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# ***JPRS Report***

# **Soviet Union**

## ***AVIATION & COSMONAUTICS***

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SOVIET UNION  
AVIATION & COSMONAUTICS

No 4, April 1987

[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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## SOVIET SPACE INITIATIVES, COOPERATION OUTLINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 1-3

[Article by Lt Gen Avn G. Titov, Hero of the Soviet Union and USSR Pilot-Cosmonaut: "Peace for Space, Peace for the World"]

[Text] Cosmonautics Day, which our people celebrate annually on 12 April, is a holiday of all progressive mankind. The Appeal of the CPSU Central Committee, the Presidium of the USSR Supreme Soviet and the Soviet Government to the Communist Party, to the People of the Soviet Union and to the Peoples and Governments of All Countries on the Occasion of Man's First Flight in Space emphasized: "We, the Soviet people, who are building communism have had the honor to be the first to enter space. We consider the victories in the conquering of space to be not only an achievement of our people but also of all mankind. We are happy to place them in the service of all peoples, in the name of progress, the happiness and well-being of all people on the earth. We are putting our accomplishments and discoveries not in the service of war but rather in the service of the peace and security of peoples."

Proceeding precisely from this principle, the Soviet Union had elaborated and is implementing an extensive program for the study and development of space for peaceful purposes and the implementation of this program commenced scarcely 30 years ago with the launching of the first earth satellite.

At present, in accord with the course set out by the 27th CPSU Congress of establishing an all-encompassing system of international security, the USSR has worked consistently to completely exclude space from the sphere of military preparations and for employing it solely for peaceful purposes. In a meeting with Indian members of parliament in November 1986, the General Secretary of the CPSU Central Committee, Comrade M.S. Gorbachev, pointed out: "We are profoundly convinced that space is the common property of mankind and should be only peaceful while only peace and not war should be of the stars."

As is known, the Letter from the Chairman of the USSR Council of Ministers N.I. Ryzhkov to the UN Secretary General Peres de Cuellar in June of last year set out a specific program of joint practical actions by the states relating to the research and use of space for peaceful purposes. This program was an appeal to collaboration among all states without exception. It was based upon

a profound conviction that the development of extensive international collaboration in the peaceful development of space is a constructive alternative to the sinister plans of extending the arms race to space. A distinguishing feature of the program is its scope and material completeness. It is planned in three stages and is aimed at establishing firm material, political-legal and organizational foundations for "Star Peace" before the year 2000. Here the Soviet Union proceeds from the view that this should not be the prerogative of just the developed countries. An important role on this question should be played by the authority and desires of the developing countries to collaborate in carrying out these tasks and their interest to shift the development of space along peaceful lines on a basis of extensive international cooperation.

For this reason even now our nation has proposed establishing an international center with the aid of the leading space powers for joint research and development in following the orders of the developing countries for types of space equipment (for example, satellites for studying natural resources) and under which there would be a school operating to train specialists from the developing countries, including cosmonauts, as well as a space center for launching spacecraft.

The Soviet Union gives great importance to the idea raised in this program of establishing a world space organization. This would make it possible to raise international cooperation in peaceful space development to a qualitatively new, higher level, having in mind the implementation under the aegis of this organization of major international projects in various areas of space science and applied cosmonautics. In turn, the Soviet Union is ready to exchange achievements in space with all states as well as launch peaceful spacecraft for other countries and international organizations employing Soviet carrier rockets under mutually acceptable conditions.

Having proposed this program for a "Star Peace," the Soviet Union is firmly convinced that world civilization should enter the 21st Century precisely with this and not with the absurd plans for "Star Wars."

A major step in the conquering of space was the launch on the eve of the 27th CPSU Congress of the new generation of orbital space stations called "Mir" [Peace] and equipped with six docking assemblies and representing the base unit for constructing a multipurpose, permanently operating manned facility with specialized orbital modules for scientific and national economic purposes. In the not distant future, five orbital modules each weighing 21 tons can be docked to it. These will be unique specialized scientific laboratories or production shops in space. Last year on this station a large amount of scientific technical research and experiments were carried out by the Soviet crew consisting of the Soviet pilot-cosmonauts L. Kizim and V. Solovyev. Also working there are the cosmonauts Yu. Romanenko and A. Laveykin and they will be joined by a Soviet-Syrian crew in the second half of July of this year.

Under present-day conditions it is hard to imagine our economic and scientific activities without the use of spacecraft. Radio communications is the most developed area for the practical employment of space equipment. This involves

radio broadcasting, television, including colored, telephone conversations and telegraph messages and facsimile images. At present, using the Molniya, Raduga, Ekran and Gorizont satellites, we have actually solved the problem of covering our nation's territory with two-program television broadcasting and the transmitting of the television programs is done in the five zones, considering local time. At present, not only the inhabitants of population points but also mobile groups are able to view the broadcasts of Central Television. Since 1978, for example, they have been successfully employing the receiving unit of the Ekran System on the nuclear icebreaker "Sibir" which makes trips across the Arctic Ocean. Satellite communications have been widely developed in transmitting photocopies of the central newspapers for their simultaneous publication with Moscow in the most remote cities of the country.

The space meteorological systems have also made a substantial contribution to solving national economic problems. The forecasts of the USSR Gidromettsentr [Hydrometeorological Center] and which are drawn up employing information from space satellites of the meteor type, make it possible to warn ahead of time about destructive atmospheric phenomena (typhoons, hurricanes). This provides an opportunity to protect property and promptly take the required protective measures. In the operations service of navigation and aviation, the data of these satellites make it possible to choose or adjust the optimum safe routes for vessels and aircraft. According to the statement of scientists, the use of weather satellites for studying the atmosphere has made a major contribution to increasing the reliability of the short-range forecasts and with the presence of global information, to assess general trends in the development of atmospheric processes.

A study of natural resources on earth from space is assuming ever-greater practical importance for the development of our nation's economy. With the aid of space information, we are solving problems of geological prospecting, we are able to develop different-type maps, we can assess the state and inventory natural lands, we can select routes for laying high-voltage transmission lines and transport arteries in inaccessible areas, and we are able to provide day-by-day supervision over the condition of bodies of water, lakes, rivers, the air basin as well as seek out areas of increased biological productivity in the seas and oceans.

Using space equipment a cosmogeological map of the USSR has been drawn up with a scale of 1:2,500,000. Using data of space surveillance, we have detected and turned over for exploration over 500 objects which are promising for the occurrence of minerals in Central Asia, Kazakhstan, Yakutia and other areas. Of great practical importance is information from spacecraft which carry side-viewing radars. For example, when combined with photographs in the visible range, the information from the radar made it possible to successfully lead the research vessel "Mikhail Somov" out of heavy ice in the Antarctic.

Presently widely employed are the space navigation systems designed to determine the location of vessels of the maritime and fishing fleet of the Soviet Union at any point of the world's ocean. Navigation fixes using satellites due to their globalness, quickness and high accuracy, increase the safety of navigation, they reduce running time and fuel consumption and

increase the effectiveness of the fishing fleet. Very great has been the benefit from employing space navigation systems by vessels employed to prospect for minerals, in the interests of oceanography and geophysics, in conducting operations to mine oil in areas distant from the coast as well as for measuring ice drift.

The development of space is a far from simple matter. It requires an extraordinary bending of forces and highly developed scientific and technical potential. This is why the Soviet Union from the very start of the space age has been decisively in favor and is in favor of a pooling of efforts and of collaboration of all states in the use of space. This collaboration should be carried out on the basis of such standards of international space law as would conform to the interests of all countries on the basis of the existing generally recognized principles and standards of international law, including the UN Charter.

For over 20 years now, our nation has participated in international cooperation programs in the area of the development of space. A number of agreements has been concluded upon Soviet initiative between the socialist commonwealth countries (on organizing the Intersputnik Space Communications, on the intercosmos Cooperation Program and others). The carrying out of these has already provided numerous practical results.

Under the joint program of the fraternal countries for the exploration and use of space for peaceful purposes, some 23 satellites of the intercosmos series have been launched along with 11 Vertikal high-altitude rockets and hundreds of meteorological rockets. Valuable research has been conducted with them and the results have been made available to all the partners. Cooperation with the socialist countries is constantly broadening. Representatives of the CSSR, Poland, GDR, Bulgaria, Hungary, Vietnam, Mongolia, Cuba and Romania, together with Soviet cosmonauts, participated in space flights in 1978-1981. The space brothers conducted around 150 scientific-technical experiments and studies of great scientific and national economic importance.

In this important area of human activity, the Soviet Union has collaborated with other nations of the world both on the basis of bilateral agreements and on a multilateral basis. The concluded agreements have made it possible to conduct a series of important experiments. A joint Soviet-American space flight was made by the ships Soyuz and Apollo and French and Indian satellites have been launched with Soviet carrier rockets. In 1982, a flight was successfully carried out by cosmonauts from the Soviet Union and France and in April 1984, the Soviet Union and India. Successfully operating is the international experimental satellite system of COSPAS-SARSAT (involving the USSR, the United States, France and Canada) and designed to determine the location of vessels and aircraft in distress.

The Soviet Union, loyal to its traditions of developing international collaboration in the space area, for the next few years and for the long run has worked out jointly with other countries a wide-scale program of peaceful research of space. During the current and in future years alone, there will be flights by Soviet cosmonauts with cosmonauts from Syria, Bulgaria and France, while from the Baykonur Space Center they will launch an Indian remote



land surveying satellite and a Soviet Granat astronomic satellite carrying the French Sigma gamma telescope. There are also plans to launch two spacecraft to study objects in distant space including the Phobos project involving specialists from 11 countries and the European Space Agency. Thus, the Soviet Union in fact is setting a vivid example of the possibility of research and the use of space exclusively for peaceful purposes by the joint efforts of states and for the good of mankind.

#### Space Pioneers of Different Countries

On 12 April 1961, Yuriy Alekseyevich Gagarin blazed the trail into space and now 17 other countries have their own trailblazers of the universe.

Cosmonaut, Astronaut	Country	Spacecraft	Launch Date	Duration of Flight
Yuriy Alekseyevich Gagarin	USSR	Vostok	4-12-61	1 hr 48 min
John Glenn	USA	Mercury-6	2-20-62	4 hr 55 min
Vladimir Remek	CSSR	Soyuz-28--Salyut-6	3-2-78	7 days, 22 hr 16 min
Mirosław Germaszewsky	Poland	Soyuz-30--Salyut-6	6-27-78	7 days, 22 hr 3 min
Sigmund Jen	GDR	Soyuz-31--Salyut-6-- Soyuz-20	8-26-78	7 days, 20 hr 49 min
Georgiy Ivanov	Bulgaria	Soyuz-33	4-10-79	1 day, 23 hr 1 min
Bertalan Farcas	Hungary	Soyuz-36--Salyut-6-- Soyuz-35	5-26-80	7 days, 20 hr 46 min
Pham Tuan	Vietnam	Soyuz-37--Salyut-6-- Soyuz-36	7-23-80	7 days, 20 hr 42 min
Arnaldo Tamayo Mendes	Cuba	Soyuz-38--Salyut-6	9-18-80	7 days, 20 hr 43 min
Zhugderdemidiyn Gurragcha	Mongolia	Soyuz-39--Salyut-6	3-22-81	7 days, 20 hr 42 min
Dumitru Prunariu	Romania	Soyuz-40--Salyut-6	5-14-81	7 days, 20 hr 43 min
Jean-Louis Chretien	France	Soyuz-T-6-- Salyut-7--Soyuz-T-5	6-24-82	7 days, 21 hr 51 min

Ulf Merbold	FRG	Columbia	11-28-83	10 days, 7 hr 47 min
Rakesh Sharma	India	Soyuz-T-11-- Salyut-7---Soyuz-T-10	4-3-84	7 days, 21 hr 40 min
Mark Garno	Canada	Challenger	10-5-84	8 days, 5 hr 24 min
Sultan Salman as-Saud	Saudi Arabia	Discovery	6-17-85	7 days, 1 hr 39 min
Wubbo Okkels	Nether- lands	Challenger	10-30-85	7 days, 00 hr 44 min
Rodolfo Neri	Mexico	Atlantis	11-27-85	6 days, 21 hr 4 min

Unfortunately, this cannot be said of the United States. Star Wars here, as before, enflames the minds of the representatives of the White House and the Pentagon. The leaders of the SDI Program, with unfeigned satisfaction, have pointed out that Reagan's Strategic Defense Initiative is being carried out very successfully and at a more rapid pace than was expected. Among the specific areas where success has been achieved are the development of various space- and land-based lasers, the Asat antisatellite system, the electromagnetic guns as well as the development of methods for compensating for atmospheric interference on laser radiation and the development of new materials resistant to the effect of radiation occurring with a nuclear explosion.

