaust gas temperature and time the engine takes to reach idle. As practical experience indicates, during startup aircrews and engineer-technician personnel sometimes pay greater attention to engine rotor rpm, failing to notice exhaust gas temperature rise. As a result the temperature rises to an excessive level, resulting in turbine blades and afterburner diffuser components (on engines with a diffuser) becoming scorched.

By monitoring exhaust gas temperature from one start to the next, one can determine an abnormal tendency in powerplant operation. Generally the exhaust gas temperature rise is less than that allowed by the engine operating manual. Therefore, by noting an unusual temperature increase even within allowable limits and promptly determining the cause of the temperature rise, one can forestall engine failure.

As for the potential air mishap situation with which we began this discussion, we should note that this and other cases occurring in powerplant operation were examined in detail at the analysis session conducted with engineers and technicians. Unit aviation engineer service supervisors reminded the men about the possible causes of engine overheating. Practice sessions on starting and testing engines were arranged for flight and technician personnel. High proficiency-rating specialist personnel shared their know-how at the practical training classes. Display stands were set up in the squadrons, showing possible engine failures during operation.

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## INSTRUMENT APPROACH AT WEATHER MINIMUMS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 33-34

[Article, published under the heading "The Reader Continues the Discussion," by Military Pilot 1st Class Maj V. Belyayev: "When Visibility Is Limited"]

[Text] I read with interest the article entitled "Landing at IFR Minimums" (AVIATSIYA I KOSMONAVTIKA, No 4, 1985). A great deal of attention is currently being devoted to this matter in our squadron. Flight personnel have encountered certain difficulties in mastering landing at weather minimums. How can these difficulties be surmounted? I should like to discuss this question.

...Fighters were taking off into a grayish, hazy sky. Pilots were honing their skills in air-to-air combat practice areas. And regardless of the mock combat results, the culminating point of the flight is the landing -- it is another examination to pass.

It is no simple matter to accomplish a landing at weather minimums. And this is confirmed by the following fact. When pilots in our subunit proceeded to work on this procedure, even experienced pilots did not avoid mistakes. During initial training, for example, pilots would shoot approaches in "go-around" mode. In order to maintain proper forward spacing between aircraft, a great deal depended on how pilots executed the go-around turnout. There were instances, for example, where jets would come into close proximity to one another during the turn from base to final. In my opinion the principal reason for the error lay in the fact that pilots failed to hold the proper bank angle during the turn onto the downwind leg.

The fact is that the required bank angle is 45 degrees for the specified courseline width, and appreciably less in the case of a go-around. For this reason good pilot proficiency plays an important role when executing the turn to downwind in conditions of limited visibility or in clouds. This phase of a flight is characterized by the fact that airspeed increases rapidly following takeoff, while at this time the pilot is performing specific operations in the cockpit: he is cutting off the afterburner, setting engine rpm, and monitoring altitude and aircraft attitude. At this point mistakes occur as a rule due to incorrect distribution of attention.

Mistakes include early beginning of the turn and excessive bank angle, due to which forward separation between aircraft decreases, and the tower must intervene. There occur excessive radio communications between air and ground, which disrupts the periodicity and precision of ATC communications traffic and makes aircrews nervous.

I would be correct in stating, however, that the main reason for mistakes is insufficiently thorough aircrew training and preparation on the ground. The following incident once occurred in our squadron. A group of fighters was heading back to base. The ground was obscured by a solid undercast.

"This is solid IFR; everybody pay close attention to your approach procedures," the flight commander warned his wingmen.

"31, beginning descent, request straight-in approach," he radioed the tower.

Cleared to approach, the leader strung out his group for IFR approach separation at the proper moment. The combat jets plunged one after another into the solid undercast. Everything was proceeding normally. But when the tail-end aircraft reached the outer compass locator, he found himself considerably off the localizer course line. The tower had to send him back around.

What prevented this pilot from making a satisfactory straight-in approach?

There were several factors involved. It was ascertained that he had incorrectly distributed his attention among the gauges. Frequently diverting his gaze to a visual search for ground reference points, the officer failed adequately to monitor the course direction indicator. His second mistake was of a psychological nature. Somewhat different navigation instrument readings with manual control negatively affected the pilot's confidence. The pilot ignored the course indicator readings as he approached the outer compass locator, and he took slowing of the movement of the localizer needle to mean an instrument malfunction. Thus ignoring the course indicator and ADF readings led to the failed approach.

Analyzing errors made by pilots on limited-visibility instrument landings, we reached the conclusion that many errors are a consequence of the fact that extended flight in clouds accompanied by intensive cockpit work procedures exerts a serious psychological effect on poorly-prepared aircrew personnel. Disorientation is a possibility. To prevent these errors, the pilot must force himself to keep his eyes on the instruments, which enables him fairly quickly to eliminate any sense of disorientation.

Upon approaching the outer compass locator, some pilots attempt to look for readily identifiable ground reference points through breaks in the clouds, and subsequently attempt to establish visual contact with the runway. This diverts attention from precisely maintaining the approach heading and leads to mistakes.

Some time after successful accomplishment of the mission, Sr Lt A. Voronov was on a landing approach. Looking downward from time to time, the pilot was endeavoring primarily to establish visual contact with the ground. Time passed, but the runway failed to materialize. At this point Voronov decided that the automatic landing approach system had malfunctioned and proceeded to descend prematurely. It was only intervention by the approach controller which corrected this error in time.

I should also like to note the following. Weather at minimums sometimes improves in the course of flight operations. It would seem this could only be to a pilot's benefit. In actual fact, however, frequently the opposite occurs. A temporary improvement in visibility slackens attention and dulls vigilance. And when the weather again deteriorates, this proves to be an unexpected factor, due to which pilots act hastily and make mistakes.

How can such shortcomings be avoided? We believe that for combat pilots to acquire psychological stability, every flight on a dual trainer should end with a landing approach under the hood, with the hood removed at middle compass locator passage altitude. The instructor should closely monitor the pilot's actions, immediately pointing out mistakes. In this way it will be possible to maintain flight personnel proficiency in landing in IFR weather.

There are also other ways to achieve better mastery of the landing approach in reduced visibility. Our unit's methods council has drawn up several recommendations. In particular, a pilot should be maximally composed when flying on instruments at low altitude, since at this moment he is engaged in intensive mental activity. This quality is best developed on the flight simulator, since it enables one to cultivate a uniform landing approach procedure calmly and purposefully, which in turn promotes development of logical analysis of a changing situation. The regimental methods council focused particular attention on the role of the flight commanders in training pilots. And this is logical, since it is the flight commander who is primarily responsible for the flying and moral-psychological preparedness of the pilots under him.

Capt Yu. Yevteyev can be cited as an example in this regard. During preliminary training activities he and his men meticulously practice on the simulator the approach and landing in various conditions. Of course this is done not for the sake of overcautiousness, but in order to teach the pilots to perform with assurance in case of deteriorating weather. In addition, a thoughtful approach to sessions on the simulator helps develop moral-psychological stability in combat pilots during an abrupt situation change. It is in large measure thanks to the efforts of Captain Yevteyev that mutual relations in the flight are constructed on a foundation of complete confidence, kindness, sincerity, mutual assistance and mutual demandingness. Subordinates never conceal from their commanding officer problems bothering them which involve preparations for flight operations and are not ashamed to ask for assistance or admit uncertain performance of a given flight procedure or element.



I once observed the following during preliminary flight preparations. Captain Yevteyev was working with his men on a simulator landing approach with crosswind. The pilot in the simulator cockpit was unable to handle the task.

"How does one correctly determine corrections on the approach descent?" he asked the flight commander.

"I'll demonstrate," Yevteyev responded immediately and took the controls.

"Give me some scenario conditions," he said to his subordinate, and proceeded to demonstrate proper procedures.

"Up to the outer compass locator I compensate for crosswind with a heading adjustment. Closer to the runway I use a slip. Just before touchdown I bring the wings level and apply light pedal in the direction of drift. Got it?"

The officer nodded affirmatively and took the simulator controls. This time he performed with precision, for which he received a good mark.

I want to stress one more thing. Our aircraft are designed for comparatively long endurance. This means that the weather can undergo several changes while an aircrew is airborne. This can occur in areas where local influences affect weather. Flight personnel should be aware of this and if weather deteriorates should immediately communicate this fact by radio to pilots in the area and to the flight operations officer. This will help the latter make the correct decision concerning control of aircrews.