According to the statement of the SDI leaders, the "key programs in the area of antimissile defense have reached a stalemate which can only be crossed by conducting major experiments in space." Such a step was taken on 5 September of last year, when an experiment was conducted called "the most complicated of any operations ever carried out by the United States for combat control in space." Its task was to gain data on the characteristic radiation from the flame of missile engines as well as the testing of guidance and navigation systems and the propulsion units providing maneuvering. In addition, the possibility was studied of holding a laser beam on an object in space. In the concluding stage of the experiment, the second stage of a carrier rocket was aimed at a satellite and they collided. In the words of the experiment's leader, the work of the sensors surpassed the boldest expectations and this makes it possible to hope that the development of sensors for a kinetic gun will turn out to be an easier task than assumed.

Reagan's Star Wars Program is the offspring of the U.S. military-industrial complex and by which the American "Business of Death" has placed its hopes on an unprecedented source of gain and on a guarantee for its flourishing until the next century. For example, the gross earnings of just the General Electric Corporation in 1986 rose to 30 billion dollars. It has continuously

received unprecedented orders from the Pentagon which bring it fabulous income. At present, when the corporation has been ordered to develop a nuclear space-based reactor for supplying power of the first-strike laser and ray gun, the plans of this monopoly the leadership of which has a representative from the powerful New York Morgan Bank appear as a monstrous, misanthropic piece of science fiction.

However, the plans for deploying space-based attack weapons by which the American strategists hope to push ahead in the arms race do not provide Washington with strategic military supremacy but rather rest as a heavy financial burden on the economy of the United States and its Western allies.

Last year at the summit meeting in Reykjavik an unique opportunity was provided for entering the 21st Century without strategic offensive weapons which now the USSR and United States possess and, possibly, by the beginning of the century complete the complete elimination of nuclear weapons on earth, as has been proposed in the Statement of the General Secretary of the CPSU Central Committee, Comrade M.S. Gorbachev, on 15 January 1986. However, the door opened by the Soviet side to a nuclear-free world has been, unfortunately, closed by Washington which has focused its efforts on carrying out the SDI Program. The U.S. president during the summit until the end insisted that America had the right to test and study everything relating to the SDI and not only in the laboratories, but also outside them, including in space. Naturally, the Soviet Union could not agree to this.

The Soviet people are hopeful that the United States will reflect on the extreme situation which has developed over the Star Wars Program and will endeavor to surmount what now separates us.

Reason, peaceful reason should win out. All honest people of the world believe this and for them the concepts of the "earth," "space" and "peace" are inseparable.

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GREATER CREATIVE THINKING, PLANNING IN AIR TACTICAL EXERCISES URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 8-9

[Article, published under the heading "For High Combat Readiness" by Col N. Tkach, military sniper pilot: "New Procedures But An Old Approach"]

[Text] The two fighter groups were rapidly closing on head-on courses. The pilots headed by Capt N. Balabukha were already preparing to launch the missiles, but the "enemy" by an unexpected maneuver thwarted their attack. The approach occurred in a few seconds and both groups visually detected one another. In the close combat, Capt N. Balabukha and his wingmen suffered a failure, as the flight plan had been worked out proceeding from the idea of launching the attack from a great range.

The flight of Capt A. Sobolev was carrying out "lone-wolf hunting." In accord with the plan for seeking out the "enemy" the pilots were carefully viewing the airspace. However, the time set by the senior chief for the "hunting" passed but the enemy did not appear.

After landing the pilots held a meeting. Everyone felt that this had not been a failure. But soon thereafter they had to change the opinion as the fighters learned that several aircraft had passed through the area which they were monitoring.

Another tactical group was carrying out the task of sealing off an "enemy" airfield. The group's maneuvers were so organized that not a single aircraft could take off from the airfield. However, the pilots had not made provision for one thing: the possibility of the relieving of the airfield by "enemy" fighters based at different airfields. Subsequently this was what happened. The blockaders came under an unexpected attack from the side and suffered substantial "losses." The well thought out and precisely executed mission was actually thwarted.

Three different instances from the practices of the tactical flight exercises of the same fighter air regiment. In analyzing them it cannot be said that the aviators from this collective were not professionally prepared. Each sortie was preceded by the working out of an overall plan, by the carrying out of the necessary calculations and by the forecasting of the conduct of the

opposing side. But a routine approach to solving tactical problems contributed to their failure.

In the first instance the pilots of Capt N. Balabukha constantly planned to destroy the "enemy" in the head-on clash but, being unsuccessful in this (in truth, there were no "losses"), they were unprepared for an energetic maneuvering battle. It was a case of tactical shortsightedness: since the sight unit and the onboard weapons made it possible to attack from the forward hemisphere, then why prepare for close combat and why burden down one's attention with a radar and visual search? A typical routine approach the essence of which is to organize tactics on the basis of just one of the combat capabilities of the fighter.

In the episode with the group of Capt A. Sobolev, the opposite seemingly occurred. The pilots were busy with a visual search and did not use the radar equipment. Incidentally, the visual search also required the visual maintaining of the combat formation and this significantly reduced the chances for discovering the "enemy." The conclusion is analogous: a routine approach and the incomplete use of the aircraft's combat capabilities.

In the third instance, the pilots did not provide defensive measures. And here the routine was apparent in the same shortsightedness: since the blockade was an active type of combat, then all forces should be used precisely in carrying out this mission.

A routine approach in tactics can be manifested very differently but there are also definite establishable patterns. For instance, the extended use of the same initial tactical idea and the transfer of tactics effective for one aircraft to another with different, as a rule, richer combat capabilities. Let us illustrate this by examples.

The fighters headed by Officer V. Glukhov were given the mission of a group air combat. The leader assigned the different tactical groups and the combat missions for each of them. In the air, in the course of the air combat which had been successfully commenced by the pilots, the "enemy" unexpectedly committed reinforcements which, being beyond firing range, launched a surprise strike.

The carrying out of the mission, in essence, was thwarted. The question arose: possibly the "enemy's" numerical superiority was so significant that the commander controlling combat did not have enough forces to repel the strike? But the point is that a feint group could have been employed as it, having carried out its mission of initiating combat, had pulled out and was free. But the commander obviously felt that the role of this group had been exhausted. Hence we have the routine application of a good idea, that is, by feint actions to establish good conditions for air combat.

Another example. In the course of a tactical flight exercise, the pilots were to cover a group of transport aircraft. The cover was organized in close combat formations. Seemingly it would be impossible to break through. But the "enemy" fired on the transport aircraft from long-range, so to speak, over the heads of the cover fighters which were too close to the supported

aircraft, that is, at distances and intervals corresponding to the performance of the previous generation of aircraft. In this sortie they were employing fighters with significant greater capabilities of the radar sights and these would have made it possible to repel the attack by the "enemy" fighters at distances safe for the transport aircraft. This was the fault of the routine of old tactics using new equipment.

Combat training practices provide examples of the exceptionally effective employment of even a well-known tactical idea but employed in a new and non-standard manner. Let me mention the following instance.

The aviation collective headed by Officer S. Drozdov had been given a difficult mission. In the process of working out the plan for air combat, the commander encountered a "insoluble" problem as there were not enough forces to organize an air screen. After a thorough analysis of the situation and after careful calculation, he found a way out. He made the screen mobile and assigned the carrying out of this difficult task to pilots who had not only outstanding professional qualities but also a true fighter nature. The task was successfully carried out.

The aviators of the squadron of Maj A. Aristov were fighting in a situation close to the one described in the case of Capt N. Balabukha. But they had a different approach to carrying out the analogous mission. The combat formation before initiating combat was so formed up that a portion of the forces were able after spotting the "enemy" to escape from its field of vision. A tactical strategem was also devised for the group which could come into the capture zone. Those who were the first to come under the missile strike were to maneuver energetically while the unattacked aircraft were to continue the flight straight toward the "enemy." According to the plan the "enemy," in pursuing the "captured" aircraft, would inevitably shift the sights from the aircraft carrying out the head-on encounter.

In the air it happened just as planned. The attacked fighters by an energetic maneuver not only thwarted the missile strike by the "enemy," but also drew the enemy after it. Then the enemy was struck by a double attack: by those who had closed in on head-on forces as well as by those who an instant before initiating combat had moved beyond the radar range. As a result there was a complete tactical success. This example indicates that success naturally depends upon the depth of understanding of the essence of modern air combat which is carried out by pilots capable of thinking in a modern way employing aircraft with increased flight and combat performance and with precise and complete support.

What are the main sources of the tactical feebleness within the examined areas of "routinization"? Without discarding such factors as indifference, inertia and a reduced sense of responsibility, we would point out that routine lives where the forces of the collective (each pilot and not just the commanders alone) are dissipated and where they do not endeavor to focus attention on the chief thing as each air fighter is obliged to do by the social essence of the fatherland's defender.

In such collectives tactics and the elaboration of new procedures of armed combat are remembered only immediately before the exercises. But preparation for them requires a great deal of work and in the process of this there is not enough time to work out tactical innovations. Then they fall back on procedures which were dependable in the past, were repeatedly tested out and developed and making it possible to conduct training combat. Here the commanders failed to consider one thing: the "enemy" is seriously preparing for combat in order to carry out its mission with maximum effectiveness.

There is also the following variety of tactical shortsightedness. For example, the pilots have prepared thoroughly for the tactical flight exercise, they have worked out good tactical procedures which were then successfully employed in the course of training and gained valuable experience. But the flight shifts and weeks pass but the same experience remains in the collective's tactical arsenal. As a rule, the next exercises unmask such "outstanding men" and the faded laurels are unceremoniously taken from them.

Precisely this happened with the personnel of one of the air units at a recent tactical flight exercise. The group was given the mission of destroying an AWACS aircraft. The pilots had carried out a similar mission in the recent past. Then they successfully implemented the commander's plan to destroy the airborne command body by a concentrated strike at maximum speed. Whether the "enemy" had poorly organized its cover or whether....they were lucky and the plan succeeded. But this time in the exercise they employed the same approach with all forces sent against the main object. But, as it turned out, it was under a dependable cover. The commander who directed this combat, even after the first failure, could and should have reformed but was unable to stop the inertia of tactical unpreparedness. The fighters fell upon the designated target, inevitably coming under the missile "strikes" of the cover. Some of them carried out the mission with great difficulty and with tangible costs.

From what has been said, the impression may be gained that the unit and subunit commanders are exclusively to blame for the tactical routine approaches. But experience suggests that in collectives which excel in great tactical maturity, pilot skills have all-round support. Here tactical questions are constantly in the field of vision of not only the command but also the party organizations. Here the activists participate in working out tactical procedures not only on the eve of the tactical flight exercise but also regularly discuss tactical questions at the party meetings; many have permanent "tactical" assignments. Here not a single idea or a single plan is missed.

But where routine prevails, bombastic formal slogans are the rule. And in order to exclude the complaints of inspectors, they often manipulate sacred concepts. And then the tactical flight exercises which are dull in concept, obsolete in idea and simplified in content are accompanied by large underscorings such as: "In Exercises As In Combat." But this moral routine and spiritual bureaucracy are much more dangerous than other ailments as they

harm the very idea of increasing all aspects of combat skill. There is and cannot be any justification for this.

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## NEW CREW, EQUIPMENT FOR MIR SPACECRAFT SYSTEM

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) p 9

[Article by G. Glabay: "The New Watch for 'Mir'"]

[Text] On 16 January 1987 there began the next stage in the work of the orbital scientific station Mir. On this day the automatic cargo spacecraft Progress-27 was launched and this carried more than 2 tons of all sorts of freight and fuel. The in-flight automatic equipment monitored by the Mission Control Center, having carried out a reciprocal search, rendezvous and docking, ensured the docking of the spacecraft with the station's equipment compartment. Everything was prepared to receive the masters of Mir on board.

6 February 1987. The carrier rocket with the Soyuz-TM-2 spacecraft was at the launching position of the Baykonur Space Center. The hands of the chronometer were approaching 0038 hours Moscow time. The command "Launch!" rang out. Frozen in expectation were the specialists, journalists and everyone present at that moment at the missile range and the Mission Control Center as well as at the ground and floating stations of the telemetering facilities.

It took just about 9 minutes to put the manned spacecraft of the new Soyuz-TM-2 series into a near-earth orbit. Its unmanned version had been tested in May 1986. And again (for how many times!) the exhilaration of our people over the capabilities and reliability of Soviet space equipment.

Thus began the multi-month space watch Taymyrov. The crew commander was the twice Hero of the Soviet Union, cosmonaut pilot of the USSR, Col Yuriy Viktorovich Romanenko, a member of the CPSU since 1965. In 1966, he completed the Chernigov Military Pilots School with honors. He served as an instructor pilot in the Air Forces. From 1970, he has been in the cosmonaut detachment. He was the alternate crew commander in the Soyuz--Apollo Program. In 1977-1978 he made his first space flight lasting 96 days as the commander of the Soyuz-26 spacecraft and the orbital station Salyut-5. How those days then amazed everyone! In 1981, Yu. Romanenko, as the commander of the seventh international crew under the Interkosmos Program, made a flight on the Soyuz-38 spacecraft with the Cuban Arnaldo Tamayo Mendes for working on the Salyut-6--Soyuz-37 orbital station.

In 1981, Yuriy Viktorovich, without leaving his main job, completed the Air Force Academy imeni Yu.A. Gagarin. On 1 August, he will be 43 years of age.

The flight engineer Aleksandr Ivanovich Laveykin feels secure and confident next to such a commander.

"We joined the cosmonaut detachment in 1978," recalled Viktor Petrovich Savinnykh. "I have already made two flights but this is the first one for Aleksandr."

After completing the MVTU [Moscow Higher Technical School] imeni N.E. Bauman in 1974, A. Laveykin worked in a missile-space design bureau. His specialty allowed him to count on the reliability of spacecraft assemblies and parts. And now these were found on the Soyuz-TM-2 spacecraft.

A. Laveykin is the 200th cosmonaut of the world and the 61st Soviet cosmonaut. He was born on 21 April 1951 in Moscow. He has been a member of the CPSU since 1980.

The son of a navyman, Yuriy Romanenko and the son of a military pilot Aleksandr Laveykin are worthy heirs of their fathers.

This time the rendezvous and docking of the Soyuz-TM-2 spacecraft with the Mir--Progress-27 orbital station occurred somewhat unusually. This involves the fact that the Mir station will gradually increase weight as initially won and then the following modules are connected to it. As a total five scientific modules can be docked to the station. Heavy fuel consumption is required for adjusting the orbit of such a heavy station prior to the docking. For this reason the docking was carried out by an adjustment of the Soyuz-TM-2 using the Kurs system for measuring the parameters of the relative approach; this was done on 8 February (for 8 hours) at 0228 hours Moscow time.

A start has been made on the basic stage of operating the Mir Station and this envisages the establishing of a permanently operating manned orbital facility with specialized modules for scientific and national economic purposes. The cosmonauts Yu. Romanenko and A. Laveykin must carry out an extensive program of astrophysical, geophysical, technological, technical and medical biological research and experiments. At the end of July, another crew, Soviet-Syrian, will be added to work in space.

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SERVICE, ACHIEVEMENTS OF TOP HELICOPTER CAPTAIN DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) p 10

[Article, published under the heading "For the Contest 'Heirs of October'," by Capt A. Popov: "Commander Maturity"]

[Text] The aviation career of Lt Col N. Mezentsev began in his school years, in a aircraft modeling circle. In his childhood, Nikolay had seen a film in which a young geologist had been taken severely ill in the tayga. He needed immediate medical aid but it was several days away to the nearest population point. It was a matter of hours. Then a helicopter was summoned by radio. The aviators landed on a limited tayga pad, took the geologist on board and brought him to the hospital. The man's life was saved. This episode made a great impression on the young boy. He resolved to become a flyer.

Desire and tenacity led Nikolay to the Syzran Higher Military Pilot School. The school years flew by and Lt Mezentsev, having received an appointment, arrived in the military district. At first, he was the co-pilot on an Mi-6 helicopter. Service demanded from the young officer great courage, tenacity and steadfastness. In recalling this time, Nikolay Aleksandrovich recalled with great warmth his first mentors Maj V. Yanshin and Capt G. Neudakhin. They taught him a great deal and helped him master his job. Soon thereafter Mezentsev was heading a crew.

Time went by. Over the years, experience was gained and combat skill grew. Over a comparatively short period of time, Nikolay Aleksandrovich moved from a crew commander to a squadron commander. Difficult and intense labor lay behind these apparent indicators. Lt Col Mezentsev had to spend a great deal of time and energy to unite his subordinates in a single combat collective and to lead his men to struggle to achieve the advanced goals in flying.

Initially not everything went smoothly. At first, the strict demandingness of the new commander evoked discontent among those who were accustomed to work without particular endeavor. Nikolay Aleksandrovich did not abandon his principles. Relying on the party organization, he put the main emphasis in indoctrinational work on increasing the personal responsibility of the aviators for the assigned job and the greatest possible development of their

initiative. The grade of "excellent" obtained by the squadron at the final year's inspection was an award for his tenacious work.

At present, they speak about Mezentsev not only as an excellent pilot who has mastered several types of helicopters but also as a skillful leader, an indoctrinator, an intelligent educator, an efficient, disciplined and industrious officer.

One time, in working on an inspection hovering, Nikolay Aleksandrovich felt that the controls ceased to obey. The helicopter went out of control. The light "Failure of Main Hydraulic System" was flashing alarmingly on the control panel. Upon the commander's instructions, the co-pilot Sr Lt P. Gelash quickly moved the switch to the necessary position. Operating in sequence the pitch and gas control, the control stick and the pedals, Mezentsev cautiously landed the heavy aircraft. Had he lost control for an instant, an accident would have been inevitable. This episode showed not only the high flight skills of Mezentsev but also his steadfastness, courage and self-control.

Later on, specialists of the IAS [Aviation Engineer Service] found the cause: a failure in the operation of one of the controls due to the violating of established aircraft equipment operating rules by ground specialists.

Nikolay Aleksandrovich was one of the first in the regiment to master the giant Mi-26 helicopter. His intense work was properly recognized. Lt Col N. Mezentsev was awarded the Order of the Red Star for successes in military and political training by an ukase of the Presidium of the USSR Supreme Soviet.

The party reference of Nikolay Aleksandrovich contains the following lines: "He tenaciously carries out the demands of the CPSU Program and By-Laws, he shows exceptional conscientiousness for carrying out his official duties and here has manifested personal courage." The party reference was given to the officer at the end of May 1986, when Nikolay Aleksandrovich had returned from Chernobyl, where along with his subordinates, he had participated in eliminating the consequences of the disaster at the nuclear power plant.

--April 26 was a Saturday. This day strikes a painful chord in the hearts of Soviet people. Mezentsev will remember it all his life.

There was assembly upon the alert. A brief assigning of tasks and then a take-off. By the end of the day the helicopter group had landed on the outskirts of Chernobyl. The aviators were already awaited. A severe looking colonel briefly described what had happened and tersely gave the mission. Then the flights began....

The helicopter pilots worked, as they say, dripping in sweat. The day's schedule was rigid: flights from 0500 hours in the morning until 0100 hours at night. Here they had to follow not only the instruments showing speed and altitude but also the indicator of the in-flight dosimeter. At Chernobyl, Mezentsev had to carry out one of the most difficult assignments. This is what happened.

The huge Mi-26 headed off to unit four. In addition to the crew, there was a group of specialists who had to make a television film of the reactor, measure the temperature inside the reactor and determine the radiation level. In dropping down, the helicopter flew almost right into the unit. You could seemingly touch it with your hand. Below were towers and a power transmission line. The commander's skill would determine not only the success of the job but also the life of the people on board.

This most intense flight continued for 2 hours and 40 minutes. Scores of meters of film were taken with valuable information and a number of other important operations carried out to determine the reasons of the accident.

Col Mezentsev flew to the reactor for the last time on 1 May. Then he had to go for a preventive examination at the hospital.

Arriving back at his home garrison, Nikolay Aleksandrovich without going home, went to the unit to see how things were going in the collective. This shows the true Mezentsev. For him the main thing was service and his job. His subordinates are fond of him and respect him for his self-sacrifice and dedication.

It Col N. Mezentsev has spent almost 3,000 hours in the air. Many of these were a major testing of combat maturity and Nikolay Aleksandrovich passed this with honor. For this reason, his promotion appears quite natural.

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CAREER, FEAT OF SOVIET FIGHTER PILOT KILLED IN ACTION IN AFGHANISTAN

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 12-15

[Article, published under the heading "They Were Decorated by the Motherland," by Col Ye. Besschetnov: "Skies for a Lifetime"; the first two paragraphs are an editorial introduction]

[Text] The name of the communist and Military Pilot 1st Class Lt Col A. Levchenko who thrice was to perform his international duty, will go down for all times in the glorious chronicle of the USSR Armed Forces. In serving as part of the limited contingent of Soviet troops in Afghanistan, Anatoliy Nikolayevich [Levchenko] carried out an immortal feat. For the first time in the history of Soviet aviation, he employed a ramming on a jet aircraft, sending his hit MiG-23 fighter against a strongly armed air defense position of the dushman and by the explosion of his aircraft destroyed it.

For courage and heroism shown in providing international aid to the Afghan people, in 1968, by an Ukase of the Presidium of the USSR Supreme Soviet, Lt Col A. Levchenko was awarded the title of Hero of the Soviet Union (posthumously).

All of this happened on 27 December 1985. It was an ordinary, completely unnoteworthy day. Lt Col Levchenko, in heading a fighter group, had already made three combat sorties. The last one was particularly successful as the four fighters had literally dessorated a dushman caravan which had invaded from Pakistani territory and which was carrying a large supply of weapons and ammunition. In drawing up their impressions about the flight, the aviators were waiting around at the airfield. Levchenko spoke with Maj Med Serv Mikhail Bozhko. The talk swung to preparations for celebrating the New Year.

Suddenly, the message came from the command post that the four fighters were to take off again. In the area of the Salang Pass on one of the elevations they had discovered two firing positions and the dushman were firing on columns of vehicles delivering fuel and food from the USSR to Afghanistan.

Anatoliy Nikolayevich out of habit glanced at his watch, noting the time of 1600 hours.

"When I get back from the flight, we will continue our talk," he tossed back to Bozhko on the way out.

Levchenko ascertained the target's coordinates and gave the combat mission for the sortie to the fliers. The aircraft took off immediately. The setting sun still illuminated the distant peaks of the mountains but the valleys were already filled with the evening gloom.

Anatoliy Nikolayevich led the group to the designated area precisely. Even on the approach to the pass, he was searching for the target, the dushman crews who had established themselves high in the mountains. When the flight in battle formation had executed a half-turn, Levchenko reported:

"On the combat course. I see the target, I am attacking...."

And his pair, separating from the formation, began to drop down into the gorge, aiming at one of the positions. The second pair consisting of Maj Vladimir Shakhov and Sr Lt Viktor Korshun continued to describe a turn in order to attack the target coming in from the other direction.

Maj Aleksey Shcherbak went into the attack after Levchenko, trying to keep the battle formation closer in order to drop the bombs in a tighter cluster. Possibly for this reason he did not immediately spot the dushman air defense weapons which were firing at the pair. On the other hand, Shakhov had a good view of them. With concern he followed the firing anti-aircraft mounts and their bright bursts were reminiscent of the flames of electric welding. At last there was the brief as a shot but decisive command from Lt Col Levchenko:

"Bombs away!"

In carrying out this, Maj Shcherbak pressed the release button, sending the bombs against the target and together with the leader who had also made his drop, began to bring the fighter out of the steep dive. Only then ahead along their course did they see the bursts of the mountain anti-aircraft mount and a little further on another one. The tracer bullets were flying right toward their pair.

Beneath the leader's aircraft, under the left wing, something flashed brightly and the aircraft, as if colliding with an obstacle, ceased to pull out of the attack. At the same time, it was noticed that the pilot was continuing to control the aircraft. The plane, in clearly obeying his will, turned down, following the tracer bullets. Aleksey realized that a disaster had occurred. Obviously Levchenko was wounded. Possibly, even fatally....

In completing his pull out of the attack, Shcherbak was able to notice the leader turning toward the nearest mountain anti-aircraft gun and headed almost precipitously precisely at it. The aircraft went lower and lower. The bullets kept coming at it, punching into the fighter. Aleksey had already gone into a turn, when the aircraft of Lt Col Levchenko with all its weight crashed on the dushman gun. Shcherbak did not hear the explosion, but he could clearly see the rising black column of smoke. In an instant it turned bright red, blazing strongly in the evening dusk....