As practical experience indicates, when weather is at minimums special attention should be focused on the approach phase from the outer to the middle compass locator. With proper composure and preparedness, it is not difficult to fly a landing approach to one's home field, where everything is quite familiar. Nevertheless the approach controller intervenes fairly frequently, giving instructions on elementary items. I feel that in order to avoid unnecessary radio exchange, the pilot's official communication to the tower should include the statement that he has the runway in sight, with all superfluous items eliminated. Brevity of radio exchange will help flight personnel concentrate their attention better during a critical phase of flight.

Mastering landing at absolute weather minimums means rising to a level of combat skill whereby a pilot not only will be capable of accomplishing the mission in any and all weather conditions but will also be capable of returning safely to his home field. Resolution of this problem should be approached in a comprehensive manner, with a strong sense of responsibility.

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## ADVERSE EFFECTS OF ALCOHOL DETAILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 38-39

[Article, published under the heading "Sobriety -- An Accepted Standard For Our Lives," by Candidate of Medical Sciences Col Med Serv V. Vlasov and Maj Med Serv Yu. Andriyenko: "Enemy of Society and the Individual"]

[Text] Through the ages man has endeavored to resist alcohol -- one of the most dangerous enemies of his dignity and spirit, talent and morality, happiness and health. Historian and sociopolitical commentator Ivan Pryzhov, who was active in the revolutionary movement of the 1860's, stated in his "History of Taverns in Russia in Connection With the History of the Russian People" that vodka was first introduced in Russia in the 16th century. Over the course of several centuries it was incorporated into people's daily lives, its consumption was forced upon people, and abstention was harshly punished, since it meant revenue for the royal treasury. This is the source of the old tale that the state cannot get along without vodka.

History has recorded numerous examples of spontaneous protests against drunkenness. These include smashing of taverns, antidrinking societies, and village meetings demanding the closing of drinking establishments. The Great October Socialist Revolution gave high sense and meaning to these spontaneous aspirations; the builder of a new world adopted sobriety as an ally.

A decree signed by V. I. Lenin was issued on 19 December 1919, prohibiting the manufacture and sale of alcohol and strong drink in the RSFSR. Violation carried a penalty of not less than 5 years at hard labor. And persons appearing inebriated in public places faced at least one year in jail.

In his concluding speech at the 10th All-Russian Conference of the Russian Communist Party (of Bolsheviks) in 1921, V. I. Lenin stated that "in contrast to capitalist countries, which allow the sale and consumption of such things as vodka and other stupeficients, we shall not permit this, because no matter how profitable they may be for commerce, they will lead us back toward capitalism, not forward toward communism."

An All-Union Council of Antialcohol Societies, with hundreds of thousands of members, for the most part blue-collar workers, was formed in this country at the end of the 1920's.

The young society, which was building socialism, was successfully eliminating the blotches of the past, including drunkenness. In the 1920's and 1930's the Soviet Union was the world's soberest country. A punishing war and the postwar devastation and grief experienced in every family were all factors which to one degree or another affected the level of sobriety of society. But the campaign against drunkenness and alcoholism always remained government policy.

Therefore the CPSU Central Committee decree entitled "Measures to Overcome Drunkenness and Alcoholism" and a firm, determined approach to this ugly phenomenon and the factors which cause it and are indulgent toward it are from a historical standpoint nothing other than reestablishment of justice and implementation of the people's age-old aspirations to follow a sober way of life. The very nature of the campaign against drunkenness, elevated to the status of a nationwide task of the entire party and people, attests to the fact that the measures which have been taken to date are not the last ones, for we are dealing with the spiritual and physical health of the people. In a political sense this is a continuation of the party's policy line in the struggle to liberate man, for social justice and the triumph of our ideals. Alcoholism is incompatible with our system, with our ideals.

It is also a well-known fact that the vaunted "revenue" to the state from alcohol is immeasurably less than the losses caused by its consumption. And how can one measure in rubles the moral losses, the tears shed by mothers and children, and the crippled fates of persons who have submitted to alcohol?

We must state the truth about alcohol, not for the purpose of intimidation but in order to be aware of the danger involved, for the human organism is defenseless against the "green serpent." If a person does not resist it with his spirit and will, this disease assumes an essentially malignant character.

Every person should possess a specific awareness of the toxic effect of alcohol.

Alcohol -- ethyl alcohol -- is a hydrocarbon compound classified as a narcotic substance. It is an intracellular poison which readily penetrates into the cell protoplasm, causing cell dehydration, with subsequent impairment of functions. One fifth of ingested alcohol is absorbed in the stomach, and the remainder in the small intestine. It enters the blood in 2-5 minutes, with a maximum concentration noted in approximately 1 hour, and it takes 24 hours fully to metabolize. Alcohol decomposition products, however, continue for quite some time to have a toxic effect on the organism (up to 15 days or longer).

Oxidation of alcohol in the organism occurs primarily in the liver and kidneys -- approximately 90 percent. The remaining 10 percent is transported out of the system with exhaled air, perspiration, and urine. Ethyl alcohol in the organism is oxidized into acetaldehyde, and subsequently to acetic acid.

Highly chemically active, alcohol and acetaldehyde compete with organic compounds, inhibit and alter the direction of biochemical processes taking place in the organism, and exhaust enzymatic systems, which has an adverse effect on one's health.

The cortical functions of the central nervous system are primarily depressed under the effect of alcohol; internal active retardation develops, which causes an apparent stimulating effect, expressed in alcohol euphoria. Onset of general stimulation and dulling of the feeling of fatigue create in an inebriated person an impression of cheerfulness and energy. The illusory nature of the boost in physical energy is confirmed by a dynamometer test: a person who has been drinking applies substantially less squeezing force than a sober person. In addition, alcohol slows neuropsychic reactions, which is most dangerous to specialist personnel (pilots, equipment operators, vehicle drivers) who require fast situation orientation and immediate reaction to external stimuli.

Studies by physiologists have shown that ingestion of even a comparatively small amount of alcohol (60-100 grams of vodka) approximately doubles motor reaction time and diminishes work capacity for a period of 48 hours. The quality of finely coordinated movements deteriorates, while attention, hearing, visual and night vision acuity diminish.

As we know, in adverse weather a pilot performs a large complex of operations. But even when flying the cockpit simulator, for example, after taking in small amounts of alcohol he makes a great many mistakes in his actions, while the quality of performing mock combat missions and flying declines sharply. Perception of external stimuli and response reaction to them also become impaired, while moderate hypoxia, acceleration, and temperature drop are less easily endured, and fatigue sets in more rapidly. Speed of visual perception, for example, slows by a factor of 4-7, while visual-motor reaction time increases by 40-70 milliseconds.

The retarding effect of alcohol is even more sharply expressed during heavy intoxication. A comatose state occurs with acute, severe alcohol poisoning, frequently terminating in death.

Chronic alcoholism is a disease characterized by an irresistible pathologic attraction to drink. This symptom is the result of disturbances in the organism, always preceded by a certain period of abuse of alcohol -- chronic drunkenness, influenced by lack of discipline, dissoluteness, moral instability, defects in upbringing, and a low level of educational awareness and competence. Changes in the organism which inevitably lead to alcoholism evolve gradually. The duration of this period varies, and depends on a person's individual characteristics, his age, and the quality of the alcohol consumed.

One of the early symptoms of this disease is heightened resistance to alcohol, which is noted at the early stages of chronic hard drinking. The amount of alcohol required for intoxication exceeds the initial dose many times over. A psychological dependence on alcohol also usually develops at this time -- the desire to repeat the state of intoxication, which takes on a pathologic,

irresistible character. The vomiting defense reflex also disappears, and control over amount of alcohol consumed is lost. Heavy intoxication as well as partial or more complete loss of memory typically occur with large amounts of alcohol consumed.

Alcoholism is not a stable condition but rather a pathologic process, possessing a specific beginning, course, and outcome. With protracted abuse of alcohol the disease always takes on more marked forms. Withdrawal (abstinence) syndrome constitutes a generally accepted indicator. It attests to an advanced stage of chronic alcoholism. Its symptoms include sweating, heightened thirst, pain in the general area of the heart, disturbance of cardiac rhythm, trembling of the hands, insomnia, and mental depression. During this period the patient is unsure of himself, suspicious, easily frightened, and distrustful. His sleep is shallow, troubled, and of brief duration. The above-enumerated symptoms diminish or disappear under the influence of additional small doses of alcohol.