The pair of Vladimir Shakhov, having completed the turn, came in on the combat run and dropped the bombs from a dive against the other dushman firing position. Then the group, having circled the point where the commander's aircraft had gone down, headed back to their airfield.

When Maj Med Serv Bozhko along with the search team landed on the peak, he saw the empty fortified dushman positions built out of stone. Where our aircraft had struck lay a completely destroyed mountain antiaircraft gun position. No doubt remained: Lt Col Anatoliy Levchenko who had sustained a severe wound, in endeavoring to protect his combat comrades and primarily his wingman, consciously decided to sacrifice himself, having chosen as a weapon the last thing remaining to him, a ram....

What was the career of Lt Col Levchenko, what sort of person was he, how had he served and what led to his feat? I was told this by those who knew him well, his combat comrades, friends and relatives.

Anatoliy Levchenko was born on 6 February 1947 in the village of Novonikolayevskiy in Volgograd Oblast. His father, Nikolay Petrovich, in 1926, had become one of the first tractor drivers in the rayon and operated a tractor purchased by our nation overseas. During the years of the Great Patriotic War, he was employed at a motor vehicle repair plant and rebuilt motor vehicles, tanks and motors for the front. His mother, Aleksandra Mikhaylovna, also worked there. A worker family which knew the value of labor.

Anatoliy grew up as an inquisitive, quick-witted and persistent individual. From his early years, he loved to hear stories about the war. His parents jokingly called him a little soldier. When Anatoliy was 6 years old, the teacher Polina Maksimovna Shibalkova asked that he be placed in first grade. Aleksandra Mikhaylovna initially hesitated as he was young, but then agreed.

The circumstance that Anatoliy began school a year ahead subsequently nearly prevented him from realizing his dream. When in the summer of 1964, upon completing secondary school, he passed the entrance exams for the Kacha Higher Military Pilot School, the commission after the fact discovered that he was 6 months under age. Anatoliy did not see his name on the list of those admitted and had to leave the school.

Levchenko could not imagine his life without flying. He had dreamed of becoming a pilot from 6th grade. His idols had been V. Chakalov, I. Kozhedub, A. Pokryshkin and Yu. Gagarin. Until the very last moment everything seemed to be going successfully and all of a sudden the blow of not being admitted! Anatoliy could not accept this. He had passed the exams successfully and his health was good. He had to fight! And he turned to the senior, the company commander and chief of the admission commission.... Bit by bit, after some hesitation, he was left in the school, albeit in the reserve. Anatoliy shared his ideas in a letter to his parents: "If they put me out I will go to work at a plant and join an air club and on the next year I will return to the school...." But he was lucky: by the start of the exercises he was



transferred from the reserve to the officer candidate group. And intense studies commenced.

Upon completing the school with the diploma of an engineer pilot, Lt Anatoliy Levchenko in the autumn of 1968 arrived in the Red Banner Transcaucasian Military District. A month later, in December, he was appointed senior pilot. Even in school he had been admitted as a candidate member of the CPSU. Here, in the battle regiment, he soon became a party member. A year later the young pilot was heading an air flight. Later on came new promotions, service transfers and overseas missions. The conscientious military service of the officer was commended and in 1975, Levchenko was awarded the Order for Service to the Motherland in the USSR Armed Forces 3d Degree.

In subsequent years Anatoliy Nikolayevich served in the Red Banner Baltic Military District, where he was in command of a flight; he was a squadron navigator and a deputy squadron commander and from May 1981, the senior navigator of an air regiment.

In some pilots with the passing of time the acute awareness of the romance of flying is dulled. But with Anatoliy Nikolayevich who served two-score years in aviation, this did not happen. Each time he felt a feeling of excitement when he took off in his all-weather interceptor. However, the intensity of flight service did make itself felt.

Anatoliy Nikolayevich was sent off to the hospital for a regular examination by the medical flight commission. Here he learned that some men from the regiment were to be sent on rotation to Afghanistan. Three days later Levchenko turned up at home. Seeing him at the door, his wife exclaimed: "What has happened? Why did they let you off so early?"

"Look, Nina, there is to be a trip to Afghanistan. And what am I to do, lie in a hospital bed? I cannot! My health still makes it possible to fly...."

In June 1985, Lt Col Levchenko was part of the limited contingent of Soviet troops in Afghanistan and along with his flying comrades began to carry out combat missions, providing international aid to the people of this country in repelling the outside aggression of the reactionary forces. In the collective he was rightly considered a strong flyer, the best trained and one of the finest. In actuality, he had earned his first class 5 years ago while serving as the deputy squadron commander. During these years he had repeatedly participated in very crucial flights. However, he did not feel that the acquired experience automatically guaranteed his success in the new assignment. For this reason he always prepared carefully and painstakingly for each flight, considering the unusual operating conditions. He also required this of his subordinates. He gave particular attention to the correct plotting of the route, to ensuring an accurate approach to the target, and to employing the entire arsenal of procedures and methods for making an accurate, unstoppable attack. Often Anatoliy Nikolayevich had to lead a fighter group of varying composition and he always obtained an excellent execution of the missions.

--At the beginning of September, the situation in the Khowst area grew noticeably more difficult. In supporting the ground subunits of the Afghan Army in the fight against the dushman bands which were intensifying their piratical activities, Levchenko and his combat comrades often flew out to carry out difficult and crucial missions. It is essential to bear in mind that orientation in this terrain was rather difficult as there was a continuous mountain range which was frequently covered in clouds. It took a good deal of time to identify the target and in such instances the pilots had to return to their "spot" with a minimum fuel reserve. But due to the unexcelled professional skill of Lt Col Levchenko and his ability to accurately recognize the characteristic features of the target, it was still found and powerful missile and bomb strikes made against it.

But once the pilots seemingly suffered a setback. The fighter group headed by Levchenko was to attack the dushman firing positions to the south of Khowst. They arrived in the designated area and it was covered in clouds. Through the breaks in the clouds they could see a heavy haze in the mountains. The pilots made one turn, a second and a third. Without success.... Levchenko was hoping that the clouds would part and it would be possible to attack, but the gray gloom, a luck would have it, was spreading and growing denser.

The fighters made a fifth pass over the area but still did not detect the target. Then Anatoliy Nikolayevich, realizing that fuel was running short, decided to attack an alternate target: the dushman positions which were near the positions of our troops.

It would be hard to say which situation demanded more courage and self-possession from the group leader: when they had to attack under the conditions of poor visibility close to their own troops, where the slightest error could entail lamentable consequences, or when he led his subordinates into an attack against chattering heavy machine guns and lead was whizzing past. Anatoliy Nikolayevich, without hesitating to assume all responsibility, led the group against the alternate target and the aviators bombed it with precision.

But Anatoliy Nikolayevich had also come under fire. For example, on 14 December, when he had to immediately launch an attack with an eight-plane unit against dushman positions in the Ali Khel area. They took off a half hour before sunset. It was growing dark on the ground, and black shadows were cast from the mountain peaks. But when the group arrived in the designated area, against the dark background of the earth the pilots immediately spotted the bursts of shells from the dushman air defense weapons.

Anatoliy Nikolayevich who headed the second group of four saw the bright tracers traveling toward the aircraft in the first flight going into the attack. And later he led in his own group. The firing positions which survived the strike were sending up a hail of bullets. In the gathering dusk one could clearly see the bright columns coming toward the fighters. Any of them could strike the aircraft and go right through it. There was a sharp feeling of danger. But one could not flinch.... Levchenko chose a light on the ground and his wingman, Maj Shcherbak, another. The pilots of the second

pair also headed toward lights. In a few seconds the four had accurately slashed the target.

At the end of December, an operation commenced by the Afghan troops to clear the bands out of the Charikar area. Upon the request of the leadership of the Afghan Armed Forces, our aviators supported them. Scouts located the dushman detachments which were retreating over the paths and passes, and the fighter crews which were at the airfield ready to immediately scramble, upon the first command took off, received their mission in the air as well as the target coordinates, and, having spotted the band, attacked. On 26 December, Anatoliy Nikolayevich in heading a group, made several successful combat sorties, destroying the retreating scattered detachments. The weather was minimal and nevertheless he promptly located the targets and launched crushing attacks against them. On the following day was the last, fatal flight which cost the life of the courageous pilot and at the same time immortalized his name.

During the 6 months spent as part of the limited contingent of Soviet troops in Afghanistan, Anatoliy Nikolayevich took part in 9 combat operations, launching 174 missile and bomb strikes. As a total in the Afghan skies, he made 188 combat sorties. Over the years of service his total flying time was 2,268 hours.

What led the communist, the military pilot 1st class, Lt Col Levchenko, to make his feat and what lay at the basis of his courage, boldness and valor? It can be said with confidence that this was an ardent love for the Soviet motherland, profound ideological conviction and an unshakable loyalty to military and international duty.

He was an exceptionally charming person who was loved everywhere, in primary school, in military school and in the units where he served. Here is what Lt Col Vladimir Shakhov wrote about him: "Anatoliy Nikolayevich, in my opinion, was among the persons without whom life and service would be gray and monotonous. His lively spirit and energy infected truly everyone and his industriousness and tenacity in achieving the set goal conquered all. It was a pleasure to work next to him. Calm, correct, self-controlled, always attentive and responsive to others, he had a unique influence on people by his nobility."

Here is the response by Maj Aleksey Shcherbak who made around 180 combat sorties in the Afghan skies together with Anatoliy Nikolayevich: "He was an amazing man. Industrious, dependable, ready to help anyone at any time. And with what zeal, with what exceptional conscientiousness he carried out the assigned job! Usually before getting in his aircraft he had everything calculated and checked out on the map. He could remain working with his maps and the flight plan until late at night but nothing remained unfinished."

Maj Med Serv Mikhail Bozhko knew Anatoliy Nikolayevich well from their joint service in Afghanistan. In a letter to me he commented: "Anatoliy was very humble. He was diffident when, for instance, respect was shown to him. But he was always exacting on himself and others. When the group came back from a mission there would inevitably be an analysis. And if there were comments, he made them firmly but tactfully, without permitting either the slightest

conceit of a superior or the superiority of a better subunit pilot. No one took offense at his comments or reprimand because they knew that he was right.

"I do not idealize him but it is essential to know just what sort of person he was! Crystal pure and honest. He was unable, he could not dissemble. If he said something then everyone believed him. And you did not have to check out whether this was right or not."

People respected Anatoliy Nikolayevich and he greatly valued this. In his heart he fostered a great, strong and pure love for his wife and children. Nina Nikolayevna Levchenko recalled: "At the very beginning of our life together, a terrible disaster struck. During the night a fire broke out in the private apartment where we were living and Sasha, our son, who at that time was not even a year, sustained severe burns. Seemingly grief would crush us and our feelings shatter. But after this, we, on the contrary, grew even closer together and became even more united in our small family. I feel that this was the chief merit of Anatoliy, his restraint, calmness and tact."

And how to measure the profundity of that humaneness shown by Anatoliy Nikolayevich when he learned that the 10-year-old son of Nina Nikolayevna's sister would be an orphan? The Levchenkos that year were expecting a second child. But still Anatoliy Nikolayevich insisted:

"Let Slavik live with us. We will adopt him. Of course, his grandfather and grandmother will not treat Slavik badly, but it will be easier for him to bear the grief with Sasha." Then he added: "Look, we are going to have a second son. It will be much happier for them as three...."

And literally upon his prediction, 6 months later another son was born, Deniska.

Now Vyacheslav is doing his regular service in the ranks of the Soviet Army, Aleksandr has become an officer candidate in the Riga Higher Military Aviation Engineer School, and Deniska is studying in second grade.

The parents of Anatoliy Nikolayevich carefully keep the letter from the command which informed them of the feat of their son on Afghan land. It contains the lines: "Dedicated to the cause of the Communist Party and the socialist motherland, Lt Col A.N. Levchenko honorably carried out his military and international duty. In possessing high moral-political and professional qualities, he set an example of courage and valor, as a commander and comrade he had enormous authority and respect among all the personnel. Anatoliy Nikolayevich loved life but he sacrificed it for the sake of saving the lives of his comrades and, being morally wounded, without hesitation crashed his airplane into the heavily armed air defense position of the dushman and perished as a hero."

--I re-read the long, moving letter sent to me by the mother of Anatoliy Nikolayevich, Aleksandra Mikhaylovna, in which she describes the childhood and youth of her son, his interests, love for aviation and concern for the family. I would like to quote the words which are expressed from the depth of her mother's heart: "There is much that one could recall, until the end of my

days. Let me say the main thing: our son honorably fulfilled his duty to the motherland, We, the parents, are proud of our son!" And let me add: he has become the pride of all aviators of the Soviet Armed Forces.

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## GREATER EMPHASIS URGED FOR USE OF IN-FLIGHT RECORDING EQUIPMENT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 20-21

[Article, published under the heading "Flight Safety: Experience, Analysis, Problems," by Lt Col V. Shishkin, Military Pilot 1st Class, Candidate of Military Sciences: "Objective Control and Objectivity"; the article is published as a discussion of the article "The Skies Do Not Forgive Mistakes"]

[Text] In his article (AVIATSIYA KOSMONAVTIKA, No 1, 1987) Lt Col V. Antyufeyev touched upon a number of important problems influencing flight safety. In continuing the discussion commenced in the journal, we would like to take up how the in-flight recording equipment is employed in military transport aviation for preventing flight accidents.

The complete use of the capabilities of modern military transport aircraft and ensuring flight safety to a significant degree depend upon the methods of assessing the piloting techniques of the pilots. This is based upon the employment of the existing in-flight recorders. This is quite natural as the in-flight recorders significantly broaden the field of activity for the commanders in preventing potential accidents.

The experience of the advanced subunits indicates that an intelligent analysis of information gained over a certain period of flight instruction makes it possible to bring out not only a trend toward a change in the level of a specific pilot's professional training but also predict and, consequently, prevent errors in the air.

The chief drawback of the existing system of assessing piloting techniques is, in my view, its insufficient objectivity. One of the reasons for this is the poor efficiency of in-flight monitoring of the flights caused by the large expenditures on the hand processing of information gained from the in-flight and ground monitors. In this context the urgent question arises of most fully utilizing the system for the automated processing of flight information of the Luch-74 type and television equipment.

The experience of operating Luch-74 has shown that its capabilities are far from fully utilized. Suffice it to say that the program for the logical processing of flight information (the express analysis mode) does not provide

a dependable assessment of piloting techniques, as it has been drawn up without sufficiently complete consideration of the tasks carried out by the crews in the combat training process. Moreover, regardless of the equipping of modern aircraft with in-flight computers and the subunits operating them with the Luch-74 systems with their digital computer, predominant in the practices of considering and analyzing the flight training is manual labor employing numerous graphs, logs and other materials. Thus, a contradiction arises between the degree of the development of aviation equipment and the technical level of processing the information describing the quality of crew training.

The evaluation should be quickly obtained on the basis of an analysis of complete information concerning the cleanness of piloting techniques and should conform accurately to their actual quality. This is a demand of today upon the in-flight recorders (SOK). The essence of the existing method for assessing piloting techniques is to compare the deviations made in the flight trajectory parameters from the set values with the standard scales which set the limits of deviation. Here the system for setting the overall result for piloting techniques also presupposes the use of an average arithmetical value of the grades for the individual parameters, elements and stages of the flight. In other words, the estimate is set from the end results of the pilot's activities without considering their nature and the energy expenditures for achieving the specific end results.

The most important stage in evaluating piloting techniques, in my view, is the collecting and processing of information concerning the actual values of the flight parameters to be evaluated. Without this it is simply possible to proceed on to the remaining stages. Information is collected and processed during the flight shift with the aid of the in-flight and ground equipment by the instructors and the inspectors in the introductory, check-out and inspection flights as well as by persons of the GRP [flight control group] on the specific legs of the flight. This stage in the process of evaluating piloting techniques is most complicated and labor intensive and to a significant degree determines the objectivity and completeness of the assessment.

Certain flight commanders and instructors feel that the observation method helps in effectively gaining information concerning the quality of crew activities during a flight. On the one hand, this is the case. However, it must not be forgotten that the subjectivity of perception and the limited capacity of instructor memory, the large flow of information which must be recorded and the high rate of crew work substantially reduce the possibilities of the observation method. Thus, in carrying out a flight into a zone, an instructor should evaluate around 30 elements of piloting techniques. And if it is considered that during a flight shift he can carry out up to ten introductory and check-out flights, it is not hard to imagine what an amount of information he must hold in his memory for a rather extended time. For this reason, instructors at times assess the quality of piloting techniques in referring, so to speak, to the overall impression of the performed flights. Here mistakes in the evaluations by the inspectors are 30-40 percent in comparison with the data of the in-flight recorders.

I also feel that the individual features of the pilot, his strong and weak points are not reflected by the existing form of recording the results of inspections on piloting techniques in the flight log. Here is why. From the grades of "excellent" and "good" it is very hard to see the specific pilot, his individuality, to ascertain what characteristic errors he has made and at what stages of the flight, how he corrects them and to what degree he has developed the ability to anticipate possible complications in the air. In a word, the replacing of concrete indicators for his activities by abstract assessments or grades reduces the effectiveness of the entire flight training process.

Here is confirmation of this. Last year, in several VTA [military air transport] units, an analysis was made on the entries in the flight logs concerning the results of checks on the quality of piloting techniques. All in all the instructors gave over 700 excellent grades and approximately the same number of good grades and only 2 satisfactory ones. At the same time in these units during the year there were over 20 potential accidents due to major errors precisely in piloting techniques.

We should say outright that there is not great dependability in the estimates of the quality of aircraft command when these are given to the pilots by the assistant flight controller at the SKP [runway control]. The deviations from the set flight parameters are determined using the old methods, by the rule of thumb, and naturally, with great mistakes. A swing landing or the position of the aircraft relative to the center line of the runway, for example, is virtually not judged due to the bad sight angles. Thus, with the SKP 150 m away from the center line of the runway and the height of the line of sight of the assistant flight controller at 5 m, the maximum sight angle relative to the runway plane is just 2 degrees and for this reason the runway center line cannot be seen. In addition, the particular features of observation from the work area of the assistant flight controller are such that he is virtually unable to note any deviations made in performing a take-off, since the lift-off point lies approximately midway down the runway.

Moreover, in assessing piloting techniques, the assistant works at a high pace, carrying out a large number of operations. At the same time he must enter the estimates in the log, control the operation of the landing lights and this distracts him from strictly monitoring the air situation and, consequently, from carrying out the main task of ensuring safe landings.

Thus, the main drawback of the evaluations given by the instructors and the persons of the GRP to the crews is their poor objectivity caused by the particular features of the perception, processing and recalling of information concerning the pilot's activities in the flight.

The necessity of making notes creates substantial interference in the work of both the instructor as well as the assistant flight controller. For this reason, we feel, the time has come to take a closer look at the problem of compensating for the shortcomings of the observation method by employing television equipment and sound recording facilities. The game, as they say, is worth the candle.



The inspection method based upon the use of a video recording as employed in the unit where Officer V. Kremer serves possesses a number of indisputable advantages. It provides high efficiency, the possibility of superimposing sound information on the visual recording, viewability, as well as the possibility of reproducing the recorded information, for instance, at flight analyses. It has been shown that the showing of fragments from a television film in the process of an analysis between flights stimulates the activity of the trainee. In comparing his own impressions with those recorded by a dispassionate television camera (the piloting and navigation instruments, the image of the aircraft, the ground target and so forth), the pilot is able to analyze his actions in detail and work actively on eliminating the disclosed errors.

The problem of the instructor's recording of the necessary data in a check-out flight can also be solved by a simpler method, for example, using simple equipment. The experience of the employment of even a portable dictaphone by the instructor indicates that the scope of recorded information increases by more than 10-fold in comparison with the amount of entries on a lap plotting board.

As we can see, the optimum direction for improving the methods of observing the pilot's activities in a flight is the use of video and sound recording equipment. This modern equipment substantially widens the possibilities of the instructor (the assistant flight controller) in the area of collecting, processing and noting down the necessary data and increase the effectiveness of flight training. And this means an increase in flight safety.

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BOOK ON HELICOPTER DEVELOPMENT, OPERATIONS REVIEWED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) p 21

[Unattributed review, published under the heading "New Books," of the book "Osnovy konstruksii i tekhnicheskoy ekspluatatsii odnovintovykh vertoletov" (Principles of the Design and Technical Operation of Single-Rotor Helicopters), by A.M. Volodko and A.L. Litvinov and edited by A.M. Volodko, Moscow, Voenizdat, 1986, 200 pages with illustrations, 85 kopecks]

[Text] Recently many countries, including the Soviet Union, have shown a great interest in helicopter building. This is explained by the fact that the rotary-wing aircraft, which arose as a transport and liaison aircraft, has long since gone beyond the initial limits of use and has come to hold its own independent place in the national economy and the Armed Forces.

Recently Voenizdat published a regular book [the one reviewed in this article] which examines the particular features of the design and operation in the main systems of single-rotor helicopters, and provides recommendations on detecting and preventing characteristic malfunctions in them.

At present, the basic portion of our nation's helicopter fleet, the book emphasizes, is comprised of helicopters from the Design Bureau imeni M.L. Mil and designed using a single-rotor system with a tail rotor. Such a design approach has been determined by the fact that at the present stage in the development of aviation science and equipment, the merits of the single-rotor system were greater than its drawbacks and the advantages of the other helicopter systems. In the process of developing helicopter building, a very definite appearance has arisen for the modern single-rotor helicopter with the main elements and layout of this being found in the various classes of rotary-wing aircraft built according to the single-rotor system.

The interesting and informative book consists of sections which describe the particular features of the design and operation of the main and tail rotors, the air frame, the landing wheels, the control systems, the propulsion unit and transmission. The concluding chapter takes up the operational properties such as reliability, serviceability and durability of helicopters.

The rapid development of helicopter construction, the authors conclude, has led to the development of new classes of helicopters which possess good performance and operating characteristics. These helicopters extensively employ modern equipment and weapons and make it possible to carry out a broad range of important defense and national economic tasks. A thorough study of the design and maintenance of these remarkable aircraft will help to increase their operating reliability, efficient use, and ensure a high degree of flight safety for the crews.

The book, undoubtedly, will evoke lively interest among aviators and other readers interested in the problems of the development of helicopter building in our nation and abroad.

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## HISTORY, PROJECTS OF INTERCOSMOS PROGRAM DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 22-25

[Article, published under the heading "On the 20th Anniversary of the Intercosmos Program," by M. Rimsha: "Orbits of Collaboration"; the present article is the second installment; for the beginning see issue No 3 of 1987]

[Text] In 1978, an unusual mission was carried out by the universal automatic orbital station Intercosmos-18. In addition to a range of scientific equipment, it carried the earth satellite Magion developed and manufactured in Czechoslovakia. After separating in orbit upon command from the earth, Intercosmos-18 and Magion began to carry out coordinated research which made it possible to gain a spatial picture of the structure of the electromagnetic fields in the circumterrestrial plasma. Thus, for the first time in the history of the intercosmos Program, a project was carried out using a system consisting of two synchronously operating satellites.

Constantly new types of spacecraft are filling out the "satellite fleet" of this program. In 1981, when the Bulgarian people were widely celebrating their 1300th anniversary of statehood, a jubilee Soviet-Bulgarian project Intercosmos-Bulgaria-1300 was carried out and for this Bulgaria developed major installations of scientific equipment for investigating the physics of near-earth space and the natural resources of the earth.

Starting in 1976, all of the Prognoz high-apogee satellites launched in the USSR carried equipment developed under the Intercosmos Program. In 1985, the 10th Prognoz was completely "equipped" with scientific instruments bearing the mark Intercosmos and this conducted timely research on the nature of cosmic shockwaves and solar wind.

The first equipment developed for studying the planets of the solar system was the infrared spectrometric unit carried on the automatic interplanetary stations Venera-15 and Venera-16 launched in 1983.

In speaking about the accomplishments of the Intercosmos Program in investigating the planets, we must mention first of all the Venera-Halley's Comet Project. Scientists from the socialist countries participated in developing very complex scientific equipment and an unique television system.

The work and accomplishments of the participants in this project have been properly praised in governmental, scientific and social circles.

The nine international manned flights under the Intercosmos Program have become a vivid space salute. All the cosmonauts participating in them showed courage, high professional skill and outstanding abilities as researchers. In the course of the flights in 1978-1981, they performed around 150 different scientific and technical experiments in the area of space biology and medicine, remote probing of the earth, space material sciences and space physics.

The glory of these remarkable accomplishments, along with the cosmonauts, have been rightfully shared by the scientists and specialists from the countries participating in the Intercosmos Program and who prepared the scientific research for the international manned flights and develop the diverse equipment for them. A portion of the equipment manufactured specially for these flights subsequently became regular equipment on the orbital stations Salyut-6 and Salyut-7.

International medical and biological research on the Soviet biosatellites is continuing. Scientists and specialists from the socialist countries have participated in research on six such satellites. Preparations are underway for new experiments.