In the beginning stages of formation of abstinence syndrome, the need for a morning-after drink appears only after consumption of considerable amounts of alcohol, while the hangover proper is achieved by drinking tomato juice, kefir, soda water, or by applying stimulating procedures -- a shower or bath. This is so-called nonspecific hangover. In more serious cases alcohol alone is required with abstinence syndrome. Abstinence syndrome is always present during alcoholism. It completely disappears under the influence of treatment, but it easily arises at various stages of hard drinking, even following extended periods of abstinence. The symptoms of alcoholism subsequently increase, become more serious, and a unique psycho-organic syndrome appears, which includes diminished intellect and memory, diminished criticism of one's condition, and various impairments of mental activity are noted.

One of the problems standing side by side with physiological disturbances is the effect of alcohol on unborn babies. Recently children born from a "drunk fetus" were shown on television. This is a horrible thing. Hippocrates stated that parents who had consumed alcoholic beverages on the date of conception were the causes of epilepsy, idiotism and other neuropsychological diseases in children. Aristotle wrote that women given to hard drinking bear children similar to themselves in this respect. And Plutarch's statement "Drunken women bear drunken children" became a regular adage. The renowned psychiatrist Morel claimed that alcoholism leads to degeneration. Tracing four generations of chronic alcoholics, in the first generation he discovered moral depravity and alcoholic excesses, common drunkenness in the second generation, hypochondria, melancholia, and a tendency toward suicide in the third, and mental retardation, idiotism, and sterility in the fourth generation.

It is not inappropriate to observe that consumption of alcohol also adversely affects a person's sex life. The claim that alcohol has a stimulating effect is pure delusion. As a rule moderate amounts of alcohol cause weakening of erection and dulling of sexual sensations in males during a period of habitual drunkenness. Deepening of sexual insufficiency occurs, the sex drive diminishes, and erection weakens, right down to inability to perform the sex act under the influence of alcohol intoxication and with further development

of the disease. Intensity of specific emotional sensations is dulled. Chronic alcoholics often become sterile.

What changes does alcohol cause in individual organs? Initial disturbances are of a functional nature and are reversible. The stomach is affected first. Small doses of a weak alcohol solution usually increase secretion, boost acidity, and speed up the stomach's evacuant function. The opposite reaction is observed with large doses. Dystrophic changes, inflammation phenomena, edema, punctate hemorrhaging, and even areas of necrosis develop in the mucous membrane of the stomach as a result of the repeated action of alcohol. In the mornings patients experience nausea, vomiting, belching, and a metallic taste in the mouth. According to the figures of Soviet researchers, phenomena of alcoholic gastritis occur in 90 percent of patients examined.

Similar phenomena occur in the duodenum and in other parts of the intestine. Hemorrhoids develop and become more acute. The quantity of pancreatic juice decreases at the same time, its digestive ability diminishes, absorption of protein is impaired, and the blood sugar level initially tends to drop and subsequently to become elevated, which can lead to diabetes mellitus. Adiposity of the liver, inflammation and, as a rule, impairment of bile production occurs under the effect of alcohol. Chronic alcoholics frequently suffer from loss of appetite and pains in the region of the right hypochondrium, which they ignore, and their liver can frequently be palpated. Acute or subacute hepatitis can develop into chronic hepatitis and subsequently cirrhosis of the liver.

With impairment of activity of the cardiovascular system, patients are usually troubled by heightened fatigue, dull, gnawing pains, in the region of the heart, and a heightened pulse rate. Morphologic investigations reveal signs of excessive accumulation of fat and dystrophy of the heart muscle. These cases are generally characterized as "beer heart" and alcoholic myocardium. Initial signs of atherosclerosis in such patients frequently appear at the age of 25-30. Approximately one out of every 10 myocardial infarctions develops following consumption of alcohol. Alcohol causes elevated blood coagulability, increases permeability, edema, and toxic damage of the vascular wall. Thus alcohol promotes the development and aggravation of diseases of the internal organs.

Clinical investigations and modern concepts on the effect of alcohol on the organism demonstrate the erroneous nature of the prevailing opinion about the positive aspects of the effect of alcohol. Alcohol in any dose and concentration is the bitterest enemy of the cell, organ, and the organism as a whole. And it is only the amazing defense capabilities of the organism, provided by nature, which are capable of combating alcohol. In today's world there are too many various negative factors affecting man, shortening his overall active period of life and his longevity. It is criminal to one's health voluntarily to subject one's organism to the effect of alcohol intoxication.

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EXAMPLES OF OUTSTANDING AVIATION ENGINEER SERVICE PERSONNEL PRESENTED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 40-41

[Article, published under the heading "Communists in the Vanguard," by Maj M. Krivorotko: "People of a Strong Sense of Duty"]

[Text] The editors receive letters from military aviation personnel doing difficult duty at remote garrisons. They are filled with love for the homeland and a feeling of pride in their difficult but honorable military labor.

The author of the following selection -- Maj Mikhail Ivanovich Krivorotko -- recently served on the Kamchatka Peninsula, guarding our country's eastern borders. This officer speaks with warmth and affection about aviation engineer specialist personnel, those who in conditions of a harsh climate ready modern aircraft for flight operations, service and maintain them on the ground and in the air, steadily and methodically boosting combat readiness.

With a Solid Warranty

Everybody acquainted with Capt N. Redkin speaks warmly about him as a good person, with an open heart, a sensitive, responsive comrade, a skilled efficiency innovator and strong-willed commander. It is not surprising that the maintenance group he heads is rated excellent. Nikolay Afanasyevich himself is excellent-rated in combat and political training, a recognized master proficiency rating and the unit's top efficiency innovator. The Communists elected him member of the technical maintenance unit party buro.

Nikolay Afanasyevich began his duties as group chief not with testing his men's knowledge of their job duties, their technical knowledgeability and work techniques of the aircraft equipment, but with the external appearance of each and the state and condition of each work station.

I must confess that not everybody correctly grasped this from the very outset. There were those who attempted to claim that Redkin was technically deficient

and therefore addressed secondary issues. But the young group chief did not share this opinion.

"The quality of the inspection and maintenance procedures we perform cannot be high if the men lack inner self-discipline, a clean and well-ordered work station," he stated at the very first work meeting, and added in no uncertain terms: "Tomorrow the work stations are to be put into exemplary order. I shall inspect uniforms, how well tools are being kept and maintained, and cleanliness of the work area."

After some time the aviation personnel felt the force of their superior's personal example. Nikolay Afanasyevich has truly golden hands. He managed to get his men to develop great respect for him. He was always coming up with unique schemes and ideas. Frequently at the end of the workday he would gather his group together, summarize the day's performance, name the top work performers, specify work assignments for the following day, and then ask, as if in passing, what his men thought, for example, about devising in the near future a test bench for checking filters for airtight seal.

Incidentally, this is how a test bench was devised and built for testing fuel injectors for spray and seal, a hydraulic test bench for testing shutoff valves, a device for charging tanks with carbon dioxide, plus many other innovations.

Many men in the group became infected by the example of Captain Redkin's efficiency innovation work, and this was soon reflected in the quality of the inspection and maintenance procedures performed on the equipment. For example, the labor requirements of operations were reduced and operations were sped up considerably by such devices as a universal pin puller, a special wrench for helicopter wheel brake jacket securing nuts, a simulator bench for teaching aviation engineer service specialist personnel to check tail rotor transmission shaft parameters, plus others.

Nikolay Afanasyevich has been issued 115 certificates of invention. But the savings from the efficiency innovations proposed by this party member are beyond count. When I asked Redkin about it, he smiled and said that his main objective was to reduce labor outlays and improve the quality and reliability of aircraft inspection and maintenance operations.

Incidentally, this is also the goal of activities in the technical study group initiated by Captain Redkin and the technical newsletter put out in the technical maintenance unit.

We should note that Nikolay Afanasyevich has experienced assistants. WO Stanislav Ivanovich Grachev, for example, is held in particular esteem by the group chief as a specialist who is highly knowledgeable about aircraft equipment. In addition he is a person grown wise by practical experience and a soldier of warm, paternal affection. The men respond to him in kind.

Grachev helps the Komsomol activists hold technical quizzes and take part in efficiency work under the guidance of Captain Redkin. All this helps the men boost their level of technical knowledge and effectively apply it in the



process of performing inspection and maintenance operations. It is not surprising that all aviation personnel possess a high level of job skills.

Knowing his men well, Nikolay Afanasyevich employs an individual approach to each. Pfc Aleksandr Noreyko once shared his personal plans to enroll in college after completing his military service. Redkin helped him obtain textbooks and arranged for counseling sessions. In short, he did everything he could. We are pleased to note that this concern bore fruit.

In addition to all else, Nikolay Afanasyevich is an outstanding athlete. He is first category in cycling, speedball, and skiing. By his personal involvement in mass sports activities, he convinces his men on a daily basis of the need to engage in physical training.

This officer works hard and purposefully. And the example of his father, a combat veteran, is always before him. Afanasiy Ivanovich was awarded the Medal of Valor many years after the war. Nikolay Afanas'yevich read his men one of the letters from his father. It contained instructions to the young defenders of the homeland to guard and preserve the fighting traditions of the veterans of the Great Patriotic War and to strengthen the defense might of the Soviet Union.

I can state with assurance that Captain Redkin can look his father straight in the eye, since he is carrying out honorably his filial duty to his father and to the Soviet people. This is indicated by commendations, numerous certificates, valuable mementoes and other awards he has received.

The main indicator of his contribution to the common cause is the knowledgeable, confident work performed by the aviation personnel to keep the aircraft running and, therefore, work directed toward increasing the combat readiness of their subunit. This is excellent work, with a solid warranty.

#### Right to Respect

When readying a combat aircraft for flight operations, V. Satsuk as a rule would carefully check the functioning of control, performance, and navigation instruments.

Things were taking their normal course, work was proceeding well, and Satsuk was in a good mood. Vasiliy Aleksandrovich loves his job, is proud of it, and for this reason he always derives joy from forthcoming flight operations.

As he switched power from the backup to the primary system, Satsuk suddenly noticed a slight deviation in the parameters of one of the instruments. A trivial matter, it would seem. But this experienced specialist repeated the testing. This time through he detected a malfunction.

It was only the considerable experience and knowledge of this master proficiency-rated specialist which helped him spot what at first glance seemed to be an insignificant error in the readings of a very necessary flight instrument. Subsequently everything was determined by this specialist's

ability and professional skill. It did not take Vasiliy Aleksandrovich long to correct the problem, and the aircraft was ready for action.

It is both easy and difficult to write about Warrant Officer Satsuk. It is easy because he is in plain view, as they say. He is a person with a kind, responsive heart. Such persons are said to be open-souled. Vasiliy Aleksandrovich is exceptionally conscientious about his difficult, but so necessary job. He is an aircraft equipment group senior aviation mechanic and excellent-rated in training. In preflighting aircraft, he checks the functioning of electrical equipment, automatic electronic systems, performance monitoring devices, and other systems.

It is difficult to write about him because it is virtually impossible to cover in a few lines all the good things about this fine individual. Having held the position of senior aviation mechanic for several years now, he has become not only master proficiency-rated, possessing a consummate mastery of complex aircraft equipment. Vasiliy Aleksnadrovich is a skilled mentor of youth. He takes active part in the collective's volunteer activities and in political indoctrination work: he is a member of the subunit wall newspaper editorial board, and he is also a member of the warrant officers comradesly court.

I remember a discussion of the conduct of young WO Andrey Konkov. His comrades had begun noticing that he was inclined to drink. Soon the question of dishonorably discharging him from the Armed Forces was even raised.

Vasiliy Aleksandrovich addressed a meeting of the party buro. Many of those present gave thought to the valid words he spoke. Indeed, what had the collective done to indoctrinate their comrade, and who had taken the trouble to inquire about the warrant officer's thoughts, doings, and concerns? And yet this recent enlisted man suddenly had money, considerable money, and a good deal of free time. Had anybody helped him with advice and friendly solicitude? Warrant Officer Satsuk summarized his presentation by proposing, in view of Konkov's sincere repentance, that he be given the chance to rectify his conduct. And he himself took the subject under his wing and helped him find himself in volunteer work. There are no longer any complaints about Warrant Officer Konkov's work, and he has a conscientious attitude toward his job.

Frequently Vasiliy Aleksandrovich's fellow soldiers drop in at his quarters to exchange views, talk about their doings and concerns, prepare for training activities, or to borrow an interesting book. He has a very good personal library, containing imaginative literature, specialized literature, and writings by the founders of Marxism-Leninism.

The men always listen with interest to Vasiliy Aleksandrovich's presentation. The son of a combat veteran, he always very warmly and enthusiastically conducts talks devoted to the fine combat traditions of the Soviet Armed Forces. His father, Aleksandr Tikhonovich, was a submachinegunner during the war, who had fought all the way to Berlin, where he was seriously wounded.

No less interesting is the combat biography of the father of his wife, Raisa Iosifovna. Just like every combat veteran, Iosif Kazimirovich Tratsevskiy

does not like to talk about his exploits, but Vasilii Aleksandrovich nevertheless learned that due to his injuries he had been unable to receive some decorations at the time. He made an inquiry at the Central Archives of the Ministry of Defense. Recently a ceremony was held, at which the combat veteran was presented the Medal of Valor and the Order of the Red Banner.

Warrant Officer Satsuk has received many commendations from his superiors for exceptionally conscientious performance of his military duty. But the most important thing he has obtained is the respect he enjoys with his men. Vasilii Aleksandrovich has confirmed the right to this respect by his many years of flawless service, by his contributions to the cause of defense of our beloved homeland.

#### By Personal Example

The signal for the squadron to assemble sounded in the early morning, when the sun was barely peeking up from below the horizon and its rays were skittering across the trees tightly ringing the airfield.

Soon the aircraft were a beehive of activity. Aviation engineer service specialist personnel were working at full effort. Every second counted. Pilots, navigators, technicians, and mechanics were readying for flight operations. They worked smoothly, endeavoring to perform all operations with swiftness and precision: aviation personnel were about to take an important combat proficiency examination -- a tactical air exercise.

That day the sure, precise, and competent actions by Sr Lt A. Brazhnik, flight technician of one of the aircraft, did not remain unnoticed by the inspecting officers. Specialist 1st Class Anatolii Brazhnik, excellent-rated in combat and political training and secretary of his flight's party organization, had quickly readied his combat aircraft for departure and then had proceeded to help others in his flight. He always serves as an example to others in all things. This party organization leader also unquestionably deserves part of the credit for the fact that his flight was the first to take off on a mock combat mission. It is not surprising that he is highly respected by his fellow soldiers.

Anatolii is a cheerful, sociable officer, loves to joke, and can also sing with feeling a song about these beautiful places, the first to greet the Soviet morning, about the life and work of the defenders of the homeland.

There are times when extreme composure and presence of mind are demanded of a soldier, the preparedness and willingness to make a bold, uncompromising decision. This is precisely what happened once during a flight, when knowledgeable, strong-willed actions by the flight technician helped his crew, which displayed courage and selflessness, emerge victorious from an extremely difficult air situation and bring the aircraft down safely. Anatolii Brazhnik was among those who were presented with a valuable memento by the commander in

chief of the Air Forces. Subunit activists put out a radio broadcast dedicated to this vanguard officer, and his experience and know-how were discussed in detail by colorful printed newsflashes. In short, the example of this party secretary is worthy of emulation.

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## SDI CALLED FIRST-STRIKE SCHEME

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 42-43

[Article, published under the heading "Imperialism -- Enemy of Peoples," by M. Aleksandrov: "SDI -- First-Strike Strategy"; based on materials published in the foreign press]

[Text] The third round of talks between the USSR and the United States on nuclear and space arms is continuing in Geneva. The Soviet Union's position remains unchanged: it advocates securing strict observance of the previously reached understanding. The talks should ensure preventing an arms race in space and bringing the terrestrial arms race to a halt. Both of these issues are closely interlinked and, consequently, this problem must be resolved as an aggregate. Any other approach is simply in contradiction to the principle of equality and equal security of the parties.

As had been supposed prior to the beginning of the talks, the road to attaining a mutually acceptable agreement with the United States has proven to be a difficult one. The U.S. side is openly sabotaging examination and resolution of the issue dealing with preventing an arms race in space. And yet limitation and particularly reduction of nuclear arms is inconceivable in conditions of militarization of space and its transformation into a new theater of armed combat.

Washington is dying to get into space, and the diplomats are doing their very utmost to help out. Just what do the people across the ocean expect from their planting of SOYBEANS [SDI is rendered by the Russian acronym SOI, the genitive case of the noun "soybeans"], as the "Strategic Defense Initiative" has been ironically dubbed?

Today it is no secret to anybody that it is aimed at creation of a new type of weapon -- offensive nuclear weapons. The large-scale antimissile defense system conceived in the United States is of a clearly-marked aggressive thrust.