In 1985, in Dubna (USSR), an experimental space communications station was put into operation and the equipment for this was supplied by many countries participating in the Intercosmos Program. This event should become the start to a new stage in the development of joint work in the given area and involving the development and testing of new space communications equipment.

Gaining ground is the presently so timely area of investigating the earth's natural resources and the environment using remote sounding methods. In recent years, a number of major international projects devoted to this problem has been carried out including Gyunesh, Chernoye More [Black Sea], Kursk and others. Curiously, for them they have employed different levels for the basing of the research equipment including satellite, aircraft and land in ground and water versions.

The second decade of the Intercosmos Program has become a period of the birth and intensive development of a new discipline in collaboration, space material sciences. In recent years, a distance has been covered from the first joint theoretical and procedural developments to space experiments on the Salyut--Soyuz orbital facility as well as the development of the special universal technological device, Kristallizator. This equipment possesses extensive capabilities for investigating the behavior and producing materials under space flight conditions. It is well complemented by the special technical development "Automatic Parameter Recorder" which is capable of measuring and monitoring the thermal parameters of the Kristallizator as well as carry out other important metering operations on board the spacecraft. For this facility the scientists of the member nations of the Intercosmos Program have developed an extensive list of research involving many aspects and problems of space material sciences.

Year by year the intensity and effectiveness of the work have grown. More and more frequently the spacecraft employ in-flight processors which make it possible to select the logically optimum operating conditions for the space equipment, proceeding from the specific flight situation. This is already a qualitatively new level in the development of operational control over the experiments.

One of the main trends in the joint work of recent years has been the drive for comprehensive research. This has been manifested in the various methods of the scientific and technical ideas for the joint projects. For example, there has been the placing on board of the spacecraft of a range of devices designed to conduct complete interrelated research in one specific area. These were the recently carried out Venera--Halley's Comet and Intershok projects and the remote earth sounding experiments such as Gyunesh, Chernoye More and Kursk.

The participants of the Intercosmos Program are giving a great deal of attention to work of an applied nature. This applies primarily to activities in the area of investigating the natural resources of the earth and the environment. Here they have developed the multizonal MKF-6 photographic system and its modifications which are well known to the readers as well as the multichannel spectrometric equipment. The range of scientific equipment of the Ionozond Project (the satellite Intercosmos-19) is employed in the work of the hydrometeorological service. Certain procedures and equipment developed by specialists in the area of space biology and medicine are being introduced into clinical practices.

During these jubilee days, all participants in the program are paying a tribute of profound respect and gratitude to the persons who stood at the sources of our collaboration and who devoted their talent to this.

The first chairman of the Intercosmos Council under the USSR Academy of Sciences was the remarkable Soviet scientist, Academician Boris Nikolayevich Petrov. Intercosmos held a special place in his activities. The role of Boris Nikolayevich was inestimable in the establishing and development of collaboration. His highest scientific erudition, his great experience as a space researcher and his unsurpassed qualities as an organizer for almost 15 years were put into the service of the common cause. The first chairmen of the national coordinating bodies for space research also made an enormous contribution to the successes and accomplishments of Intercosmos.

A great deal of time and energy has been dedicated to the cause of developing peaceful international collaboration in space by the current chairman of the Intercosmos Council, Vice President of the USSR Academy of Sciences, Academician Vladimir Aleksandrovich Kotelnikov. All the accomplishments of the Intercosmos Program in the 1980s are inseparably linked to his name.

We have made a brief excursion back into the history of the Intercosmos Program and have recalled the events which made a beginning to creative collaboration among the space researchers of the socialist countries as well as the vivid pages of the distance come over the last 20 years. What are the

plans for Intercosmos? What new research are the program's participants talking about? Thus, briefly about the program's tomorrow.

Interdisciplinary research on the earth's ionosphere and magnetosphere is to be continued. Satellites from the family of AUOS [Automatic Universal Orbital Station] as before will continue to dependably and truthfully serve collaboration. With their aid in the not distant future a study will be made of the wave processes in circumterrestrial plasma. These experiments are conceived as being carried out by "active methods" whereby the plasma processes will be initiated by using special on-board equipment. Such research requires new original procedural and design solutions.

The international Interbol Project is to be devoted to the problem of solar-terrestrial relationships and this will be carried out by using four satellites all at once: two Prognoz and two separating satellites developed in Czechoslovakia on the basis of Magion.

Table

Area of Research	Start of Research in Space	Spacecraft	Units of Equipment
Study of physical properties of space	1969	Intercosmos**	23
	1970	Zond (Vertikal rocket)	11
	1970	Cosmos*	3
	1976	Prognoz*	5
	1977	Salyut*	2
	1978	Magion	1
	1983	Venera*	2
	1984	Vega*	2
Remote sounding of earth	1976	Soyuz*	10
	1977	Salyut*	2
	1980	Meteor-Priroda*	1
	1981	Intercosmos-Bulgaria-1300	1
Space biology and medicine	1970	Cosmos*	5
	1976	Soyuz*	10
	1977	Salyut*	2
Space material sciences	1977	Salyut*	2
Space meteorology	1977	Meteor-2*	2

\* Launched under Soviet national program.

\*\* Also used for studying natural resources of earth and environment.

Planetary research will become the subject of one of the major projects in the ending decade, Phobos. A very complex set of equipment will make it possible to study Mars, its satellite Phobos, interplanetary plasma and solar radiation. This project in terms of the breadth of the scientific problems and technical complexity is clearly the equal of its famous predecessor, the Venera-Halley's Comet Project.

Research will be conducted evermore intensely in the area of astrophysics and particularly radio and gamma astronomy. This has provided an impetus to improve the existing optical equipment as well as develop new equipment as well as for the designing of new models of telescopes and other instruments.

On-board technological equipment of fundamentally new types is being developed by a number of nations participating in the Intercosmos Program. The introduction of this will open up new opportunities for researchers working in such a crucial area as space metal sciences.

Over the 20 years the Intercosmos Program has come a glorious way. Its accomplishments constantly attract lively attention throughout the world. The high prestige of Intercosmos is indisputable in scientific and social circles. This universal recognition is caused primarily by the humane and peaceful focus to its activities.

At present, in this complex period for mankind, when one of the most important questions of the modern world is being settled, that is, what will space be--a peaceful field of discovery and labor for the good of people or an arsenal for the merciless destruction of our civilization's accomplishments, the missiles launched with the red letters Intercosmos are an example of truly human use for the leading achievements of scientific and technical thought. The Intercosmos rockets and satellites will bring to the people of our earth peace, mutual understanding, creativity and progress.

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## BETTER PHYSICAL TRAINING IN FIELD FLIGHT PROGRAM RECOMMENDED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 28-29

[Article, published under the heading "From the Life of VUZes," by Col V. Koltunov and V. Ivanov: "At the Camp Airfield"]

[Text] An analysis of the physical training of pilots and officer candidates during the period of flight practice at camp airfields has disclosed a series of factors which substantially influence its effectiveness. Among them, in our view, must be put the flight rotation, the number of subunits at the camp assemblies, the climatic conditions, the availability of sports facilities, the staffing of the chair for physical training and sports with instructors, cooperation with commanders, the health state and training of the students and the environment.

All the factors taken together influence the functional training of the flight personnel and for this reason urgently require the search for optimum conditions for their effective realization. Experience indicates that for work at camp airfields it is advisable to train the physical training instructors from regular servicemen with a higher education and in the winter employ the UPS-16T as a gymnasium. In our Yeysk Higher Military Pilot School, the sports compound includes two volley ball courts, a stadium with a running track, a handball court, four looping swings, two sets of horizontal bars, two sets of parallel bars, overhead ladders and a vaulting pit. These sports facilities make it possible to effectively conduct physical training exercises.

In the event of bad weather, when the flights are conducted irregularly, good sports facilities help to organize active recreation and to strengthen discipline, and help to combat the abuse of alcoholic beverages and smoking. When an aviator regularly and independently participates in physical exercises and sports, this keeps him from becoming bored and idle, it develops the ability to self-control and self-regulation and determines an attitude toward personal conduct and a healthy way of life as well as the spending of time in an interesting manner.

In planning exercises for physical training at a camp airfield, it is important along with the unit command to determine and incorporate in the

daily schedule the time for holding the exercises (depending upon the flight shift and in the event of shifting the flights). The time for physical training which is clearly determined in the daily schedule should be a law for everyone: from the squadron commander down to the officer candidate. This will help indoctrinate the men in a spirit of the precise fulfillment of the flight service rules.

Pedagogical observations have shown that physical training exercises with officer candidates should be held as part of a squadron. The instructor pilots who are best trained in physical and educational terms should be involved in holding these. This develops the desire of the officer candidates to participate in physical exercises and encourages them for independent training.

Our exercises are conducted according to a subject plan. During the physical training reviews, great attention is given to inspection exercises, however we exclude any "forcing." Experience shows that the artificially narrowed range of tasks confronting physical training reduces the interest in the exercises and this tells negatively upon the work efficiency of the men.

At the camp airfields we employ exercises in the form of integrated circles. Here we increase the percentage of interdisciplinary exercises. At a nearby body of water twice a week we hold cross-country runs with subsequent swimming. The load factor is adjusted to a pace accessible for the officer candidates. Here we develop the ability to assess one's own actions and control one's conduct and maintain an optimum mental state of cheerfulness and independence under the conditions of intense combat training activity. Here there is the opportunity to instill specific perceptions and sensations and an attitude on the part of the officer candidates to observing the rules of personal hygiene, working and resting conditions. The level of emotional excitement and its dynamics are recorded by the Biometr instrument developed by the Soviet Army employee V. Kolesnikov. The cross-country races and exercises on the looping swing are usually conducted during the morning and evening hours.

For developing the mind sets for the forthcoming exercises we recommend different versions of ideomotor training. Going through the exercises in one's mind helps work through the sequence of actions and one's conduct in preparing for the flights as well as to improve professional skills.

We carry out the reviews of physical training and mass sports work at the camp airfield in close contact with the squadron and flight commanders and the instructor pilots. Also with their help we conduct additional exercises with lagging officer candidates. We permit the officer candidates having a high sports category to train more following an individual plan. In organizing physical training at the camp airfields, we give great attention to developing the officer candidates' strength, speed of response and endurance. The load factor is adjusted depending upon the organism's state. We have introduced a compulsory 15-minute run at a moderate pace as well as exercises to coordinate movements in place and at a varying pace in walking and running. We develop the muscles of the arms, neck and back by exercises with weights of 5-10 kg done in motion and in place in stances characteristic for a pilot. At the

same time experience indicates that the personnel must be allowed to work more individually and more widely employ sports games and swimming.

An analysis of our observations and the subjective data from officer candidates has indicated that the environment rather quickly begins to be perceived as a monotonous irritant and this impedes the physical activity of the officer candidates. We feel that the quality of the physical training exercises can be positively influenced by a audio background. We employ tape recorded music which considers the tastes of the officer candidates. The effect from this is positive.

We pay particular attention to the aesthetic organization of the gymnastic area. Thus, the turning parts of special equipment are painted white, the supports (uprights, struts) are blue, while the plates and uprights of the sports equipment are warm hues.

The experience of the training of officer candidates of the first-third years indicates that all of this stimulates the nervous system and the functional readiness of the organism to carry out the standard checks for physical training as well as the standards and requirements of the VSK [Military Sports Complex]. Increased physical endurance helps to make the officer candidates work more effectively in self-study hours and this ultimately, undoubtedly, helps to master the flight profession.

Unfortunately, certain commanders and political workers until recently have taken a formal attitude toward the exercises and often have preferred economic work to them and this, in turn, has caused fatigue and poorer quality in carrying out the flight assignments. If a squadron commander contributes to the non-execution of the planned exercises and neglects the law, the instructor pilots and the officer candidates involuntarily become infected with indifference and an irresponsible attitude toward their health. Only this can explain the poor physical training results during the passing of standard checks in the squadron of Officer N. Shulga. Capt B. Shcheka often shortened the time assigned to morning exercises and thwarted the desire of the officer candidates to participate independently in the physical exercises.

It must be said that the school's command has shown a strict attitude toward the negligent officers. The principled approach to the question has told affirmatively on improving the quality of the physical training exercises at the camp airfields.

Pedagogical observations, objective indicators and the responses from instructor pilots presently show that regular physical exercises help to maintain the physical and mental health of the officer candidates, to keep a high level of work efficiency, and to shape the psychophysiological strength of the organism and ultimately the high combat readiness of the aviators.