There presently exists an approximate parity in nuclear forces between the USSR and the United States. A deterring factor in their employment is the fact that if either side launches a nuclear first strike, it cannot count on

totally destroying the opposing side's military potential. Calculations indicate that with any scenario the attacked side will retain sufficient nuclear forces to deliver a retaliatory strike, and a strike of sufficient force to ensure "unacceptable losses" to the aggressor. Retaliation is inevitable in conditions as they presently exist. However, if the United States builds a sufficiently effective system, within the framework of its large-scale antimissile defense program, to intercept airborne missiles on a retaliatory strike and is able to reduce the losses inflicted by a retaliatory strike to a level below "unacceptable losses," there will be an enormous temptation to launch a nuclear first strike, while still figuring on survival and victory. This is why space offensive forces introduce a destabilizing element, and their creation [sozdaniye] constitutes preparation for a first strike, for aggression, not some kind of strategic defense.

Coming to believe that it can act with impunity, the present U.S. Administration, simultaneously with a decision to begin development [razrabotka] of such a system, is pushing the pace of development of strategic offensive arms and operational-tactical nuclear weapons across the entire spectrum.

As was recently reported by the newspaper NEW YORK TIMES, in the last 3 years alone a total of 1,080 nuclear-warhead cruise missiles have been deployed on U.S. B-52 strategic bombers. An additional 420 will be added in the very near future. At the same time arming of U.S. naval forces with cruise missiles is proceeded at full swing. By the end of this year there will be 80 of these deployed on warships. The U.S. armed forces arsenal will swell by an additional 1,500 cruise missiles at the end of the 1980's. These measures are only part of the U.S. strategic forces buildup program being implemented by Washington.

The NEW YORK TIMES also reports that the first MX intercontinental ballistic missiles will be deployed the following year, scheduled to enter service with the U.S. armed forces in 1989. Development [razrabotka] of still another missile -- "Midgetman" -- is in the final stages. Rearming of the Strategic Air Command and Navy with the most modern weapons is also proceeding at a rapid pace. The first strategic bomber, the B-1B, has already become operational in the U.S. Air Force, and a second, the Stealth bomber -- is standing by in the wings. Washington is planning to begin deployment of enhanced-accuracy missiles in 1989 on Trident nuclear submarines. Plans to deploy U.S. intermediate-range nuclear missile weapons in Europe constitute an important component of this policy.

Creation [sozdaniye] of a large-scale antimissile defense system will unquestionably greatly complicate the problem of preventing nuclear war, since survival and limitation of damage will become more dependent on delivery precisely of a first strike. In a number of foreign publications the space component of this system is justifiably viewed as an antisatellite weapon as well. Deployment of such weapons in space, even on a limited scale, will signify increased instability, for such weapons can knock out not only the opposing side's satellites and strategic missiles after launch but can also be used against ground targets, and once again for delivering a first strike.

Claims by the present U.S. Administration that SDI holds the promise of saving mankind from nuclear missile weapons and that its program is purely of research significance and will not necessarily be implemented fail to stand up to criticism. This political trick is the greatest deception of our time. It is beyond conceiving how the economy-minded Americans can permit themselves to spend 60 billion dollars merely to determine whether it would be possible to create [sozdaniye -- in the context of this article the term encompasses the meaning "design and build"] offensive space weapons.

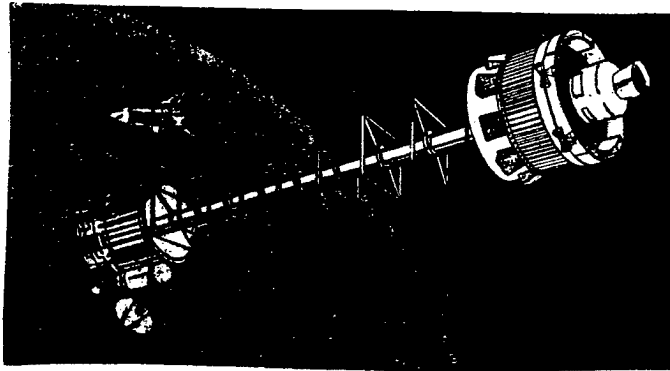
U.S. Secretary of Defense Caspar Weinberger stated bluntly at the beginning of the year: "I would say that it is out of the question to reject strategic defense either in the research or deployment stage." And recent statements by Lt Gen J. Abrahamson, head of the SDI program, and presidential science adviser (Dzh. Kiuort) that U.S. laboratories can already demonstrate several types of high-powered laser weapons merely serve to confirm Weinberger's statement. In addition, as the U.S. secretary of defense has stated, experiments will be conducted in coming months, in which a laser beam will be fired from a laser unit on a mountaintop on the island of Maui (Hawaii) at Terrier-Malamute rockets launched into space. The purpose of the experiments is to find the most effective technology for aiming at and destroying targets in space with the aid of high-powered ground-based lasers. Commentary here would be superfluous, as they say.

At the same time the present U.S. Administration is stepping up pressure on its NATO military bloc allies, as well as on Australia, Japan, and Israel. As Caspar Weinberger recently stated before the U.S. House of Representatives, there exists in Western Europe "considerable understanding and agreement" regarding SDI. He states that it is presently supported by Great Britain, West Germany, Italy, and Spain.

History records that in competition between offensive and defensive weapons, in most instances the former have won out. Recognizing this fact, a number of prominent U.S. military experts, led by former defense secretary McNamara, and a group of "concerned scientists" argue that it is an order of magnitude easier, simpler, and cheaper to design and build missiles which can penetrate a space antimissile defense shield than to create such a shield. This is obviously correct! But the advocates of militarization of space are counting on gaining a temporary advantage, which would provide the opportunity to apply military and political blackmail against the Soviet Union. At the very worst they hope to draw the USSR into a space arms race which is even more costly than the nuclear arms race, to exhaust us economically, while ensuring additional fabulous profits to the U.S. military-industrial complex.

Unquestionably, if the Americans begin testing (not to mention commencement of deployment) a new antimissile defense system, the nonexpiring treaty between the USSR and United States limiting antimissile defense systems, signed in Moscow on 26 May 1972, will be placed in question. Article 5, Paragraph 1 states: "Each of the parties pledges not to create, not to test, and not to deploy sea, air, space, or mobile land-based ABM systems or components." The significance of this Soviet-American treaty is especially great at the present time, since it remains the only ratified strategic arms limitation agreement presently in force.

The progressive international community is displaying serious concern regarding the dangerous U.S. plans to turn space into a new domain of armed struggle. A dialogue on problems of preventing an arms race in space was held in Geneva in mid-1985, in which prominent scientists, political figures, and leaders of influential antiwar movements of various political alignment from 25 different countries took part. The forum participants, examining the scientific and technical aspects as well as the potential military-strategic consequences, unanimously concluded that the new antimissile defense system, in spite of its enormous cost (ranging from 500 billion to 1 trillion dollars by various estimates), is not an effective means of protection against a potential nuclear strike and does not guarantee the invulnerability of the United States and particularly of its allies.



Electromagnetic "rail gun." A component of SDI.

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The president of the Problems of Security and Space Research Institute, former U.S. Air Force head of space weaponry, and a number of other scientists from Great Britain, Belgium, the FRG, Austria, the GDR, and Czechoslovakia, using specific scientific-technical and military materials, demonstrated in a well-reasoned manner that the system being developed within the framework of SDI is permeable and highly vulnerable and that its penetration will require incomparably less resources and can be accomplished by current military-technical offensive means. At the same time this system will inevitably become a first-strike weapon and thus a most powerful destabilizing factor. The existence of such a system, the participants in the discussion stressed, sharply increases the incentive to launch a first strike as well as the probability that preemptive measures will be taken against it. A situation will arise fostering the further improvement and buildup of offensive weaponry with the aim of achieving a strategic balance, that is, a chain reaction will occur, involving the creation of new and state-of-the-art weaponry.

The Soviet Union's approach to this problem has found expression in initiatives directed toward preventing the use of space as a springboard for offensive weapons and the elimination of all military-political dangers and economic expenditures connected with this trend.



In August 1981 the USSR proposed a draft treaty banning the deployment in space of weapons of any kind, with a new Soviet initiative following in August 1983 -- a draft treaty banning the employment of force in space and against the earth from space.

One feature of the latter consists in the fact that it combines measures of an international-law and material nature. The former mutually prohibit certain actions which could signify confrontation in space and would lead to rapid escalation of armed conflict from space-to-space combat operations to earth-to-space and space-to-earth strikes and, ultimately, surface-to-surface strikes, including a total nuclear exchange. The Soviet draft treaty calls for both sides to renounce the use of force from space toward any space objects, as well as from space toward objects on the earth and in the air.

The latter include proposed steps to ban the development [razrabotka], testing and deployment in space of new weapons systems designed to hit space objects and targets on the earth and in the air. The draft proposal also calls for mutual scrapping of existing antisatellite systems in order to foster the implementation of such measures and promote Soviet-American talks on this issue. The Soviet Union also unilaterally pledged to refrain from testing antisatellite weapons as long as the other side refrains from such steps.

And, finally, another Soviet initiative was recently announced: CPSU Central Committee General Secretary Comrade M. S. Gorbachev, in response to an appeal by the well-known U.S. public organization Union of Concerned Scientists, unequivocally stated on behalf of the Soviet leadership that the Soviet Union would not be the first to place weapons in space. The Soviet Union will undertake every effort to convince the United States not to take such a fatal step, which would inevitably increase the threat of nuclear war and would spur an unchecked arms race in all directions.

The USSR proceeds from the position that practical resolution of the problem of preventing an arms race in space and ending the arms race on earth is possible if both sides show political will and a sincere desire to achieve this historic goal.

The Soviet Union has both the desire and will.

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## ORBITAL OBSERVATIONS FURTHER SCIENCE OF GLACIOLOGY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 44-45

[Article, published under the heading "The Space Program Serving Science and the Economy," by L. Desinov: "For the Benefit of Glaciology"]

[Text] One of the most striking views of the earth's surface which pass in parade before the eyes of cosmonauts on an orbital mission is the sight of high mountains. The atmosphere above mountains is more transparent, and ridges and deep valleys, deep-blue lakes and green alpine meadows stand out sharply. Nevertheless eternal snows and glaciers are the most prominent elements of the landscape. Glaciology, the science of natural bodies of ice, occupies a substantial portion of the schedule of every Soviet manned space mission.

Ice is the symbol of cold and absence of life, but water (its other phase state) is the basis and cradle of life. Snow cover and glaciation play an important role in the life of our planet. Suffice it to say that in winter approximately 80 million square kilometers of land surface in the Northern Hemisphere and 40 million square kilometers of land surface in the Southern Hemisphere are covered with snow, while the total volume of all the ice on earth amounts to almost 30 million cubic kilometers, equal to the discharge of all rivers during a period of almost 700 years. Glaciers on the surface of our planet cover 11 percent of the land surface, subterranean ice masses comprise 14 percent, while sea ice covers more than 7 percent of the surface of the World Ocean. If all the world's glaciers were to melt, the level of the World Ocean would rise 60 meters.

The economy's need for regular, up-to-date information on snow and ice status is constantly growing. In arid regions this is connected with the dependence of economic activities on the discharge of mountain rivers. At the middle latitudes the time of development and melting of snow cover determines the times of agricultural field work. In northern regions the freezing over of rivers and the end of ice breakup affect the length of the navigation season. Knowledge of the ice situation and routes of iceberg travel on the seas increases safety and efficiency of navigation.

Only with the aid of space hardware and technology is it possible regularly to monitor the state of snow and ice over vast, not easily accessible areas of arctic countries, in high mountain country and in cold ocean regions. All other methods, including aerial photography and a network of hydrologic and weather stations, are insufficiently effective. The success of orbital glaciology experiments is affected by the level of cosmonaut training in this area, the number and quality of photographs and visual observations, and the volume of synchronous air and ground information in test field areas.

An inventory of the snow and ice in the mountains of our country is recorded in the "Catalogue of Glaciers of the USSR," which totals 111 volumes. In coming decades information obtained with the assistance of orbital hardware will be used to refine and detail these figures, for variability of the mountain glacial complex is extremely high.

In the process of opening up new regions, the following question frequently arises: what are the water resources of this region? This problem is quite acute in areas irrigated by river discharge from glaciers in nearby mountains. The Catalogue facilitates its solution.

Avalanche bodies are of particular interest. They plunge hundreds of meters down mountainslopes (sometimes 2-3 kilometers measured vertically) in the form of an enormous mass of snow and ice. These avalanches are not only a menacing natural phenomenon which cause damage to forests, roads, and structures, and sometimes threaten human lives. They are also of great positive significance in nature. The fact is that the bulk of densely-packed avalanche snow melts not all at once in the spring but gradually over the course of the entire summer, when farm fields on the arid plains are especially in need of nourishing moisture. Avalanche beds are very distinctly evident in orbital photographs, for which reason their inventorying presents no difficulty. It is sufficient to photograph a mountain region several times at the beginning of summer in order to estimate avalanche snow reserves. Obviously information on released avalanches can be obtained only with the aid of an orbital patrol, which regularly photographs coverage areas, several times a month.

Extensive accumulations of snow and ice about to plunge downslope are easily spotted on satellite images due to their characteristic three-dimensional shape and high contrast. Images also enable one to determine the quantity, thickness, and type of released avalanches and degree of avalanche danger. Such investigations are conducted in the Caucasus, Carpathians, the mountains of the Pamir-Alay, Tien Shan, Altai, Siberia, and along the BAM.

An atlas of the world's snow and ice resources is presently being compiled. Soviet glaciologists are also taking part in this project. The atlas will contain information on natural ice bodies of all types, ice resources by region, as well as recommendations on use of ice for economic purposes. Hundreds of space images taken from unmanned and manned space vehicles and stations have been used in the preparation of this atlas.

Over the last 12 years space hardware has been employed in the study of induced and surging fluctuations of glaciers. The former are caused by feeding conditions and the latter by transient dynamic relationships within

the glacier proper. According to figures obtained from space images, the Pamir Mountains alone contain approximately 300 glaciers which have become shorter or longer. Several dozen of these have been studied during surges, when the rate of ice movement has increased by one or even two orders of magnitude.

Surging glaciers threaten the population and the economy. Advancing rapidly, they block side valleys, forming ice-dam lakes at their mouth. Bursting of water from these lakes causes catastrophic flooding. But can the surging of glaciers not be predicted? It seems that it can. This requires high-mountain patrolling.

Traditional methods of collecting information on glacier activity are limited by poor accessibility of high-mountain areas. This is why space imagery with its high periodicity and breadth of coverage is acquiring great significance. It makes it possible to inspect the glaciers of practically the entire world within a period of several days.

An example of successful forecasting of movement is Glacier No 255, located on the south slope of Lenin Peak in the Pamirs. Advancing, the ice flow reached the lower point of the passive stagnant-ice tongue and covered it. Images obtained from orbit clearly distinguish the tongue, broken up by a grid of fractures, enormous fissures on the headward end and an area of ice surge, where it is heavily compressed and folded. In order to grasp the scale of this phenomenon, we should stress that the glacier flows from an elevation of 6,340 meters, with an elevation difference of 2,270 meters between its highest and lowest points!

Activity of surging glaciers can be observed in winter, when normal glaciers are entirely obscured by seasonal snow cover. Strips of fractured ice along the edges of an advancing glacier, for example, are clearly visible from orbit as striking dark lines contrasting against the background of the blinding whiteness of the snow. Obviously at this time of year space imagery frequently becomes the sole means of estimating the state of active glaciers.

Surging glaciers include those in which rapid movement is preceded by many years of very slow advance -- only several dozen meters per year. In many instances surging does not go beyond the glacier margins and dies out within the body of the glacier. Its steep terminal face stands out clearly against the mountain topography both in summer and winter, and as a rule is readily interpreted.

Until comparatively recently it was believed that the rapid advance of glaciers is a fairly rare phenomenon. Attention was addressed to it only when glacier movement led to loss of human life, livestock and large loss of property. Orbital imagery has made it possible to establish that in the Pamir Mountains alone as many as 10 glacier surges take place in some years. In our opinion, by the end of the present decade orbital imagery of the world's mountainous countries will make it possible to identify more than 90 percent of all surging glaciers. This data will be considered in building roads in mountain areas, in constructing industrial installations, housing, vacation facilities, and ski resorts.

Thus the space program is rendering considerable assistance in studying glaciation, which in turn makes it possible more efficiently to utilize the water resources of rivers which rise in glaciers, to forecast meltwater mudflows and flooding, and to keep track of usable land freed in connection with glacier fluctuations.

Glaciologists propose establishing a specialized service in this country which would maintain continuous observation of snow cover, mountain glaciers and sea ice, estimate snow and ice resources, pollution and variability. One component of this service would be a network of ground stations conducting observations and taking measurements on certain glaciers and in glaciological field test areas. A second component would perform periodic observations and photography by helicopter and fixed-wing aircraft, while a third component would perform remote sensing of snow cover and ice from satellites and orbital stations. Thus the service would contain three echelons.

Dozens of instruments and devices have already been tested and adopted, and methods of aerial survey of snow cover and ice have been devised and are being utilized. It remains to evaluate the capabilities of the orbital component and to set up methods of regular observations and imaging.