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## SUCCESSSES IN TRAINING YOUNG HELICOPTER OFFICERS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 30-31

[Article, published under the heading "Young Officers: Problems of Development," by Col A. Demin: "Maturation"]

[Text] Climbing over the tops of the airfield structures, the spring sun shown down on the parking areas of the helicopters around which the aviation specialists were already busy! They were quickly preparing the equipment and in-flight weapons. From how they were hurrying it was not hard to realize that there would not be usual flights but rather a tactical flight exercise.

Soon the helicopters one after another took off into the skies. They headed to the range. After the first successful sorties, when the "enemy's" forward defensive edge had been hit with missiles, a brief lull occurred at the parking areas. Then the aviators received a regular issue of the photone newspaper and the combat leaflets. One of these stated that in a difficult tactical situation, the personnel of the squadron where the deputy commander is the holder of the Order of the Red Star, Capt S. Zolotov, had successfully carried out the flight missions. Here they commented on the high combat skill of not only the experienced helicopter commanders but also the young officers such as the flight navigator, the communist, Lt A. Khvostenko, the flight technician and member of the squadron Komsomol bureau, Lt A. Kharlamov, the communist, Lt S. Sitnikov and others.

Yes, the life and combat training of the young Air Forces officers are full of intense military service. Each year the aviation units and subunits receive a number of VUZ graduates who are physically strong, full of creative zeal and indefatigable on the search. Ahead of the lieutenants lie the newness of discoveries, difficult and interesting development and a true academy of honorable army service.

--Less than a year has passed since Lts S. Sitnikov, A. Kharlamov, A. Fedotov and A. Adamenko arrived in the helicopter regiment. But how they have developed over this time! The unit commander has commended them for successes in training. This event was memorable not only for themselves but also for the officers under whose leadership they are learning the difficult science of winning.

The success in improving the professional qualities of the young officers to a large degree is determined by the skillful organization of the training and indoctrinational process in the regiment as well as by the constant concern of the commanders and political workers for their skill.

The command prepared ahead of time to welcome the lieutenants. In the regiment they became closely familiar with their personal files. Upon the recommendation of the communist, Capt A. Novikov, the question of introducing the young officers to life in the unit was discussed at an open party meeting. Each CPSU member was given a specific assignment and a date set for carrying it out. The experienced commander-mentors, the Officers M. Shchezhin, V. Modin and P. Platonov were assigned to speak to the young men.

The squadron commander, his deputy for political affairs, Maj A. Skorikov, the party bureau secretary, Capt A. Novikov, as well as the Komsomol activists spoke in detail and sincerely with the newly arrived lieutenants. They described to the new men the combat traditions of the subunit, the successes of the personnel and the unsolved problems. They were profoundly impressed with the talks with the officers who had carried out their international duty in Afghanistan. All of this inclined the young officers toward a responsible attitude toward their job and impelled them to constantly assimilate the experience of the skillful air fighters and learn carefully what is required in modern combat. An awareness of their involvement in the major statewide undertaking of defending the socialist fatherland inspired them to industrious military service.

The squadron command, party and Komsomol organizations did everything so that the lieutenants could master the complex helicopter faster. In training the flight technicians, Its A. Kharlamov and G. Shutenko, the instructors, Capt V. Makarenko and Sr Lt V. Kaminskiy kept special records for their professional training and calculated the time according to the subjects and questions. The squadron did everything necessary so that the lieutenants felt the collective's concern for their development.

At the start of the new training year, the novice lieutenants, like all of the officers, assumed obligations among which was the point: to excellently study and maintain the assigned helicopter in exemplary condition and perform all technical operations on it solely on the highest level. At that time the squadron command and party organization advised the squadron deputy commander, Capt S. Zolotov, to assume supervision of the lieutenants. He showed a serious attitude toward his assignment. Disregarding time, he dedicated a great deal of energy to working with the young aviators and endeavored to interject a spirit of innovation and competitiveness into each theoretical exercise.

The best in the class in the training of the flight technician was Lt A. Kharlamov, a graduate of the Lomonosov Military Aviation Technical School and soon thereafter he was elected a member of the squadron Komsomol bureau. He did not restrict himself to planned assignments but worked a good deal independently and, if he could not himself understand something, turned to the squadron deputy commander for the aviation engineer service [IAS]. It was no

accident that Kharlamov was among the first to be permitted to independently service the helicopter.

Incidentally, others kept up with him. For example, Lt G. Shutenko was often among the pacesetters in mastering individual sections of the program.

In order to increase the responsibility of the young officers for conscientiously fulfilling their functional duties, upon the proposal of Maj V. Modin, an enlarged session of the party bureau was held in the subunit. The discussion was thorough. After an active discussion of the state of affairs, they summed up the first results of the training of the lieutenants for independent work on the equipment. The communists made specific proposals. Their implementation helped the young officers rapidly master their combat specialty.

Capt S. Zotov conducted exercises and drills more frequently than the others with the new men. Regardless of his extensive experience and educational skills, the officer prepared thoroughly and soundly. Often, in making comments in the course of a drill, he reminded his subordinates of the procedure of actions in various non-routine situations. The tact of a wise teacher was apparent in each word and gesture of the pedagogue. In a word, he did everything to strengthen the lieutenants' interest in their profession, in theoretical research and innovation.

Regardless of the fact that the subunit has many young officers, there have been no potential accidents due to the fault of the personnel here nor have there been errors in the maintenance of the helicopters. Here an important role has been played by the tours of duty regularly carried out with the IAS specialists. In addition, the young men are assigned to experienced master technicians with combat skills. They help the lieutenants in more quickly mastering the specialty, they provide instruction in skills in carrying out all types of inspections and intelligently explain the most difficult questions in the operation and maintenance of helicopters. Here it has become a rule that the young technicians over a certain period of time work as back-up men. This helps them better master their profession.

This was the case, for example, with Lt G. Shutenko. In talks with him and in observing his actions in the work process on a helicopter it was clear that he was well prepared in theoretical terms but lacked the skills. They decided to propose that the officer be the back-up man of an experienced flight technician for a certain period of time. He willingly agreed. And the results were not long in coming. After several flight shifts and the passing of the established exams, Lt Shutenko was entrusted with the independent performing of involved technical operations on a helicopter. Day by day the skill of the young officer grew. In time he began to receive good grades and then excellent ones. At present, the hard-studying young specialist performs the duties of a flight technician intelligently and precisely.

In the leading subunit under the command of Maj M. Shchezhin, they have adopted the following principle: a newly arrived flight technician is included in a crew where everyone is an experienced specialist. Under these conditions the development of the lieutenant occurs faster. With each sortie

he feels more confident and surer. With such an approach the common cause of the crew's combat training benefits.

In the squadron they carefully watch the development of the young men and are interested in what are his concerns and what is on his mind. If he is promptly helped at a difficult moment and his confidence is built, there will be a desire to keep pace with the rest.

The commander, the political worker and the party activists pay a great deal of attention to intensifying the training and indoctrinational process and to increasing the effectiveness of the socialist competition. By joint efforts Maj's M. Shchezhin and A. Skorokov, Capt A. Novikov and Sr Lt S. Volzhankin endeavor to utilize the enthusiasm of the youth caused by the restructuring process in order to strengthen their moral-political and psychological conditioning, to instill in them strict flight and technical discipline and increase their organization in service and in ensuring flight safety.

In the competition for the effective use of training and take-off time, the flight commanders and all the communists help the young men realize a personal plan for improving their professional and Marxist-Leninist training and promptly carry out the socialist obligations assumed in honor of the 70th anniversary of the Great October Socialist Revolution. They provide advice on how to more productively employ the hours of independent study, the training equipment, the check-out facilities and visual aids for achieving higher and stable results.

The results of the competition are regularly summed up in the subunit. In employing objective data, Maj B. Pushkaren, Capt V. Martynov, Sr Lt S. Gorodnichev and other activists effectively report on the achievements of the competition's right-flankers and they point to bottlenecks and unsolved problems as well as unused reserves. Such an approach helps to develop in the men a vital interest and a desire to achieve more in the competition.

Which of the aviators achieved the best results over the month? It is difficult for the squadron commander, Maj M. Shchezhin, to answer this question. Many factors must be considered, primarily giving preference to one or another flight, crew, a specific pilot, technician or mechanic. The political worker, the party and Komsomol activists help in objectively assessing the results. The officer constantly consults with them in summing up the results.

The flight of the military pilot 1st class, Maj V. Modin, won first place in the squadron. The young officers R. Nizamov and A. Tsibulskiy had recently arrived in it. At present, these aviators are moving forward confidently and have been given the next military rank. His other subordinates also worked well.

The author devotes particular attention to the quality of preliminary preparation. He teaches the men to correctly organize their independent studies and acquaints his subordinates with the reference point method and the compiling of analogue outlines. For the sake of clarity, he requires that many readings of the helicopter instruments be shown graphically in a notebook

and in checking readiness, instead of routine questions which are repeated day by day, asks them, for instance, to tell about the operating features of the propulsion unit in one or another mode and to give specific examples from their own practice. The discussion has a lively and instructive nature.

Things are also going well in the flight under the command of military pilot 1st class, Maj B. Pushkarev. Here among the young men there are many who are truly dedicated to aviation. For example, the helicopter where Sr Lt I. Dyukov is the flight technician, is always in excellent condition. A profound knowledge of the helicopter's systems, constant exactingness for oneself and high technical skills--this is what distinguishes the leading aviator.

The generalized experience of these flights has been well disseminated in the other subunits and in the helicopter regiment. The party and Komsomol organizations have done a great deal to propagandize and introduce all that is new and advanced. During the preliminary preparation days the activists hold talks where they go through the most effective procedures for operating and maintaining the helicopters. The young aviators exchange opinions on how to better carry out the combat training task in a varying tactical and meteorological situation and ultimately how to further raise combat readiness.

At present, in the indoctrinational work with the young officers in the helicopter regiment, the key place is held by the restructuring considering the activating of the human factor as well as a skillful and principled personnel policy. The unit's command and party organization realize that at present, when the course has been set of accelerating the intensification of the training and indoctrinational process, the value of the young command, political and technical-engineer personnel, their professionalism and authority are determined primarily by a heightened feeling for the new, by a professional competence and by the ability to actually take to heart the interests of subordinates and devote all one's knowledge and energy to further increasing their combat capability.

The regiment has taken to heart the words from the report of Comrade M.S. Gorbachev at the January (1987) Plenum of the CPSU Central Committee on the tasks of the military personnel and that the party has not for a moment lessened its efforts to further increase the nation's defense capability and has assigned the military personnel a special role in carrying out this vitally important task. Their enormous responsibility to the people is also determined by this.

The Central Committee counts firmly on the army personnel and the Soviet officer corps in carrying out the task of strengthening the state's defense capability and is confident that under the current complex international conditions the communists and all the Army and Navy personnel will act with the greatest responsibility and will raise and improve their skills and combat readiness.

Inspired by the decisions of the January (1987) Plenum of the CPSU Central Committee, the regiment's young officers, like all the Soviet military, are endeavoring to carry out actively and effectively the tasks posed by the USSR



minister of defense and the Air Forces commander-in-chief for the current training year, they are participating in the socialist competition, they are steadily strengthening organization and discipline and are raising vigilance, air, weapons and tactical training.

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GREATER CONCERN FOR PSYCHOLOGICAL MOTIVATION IN FLYING URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 34-35

[Article, published under the heading "By the Course of Restructuring," by Maj Gen Med Serv V. Ponomarenko, doctor of medical sciences and professor: "Flight Career Longevity and Combat Readiness"]

[Text] Man is the most precious thing in our socialist state. The preservation of his health has always been a matter of particular concern for the party. In military aviation, professional health is an element of combat readiness. With good reason this is at the center of attention of the commanders, the political workers and the physicians. How presently is the professional health of the aviators ensured and what are the prospects in this area?

In our aviation we have established a system of continuous supervision over the state of health of the flight personnel. This includes: thorough medical flight examinations, a network of general medical facilities as well as systematic labor, rest and nourishment. As a result of the careful organization, there are virtually no occupational illnesses or labor disability, and the probability has been reduced of the loss of crew efficiency in the air. Nevertheless, regardless of the effective work carried out in all elements of medical flight support, recently certain negative phenomena have been felt: the reoccurrence of individual groups of illnesses which had seemingly been long forgotten, a tendency toward a decline in flight career longevity, an increase in the number of individuals permitted to fly with a partial loss of health and disqualification because of the loss of professional skills. Here the most alarming is the fact that the length of the active activities of a high-class specialist does not exceed 10-12 years.