An important place is assigned to orbital stations. It is planned to exploit the ballistic peculiarities of the orbital path of the Salyut stations -- displacement of the station path by half the distance between orbital tracks every 24 hours and almost exact orbital path repetition every two days. This will make it possible to achieve cyclic recurrence of observations of the same regions, using various imaging hardware, film, and light filters, which will speed up the development of methods.

The principal difficulty of visual observation from orbit lies in the short time interval assigned to a cosmonaut to determine general location, to find, study, and photograph a target object. This time does not exceed one minute. During this time an orbital station travels approximately 450 kilometers. In certain instances glaciers which lie deep between rock cliffs can be seen for only 15-20 seconds.

Cloud cover also impedes observation and photography. Experiments in this area were conducted over a period of 5 years. In more than 70 of 100 instances of scheduled observations, the target area was obscured by clouds. For this reason it was frequently necessary to change the schedule of experiments and conduct them under more favorable weather conditions. For example, investigators would wait on weather for 9 to 10 weeks in order to evaluate the ice situation in an ocean area in the vicinity of the Antarctic regions. As a result it was established that effectiveness of observations diminishes to zero with more than 50 percent cloud cover, almost half of scheduled tasks can be performed with 30 percent cloud cover, while 10 percent cloud cover has practically no impeding effect on snow and ice observations.

The Pamirs serve as principal standard reference region. It was here that the actual resolving power of the human eye was determined. For this purpose detailed diagrams of several glaciers were included in the onboard

documentation. The diagram of the Bivachnyy Glacier, which travels down the east slopes of Communism Peak, was divided into 40 squares. Spacecraft crews sequentially observed the surface of the glacier and reported observation data for each of the diagram squares. Simultaneously the mountains were patrolled by helicopters. Their crews performed the same observations as the cosmonauts. This helped estimate the effectiveness of observation from an orbital station.

With a high visual contrast (medial moraines, sunlight reflecting off watercourses, etc), even the naked eye is capable of distinguishing extended features only 15-20 meters wide. This figure increases to 80-100 meters for low-contrast objects of compact form. As cosmonauts gained experience, they would spend less and less time locating target objects. During their 140-day mission, for example, V. Kovalenok and A. Ivanchenkov were immediately able to spot any glacier in the Pamirs as soon as it came into view.

An important characteristic of mass exchange of glaciers is the so-called snowline, which separates a glacier's region of net accumulation from its region of net loss by melting. It is very clearly visible from orbit, in the form of patches of snow and bare ice. The specific features of moraine streaks on the surface of glaciers are easily traced, and even coloration hues of a moraine can be differentiated. The contour of a glacier and the head of its meltwater stream can be seen by the naked eye. Large icefalls and crevasses in the zone of accumulation, frequently flanking it, are also clearly visible from above.

Glaciologists are also faced with many tasks in the seas and oceans. One of the principal tasks is prompt and timely spotting of icebergs and tracing of their paths of travel along sea-lanes. Floating ice is clearly distinguishable from orbit even against a cloud background, since the ice is brighter than the cloud cover and shows a clearly-marked outline.

Cosmonauts regularly reported penetration by icebergs hundreds of kilometers north of the drift ice limit in the Southern Hemisphere, which is marked on nautical charts and serves as a warning of possible encounter with icebergs. This line should evidently be moved even further from Antarctica, since isolated large detached ice masses from shelf glaciers running tens of square kilometers in area penetrate into warm waters, where they break up into hundreds of fragments. Cosmonauts observed the circular travel of an iceberg around the island of South Georgia from December 1977 through May 1981. Infrared-band instruments, which can detect large floating ice masses at night as well, are very helpful in these cases.

The employment of orbital hardware is also highly promising for evaluating the ice situation in seas which partly freeze over in winter. Such experiments have been conducted now for several years during the passage of spacecraft over the Kuril Islands, Kamchatka, and the Sea of Azov. Today weather satellites carrying a TV scanning system stand continuous watch above our country's seas which freeze over in winter. Regular visual observations from orbit can greatly assist this unmanned surveillance.

Snow and ice features are so clearly visible from orbital altitude that one is hard put to find other natural objects which can compete with them in simplicity of study from space. This is why glaciologists place high hopes on space hardware and technology, which is capable of opening up broad prospects for them.

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## VETERANS OF SOVIET SPACE PROGRAM PERFORM BOOSTER FUNCTION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 85 (signed to press 3 Sep 85) pp 46-47

[Article, published under the heading "History of the Soviet Space Program," by B. Pokrovskiy, chairman of the Space Command, Control and Telemetry Complex Veterans Council: "Veterans Remain Young at Heart"]

[Text] Many people maintain that spring is the best time of year. Fortunately it comes again and again. Youth is the spring of a person's life. The sad fact is that it comes only once; incidentally, just as the spring of the space age. Its youth consisted of the world's first artificial earth satellites, the Lunniks, unmanned interplanetary probes, and the Vostok manned spacecraft.

The authors of articles, pamphlets and books about the space program include many veterans of the space command, control and telemetry complex (KIK). They include Hero of Socialist Labor and Doctor of Technical Sciences G. Tyulin, a professor at Moscow State University and an honored scientist and technologist RSFSR; USSR Academy of Sciences corresponding member Professor P. Agadzhanov, Doctors of Sciences G. Narimanov, P. Elyasberg, and A. Bolshoy; candidates of technical sciences V. Yastrebov, G. Smirnov, and A. Bachurin, plus many others. Some of them have been Lenin and State Prize recipients.

Publications dealing with space are always received with interest and enthusiasm. But a narrative account by participants in the events and their stories about the spring of the space age exert incomparably greater emotional effect on people. It is for this reason that the KIK Veterans Council devotes particular attention to oral publicity of the achievements of the Soviet space program, particularly the history of the establishment, development, and activities of KIK and the selfless work by test personnel at land, sea, and airborne telemetry facilities.

The veterans consider it their duty to relate to young people about those persons who were fortunate enough to be pioneers in this endeavor. Our council endeavors to take every opportunity to address the public, especially youth. Activities include participation in oral editions of the journals AVIATSIYA I KOSMONAVTIKA and ZEMLYA I VSELENNAYA, and in scientific readings. A. Bachurin, member of the Bureau of the USSR Federation of Astronautics, a



candidate of technical sciences and recipient of a USSR State Prize, has spoken in many cities in Siberia and the non-chnozem region under the auspices of the Znaniye Society and the Council. And when Candidate of Sciences G. Smirnov traveled on vacation to the Crimea, the Council asked him to speak to the engineers, technicians, and operators at the Yevpatoriya Long-Range Space Communications Center, in the establishment of which he had taken part.

A. Vitruk, first director of KIK, directing it in the period 1957-1959, is an active publicizer of the achievements of the Soviet space program. A Communist from the Leninist call-up, he fought in the war from Moscow to Berlin. Andrey Avksentyevich is a frequent and always welcome guest with workforces and at schools in Moscow, Moscow Oblast, and Vinnitsa, the city of his childhood and Komsomol youth. Recently this party, war and labor veteran, who will be celebrating his 80th birthday next year, spoke at the All-Russian Teachers Seminar. Seminar participants later commented that such presentations are very helpful to them in the heroic-patriotic indoctrination of students.

These goals are also served by the museums established at many land and shipborne telemetry stations. A Zarya radio antenna, retired from service, has been placed on a pedestal at a telemetry facility in Siberia. One sunny morning on 12 April 1961 it was the first to pick up Yuriy Gagarin's voice from space. Today rallies are held by this unique memorial on holidays, Komsomol membership card presentations are held for young people, and Pioneer kerchiefs are placed around the necks of yesterday's Young Octobrists.

Unfortunately the mementoes of the spring of the space program are not always treated in this manner. I am still upset by the fact that the tape carrying a historic speech by S. Korolev at a meeting of KIK administrative personnel in 1958 was destroyed. In this speech he summarized the system's accomplishments with our first three satellites and discussed prospects for the future.

Time passes at truly cosmic speed. Mementoes -- witnesses to man's first steps into the universe -- disappear. The events of those years are erased from people's memories, while fewer and fewer actual participants and eyewitnesses to these events remain among the living. Today get-togethers of KIK veterans are attended by their children, many of whom are continuing in the footsteps of their fathers -- working at KIK telemetry facilities, communications centers, and on vessels of the USSR Academy of Sciences "Star Fleet."

An exhibit on the people of KIK and their activities was opened in honor of the 25th anniversary of the space age. In honor of the 40th anniversary of the Great Victory, the exhibit was updated and enlarged with photographs, documents and other materials from the personal archives of KIK veterans. It is these war veterans who journeyed to distant telemetry station sites to drive in stakes and set up tents, these first swallows of all construction projects -- large and small, of earth and space. Volkhovstroy and Magnitka, Komsomolsk-na-Amure and the Bratsk GES, KamAZ and BAM began with them. Our telemetry facilities in the taiga and semidesert, in the mountains and tundra also began with tents.

Candidates of sciences I. Spitsa, V. Yastrebov, V. Budilovskiy, N. Fadeyev, and B. Drozdov, and Engrs V. Krasnoper, L. Katernyak, and V. Kolbas attended the first meeting of the KIK Veterans Council. It was held on 17 August 1973, on the date of the 40th anniversary of the first successful launch of the GIRD-09 liquid-propellant rocket designed by M. Tikhonravov. All of us were well acquainted with Mikhail Klavdiyevich from our work in that same organization where the space command, control and telemetry complex was established. First of all we were endeavoring to unite within our organization the founders and pioneers of KIK. At first we were able to gather together 15 or 20 people, who would get together each year on 4 October, the birthday of the space age. Gradually our organization grew, and activities became more substantial and diversified. In 1983 the Council was accepted into the USSR Federation of Astronautics.

The wives of veterans, who steadfastly endured the burdens and deprivations together with their husbands at those remote, desolate sites where the first telemetry stations were established in 1957, are also becoming increasingly more actively involved in activities. Many of them have taken part in activities conducted at the Exhibit of Achievements of the Soviet National Economy, at the Museum of Astronautics, at the S. P. Korolev Home-Museum, and at the GIRD-09 rocket launch site, where a participant in the launch, Ye. Matysik, a former member of the Group for the Study of Rocket and Jet Propulsion, told us about this historic event.

The VETERAN wall photo newspaper, regularly put out by the Council, is very popular. Materials are prepared by A. Gusakov, N. Modestov, and Council Secretary S. Kamenskaya. Some issues have been used at events dedicated to the glorious Victory holiday, everywhere drawing great attention and interest. The get-togethers were conducted in a solemn and at the same time very warm atmosphere.

We visited one of the units of the Order of Lenin Moscow Military District. Together with the unit command authorities we laid wreaths on the Tomb of the Unknown Soldier at the Kremlin Wall and then visited the garrison. There we spoke with young military personnel in the Lenin rooms. The veterans told them of the heroism of their counterparts during the tumultuous war years and about the courage and skill of the pioneers of the space program in its early years.

The fraternity of veterans is continuing to develop and grow stronger. We are also thinking about the future. At the initiative of and jointly with the Council, the KIK administration and party organization have announced a competition in honor of the 30th anniversary of the space age, to be celebrated in 1987, for the best amateur literary, photographic, and artistic works which graphically publicize the achievements of the Soviet space program, the advanced know-how of the finest specialist personnel of land and shipborne telemetry stations, and which tell about their lives and interesting labor.

This year the KIK Veterans Council was awarded a Diploma imeni Yu. A. Gagarin for its active efforts to educate youth and publicize the achievements of the Soviet space program.

...At the beginning of July, just before his fifth manned orbital mission, twice Hero of the Soviet Union Pilot-Cosmonaut USSR V. DZHANIBEKOV stated: "Every mission has been different from the preceding one." And, thinking for a moment, he added: "On the earth as well every day portends something new."

We can second that. Every day in the activities of the KIK Veterans Council also brings something new. We are presently striving to greet in a worthy manner the 27th Congress of our Leninist Party.

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NEW ENCYCLOPEDIA OF ASTRONAUTICS PUBLISHED

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[Article, published under the heading "Criticism and Bibliography," by Hero of the Soviet Union M. Druzhinin: "Encyclopedia of Astronautics"]

[Text] Time passes swiftly! Just 3 decades back the word "space" was akin to the word "fantasy." We might recall the book by I. Yefremov entitled "Tumannost Andromedy" [The Andromeda Nebula], which came out the same year the first artificial earth satellite was launched. And today we are witness to the flight of the Vega 1 and Vega 2 interplanetary probes to Halley's Comet. Within a short period of time astronautics has gone beyond the framework of narrow research and has become transformed into an independent branch of science. Publication of a unique work in this field constitutes a synthesis and summary of the activities of scientists, designers, and experts in various areas of specialization.

In the years of my youth young engineers were engrossed by the writings of K. Tsiolkovskiy, Jules Verne, A. Tolstoy, A. Belyayev, and other scientists and writers. The ideas laid forth by these visionaries stirred the imagination and inspired people to seek new discoveries, to create the technology of space flight. "People are wrong," wrote V. I. Lenin about fantasy, "in thinking that only a poet needs it. This is foolish prejudice! It is necessary even in mathematics; even the discovery of differential and integral calculus would have been impossible without fantasy. Fantasy is a quality of the greatest value...." It is precisely fantasy which enabled S. P. Korolev and his colleagues to achieve outstanding success in their innovative search.

Civilization knows of many discoveries and major achievements, but only a few of these became milestones, turning points in the development of science and technology. The launching of the first Soviet artificial earth satellite was just such an event.

It was a difficult time for our country. Only 12 years had passed since the end of the Great Patriotic War. The wounds inflicted by the fascists were still in evidence. And few people in the world believed that the Soviet Union was standing at the threshold of the practical conquest of space. Even when Academician I. Bardin officially announced at the Assembly of the

International Geophysical Year in the summer of 1957 our country's intentions of launching an artificial earth satellite, many Western delegates did not believe him. But a team of scientists and designers, guided by the Communist Party of the Soviet Union, possessed firm belief in the possibility of launching a satellite.

Today many of them are no longer with us. But their brilliant names remain, names with which today almost everybody is familiar. And the labor, the joys and concerns, the misapprehensions and victories of those who began this undertaking invisibly stand behind a great deal of the contents of the Encyclopedia of Astronautics ("Kosmonavtika: Entsiklopediya" [Astronautics: An Encyclopedial], Moscow, Sovetskaya Entsiklopediya, 1985, 528 pages, illustrations, 9 rubles). They were volunteers in an army of enthusiasts nurtured by the Soviet Land. They laid down the foundations of that which astronautics has achieved to date. On the pages of this encyclopedia the reader will find biographies of the pioneers of the space program -- the designers and builders of space hardware, and cosmonauts.

In recent years a fine tradition has developed at the Sovetskaya Entsiklopediya Publishing House -- that of putting out publications dedicated to a given area of science and technology. "Astronautics" is such a book.

Demand for reference literature which fully and clearly answers the questions which are of interest to readers has today become much greater than in the past. And in this connection the publication of an encyclopedia dedicated to knowledge in such a vanguard field as astronautics is quite logical. We should like to note not only the relevancy of this new book but also its utility. This terminological reference volume will also serve as a reference aid for specialists as well. The terminology of astronautics, as of any young and rapidly developing field, is far from being standardized. The Encyclopedia of Astronautics will make it possible to take another step along the road toward standardization of terminology in this field.

It is considerably larger than the volume of the same name (first edition 1968, second edition 1970) which was published in the "Small Encyclopedias" series, and this is understandable. Fifteen years have passed since the most recent edition.

The number of space vehicles launched can serve as one of the indicators of the advance of astronautics. More than 3,000 satellites have been launched into earth orbit, and more than 100 space vehicles have been launched to investigate the moon and the planets of the solar system. Dozens of countries, including developing countries, have become involved in the investigation and utilization of space. Space technology has found particularly broad application in such areas as communications, navigation, meteorology, earth resources, and environmental monitoring. For example, more than 50 countries make use of weather satellite information.

With each passing year the practical areas of utilization of space technology, which have now become traditional, are becoming increasingly more extensively joined by experimental areas. Substantial changes have taken place in the manned space program. Pilot-Cosmonauts USSR L. Kizim, V. Solovyev, and O.

Atkov demonstrated the capability to live and work in space for a period of 237 days. Qualitative changes have taken place in investigation of the planets of the solar system. There have been changes in the technology and hardware of operating and supporting space flights, and views on utilization of space hardware have broadened. All this is reflected to one degree or another in this new publication.

The new encyclopedia contains more than 2,000 articles, which are divided among 15 subject sections. Readers will find clarification both of specialized and general technical and legal terms used in astronautics and the space program. The articles, tables, diagrams, definitions, and other data have been prepared by a large team of authors, including more than 100 academicians and doctors of sciences.

I believe that this volume will be greeted by Soviet readers with great interest.

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