From the social standpoint, the loss of a specialty which has been chosen seemingly for all one's life at a point when a person is at a peak age and at the very top of professional skill, for many is a personal drama. From the economic viewpoint the extending of a flight career is very important and from the strictly military position (high combat readiness) the loss of the age group of 35-40 years means a real weakening of the opportunity to hand on human and professional experience. Thus the problem of a length of a flight career is not so simple and requires a thorough analysis.

The task of providing a long professional career, as experience shows, arises in the very stage of developing and then testing aviation equipment. As practice shows, scientific and technical progress in aviation along with positive trends from the medical viewpoint has introduced into working conditions previously non-existent factors which increase the probability of a man's falling under extreme conditions. Modern equipment, the speed of control processes as well as chemical and physical factors against the background of high mental stress are strong stress factors. Precisely their total effect tells on the organism's strength. Thus, a high temperature reduces tolerance to G-loads by 1-1.5 unit and by 2 or 3 when combined with vibration.

An equally important role in solving the problem of extending the length of a professional career is played by theoretical and practical aviation medicine. In paying proper due to medical flight examination practices, to its high professional competence and effectiveness, we must still raise certain considerations which, possibly, are not indisputable. But, as they say, truth is born out of argument.

At present, the strategy and tactics of medical support for flight safety come down to preventing an ailing pilot from flying, to promptly spot the initial forms of an illness and to correctly and promptly ground him. As lamentable as it may be, the term "warn" still seems to mean "not allow," "not permit" or "not grant." In other words, the impression is created that in aviation medicine the flight surgeon's judgment has begun to prevail over restoring the health and over a principled struggle for the man, the military pilot.

How can one oppose this phenomenon? First of all, we feel it is essential to have a clear scientific methodology and a correct view of professional health as a social category, an inseparable component of a man's combat capability and readiness. As for the medical tactics in evaluating and protecting professional health, the former policy of establishing the process of transition from a healthy man to a sick one must be replaced by a policy of monitoring the store and reserves of health.

That is, we must monitor the psychophysiological state of a person, the reserves of his organism helping to overcome professional stresses and the ability to restore these reserves. Proceeding from such a methodological basis, by professional health of aviators one must understand the organism's properties to maintain compensatory and defensive mechanisms which ensure the capacity to work under all conditions.

The main indication of professional health is the ability to recover a working state in accord with the scope and type of professional labor. Such an understanding provides an opportunity to focus attention, conscience and awareness on the factors which reduce the psychophysiological reserves, to establish the corresponding devices for monitoring them and in aviation medicine to organize a rehabilitation system, that is, medical recovery measures. Over our hospitals we should hoist a flag of rehabilitation not only for the sick flier but also for the apparently healthy one who has temporarily lost his reserve of energy or interest in flying.

The necessity of rehabilitative medicine is presently dictated by two demands: to erect a strong barrier against the occupational hazards of flying and to improve the mental-ethical, psychological and professional cooperation of the aviation physicians and fliers. Let us be frank: each year in the preflight inspections many crew members are prevented from flying due to an ailing state. The questioning of flight personnel has shown that certain aviators conceal from the flight surgeon such physiological states as illusions of spatial position, the occurring of a gray or black veil in front of their eyes from acceleration and the appearance of the feeling of alienation in the stratosphere, alarm and even fear without reason. The pilot does not mention this merely because he is afraid that he will be grounded, the diagnosis will "catch," he will fall behind his comrades and be suspected of inability or cowardice. It is sad to admit, but the flight surgeons far from always are unable themselves to understand and explain to the pilots the difference between an ailing condition and reduced capacity for work. Here we must aim at confidence, at high morality and proper behavior, as the pilot who has gotten into a difficult psychological position needs not an expert evaluation but primarily moral support, including that he be believed. I dare to assert that a majority of the mentioned "ailments" must be treated not in the hospital but rather in the air, in flights.

A restructuring of relations between the flight surgeons and the air fighters who have a diagnosis or a permission to fly under a so-called individual assessment is extremely essential. This category of aviators particularly needs help precisely from rehabilitative medicine. To rehabilitate such individuals means not merely to treat and subject to a flight surgeon's evaluation but chiefly by psychological, physiological, social and medical means to help them acquire the necessary reserve of health and the ability to oppose those risk factors which directly effect their illness. Of course, medical rehabilitation is not a novelty and has always been an inseparable part of medical care. To rehabilitate a sick person is one thing but it is another to do the same for a virtually healthy pilot in whom the psychophysiological reserves have been expended for combating the negative factors of flight.

Research has established that fliers who show deviations in their state of health need prophylactic rest after every 6 or 7 months of flying as they more often make incorrect actions, they are more subject to negative emotions than others, they are more woundable and impressionable and respond more acutely to everyday inconveniences. The time has come to set up in the aviation hospitals specialized departments where the pilots would not undergo evaluation but rather their psychological mood would be restored using sports exercises, games, physical therapy and balneological procedures, psychotherapeutic self-control of attitude and a cultural program.

A pilot who has become tired, who has undergone mental stress, who has lost interest in his work or has acutely felt his shortcomings is in particular need of psychological support. It is presently within the capacity of our aviation hospitals to effectively restore weakened psychophysiological qualities. The use of psychotherapeutic means together with a flight trainer

produces good results and many aviators who have lost confidence in their flying future have returned to their formations.

It must be said that psychotherapeutic rehabilitation depends completely upon the commanders who should take into account the recommended level of psychophysiological stresses in planning the flights and the complexity of the missions to be carried out. Here it is essential to bear in mind that each pilot can reach the boundary of first class, but not every man can become a true master of flying. Consequently, there must be an individual setting of the amount and complexity of the flight stress. If the question is approached in this manner, the issue of accidents and a long professional career will be more successfully resolved. In the future an effective area for ensuring a long professional career can be seen in converting the preventoria into rehabilitation centers as well as in a fundamental restructuring of the style and methods of rehabilitative medicine.

The motives for flying hold an important place in maintaining a long professional career. This is a very complex question and here a definite restructuring is essential, and more precisely a decisive abandoning of the established view of the flying profession as a specialty consisting completely of courage and romance but also full of "intelligent" automata which solve difficult problems for the pilot.

As was already said, a pilot's profession is a dangerous one. It is dangerous in the sense that the high probability of encountering an unexpected event places extreme demands on the moral content of the personality. On the one hand, the pilot always takes a decision on behalf of the collective which entrusted him with the flight, that is, his social activity is largely determined by the fact of not only what he has in himself but also behind him. In other words, his moral level shapes the psychological readiness to surmount any danger which constantly accompanies flying. On the other hand, a pilot should constantly maintain high readiness for an unforeseen event. From the viewpoint of physiology, this means that the organism or more accurately its nervous system works in an area of low sensitivity thresholds. But from the standpoint of flight psychology, high sensitivity is not only an "exposed nerve cell" which responds precisely to a danger signal but also the "exposed nerve of the soul," that is, openness. A pilot goes into danger with open eyes.

As is known, ambition in aviation is regulated by the social justification of risk and confidence in oneself by the necessary reserve of skill to carry out the difficult task involving a threat to one's life and advancement in service is governed by the moral right to risk not only one's life but also the lives of others, while the material incentive is governed by the personal professional level. And when these mechanisms for the vital activities of an aviation collective are disrupted, moral conflicts and losses are inevitable.

Hence, it is no accident that the strength of motivation for flying in being cemented together with conscience at times reaches nostalgic strength. A man's need to completely master the flight specialty begins with his awareness of his actions, that is, not to fail, not to cause reproach or harm. In line with this the loss of motivation is always a symptom of a social and moral

breakdown. The true romantics of flying have often shirked social injustice not because they were weak-willed, but because they were conscientious by nature. And a pilot's conscience is the foundation and generator of his professional motivation. This is shown by psychoneurological studies from which it is apparent that the cause of individual illnesses in pilots has been the negative experiences from their unpreparedness to act under special flight conditions or to carry out more difficult professional tasks. However that may be, the ethical considerations cloaked in medical jargon conceal the true reasons for disqualification.

Proceeding from the psychological essence of flying, it is essential in every possible way to support motivation for flying and increase the professional reliability of the crews. In flying this is expressed in the actions of a person under abnormal conditions. Here also there must be a decisive restructuring, and in particular it is essential to abandon the harmful convictions that the success of actions is determined solely by automated skills. Experiments in problem instruction have shown that the flying profession requires non-standard thinking, highly intellectual decisions with ambiguous or contradictory information and an acute shortage of time as well as high social responsibility for the decision taking. A nervous breakdown occurs not all at once but as a result of a person's deep penetration into the essence of his profession and a realization that his preparedness is below the required, although formally everything is fine.

Thus, to extend the length of a flight career means to create living and working conditions which provide an opportunity to develop and strengthen the main interest in a pilot's life, that is, to fly with desire, confidently and skillfully, and to constantly improve his skill in order to ably defend the motherland. It is possible to ensure a long professional career for aviators only by profoundly understanding the essence of the flying profession. A long career itself is the height of civil awareness and a measure of the spiritual maturity of the aviation fraternity.

The flying profession is founded on a great love for aviation, this most difficult undertaking, on responsibility and conscience and a constant improvement in the personality. In the air, in encountering danger, one cannot hide behind someone else's back just as one does not pull out of a spin at the first try. A failure to recognize the moral traits of a profession, a disregarding of the motives for flying and the right to take reasoned risk as a means for improving flight skills lead to a decline in the profession's prestige. And this is a social disaster. Life itself shows that as soon as attempts are made to play down a flight specialty, immediately there is primitivism, individualism, conformism, and, as a consequence, a rise in accidents.

If in the diverse life of an aviation collective a flight is not the end but only an element, then one can expect difficulties. The lasting pride of aviators which is passed down by generations is precisely that everyone involved in a flight or who supports it lives by his own conscience and not someone else's, without placing the blame for a failure on others or on some circumstances. Aviation has been, is and will be the focus of technical progress for a "journey into the unknown," and it can be fully utilized only

by highly intelligent persons for whom the flight and the ensuring of its safety are not merely a job but rather a highly moral mission.

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## EMPHASIS PLACED ON PSYCHOLOGICAL TRAINING OF GROUND CONTROLLERS

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[Article, published under the heading "Flight and Psychology," by Col V. mirnov, military pilot 1st class and candidate of psychological sciences: "It Was Easier For Me As I Was On the Ground..."]

[Text] The intensity of the flights did not decline over the entire flight shift. The maximum possible number of aircraft were constantly circling overhead. A rather tight situation arose at one of the moments in the air. An aircraft was approaching flare-out altitude and it was to take off again from the "conveyor line," a second aircraft making circular flights was climbing after take-off while the distant marker was being approached by a pair which was to go into a break-up pattern.

In order to simplify the situation, the flight controller, Lt Col M. Kurych took a decision to have the aircraft which was to take off from the "conveyor line" taxi in and gave the appropriate command. But the officer candidate busy with preparing to take off did not immediately understand it and put the engine in a take-off mode. Now it was dangerous to abort the take-off.

Thus, there were now four aircraft approaching the turn on the cross-wind leg of a tight circle almost simultaneously. In order to defuse the situation, the flight controller ordered the leader of the pair of aircraft to hold their position until the aircraft taking off from the "conveyor line" had made its first turn and there would be a safe distance between the aircraft. But the command coincided with the request of the leader to break up the formation. Due to static in the radio communications, the leader heard what he was expecting, that is, the permission of the controller to break up the pair. And this is what happened: the pair split up on the turn of the cross-wind leg.

Contrary to the intentions of Lt Col M. Kurych, the situation was now more complex. However, the officer carefully watched it, by precise radio commands he moved all to safe distances and demanded that the pilots intensify visual and radio watchfulness.



The given example confirms how strong and trained should be the willpower of a person in charge of flights. Regardless of the danger increasing before his very eyes, the flight controller did everything to successively simplify the situation. Moreover, after untangling the knot of negative factors which had put him to a severe test, he was still able to catch his breath as the flights continued with their former intensity and hence he had to resolve other problems and give radio commands in a calm, confident and affirmative voice.

When the question is raised of the psychological problems of flight control, as a rule, it is most often a discussion of the flight personnel. And this is understandable as precisely the pilot is most involved in the sphere of psychological effects as by his very occupation he has been put under unusual conditions, that is, he works in the sky. The remaining aviation specialists perform their important and major job on the ground. This includes the flight controllers. But do we have the right to feel that in shaping his professional qualities it is possible to get by solely with, as they say, a "ground" psychology?

Research on the activities of the flight control groups has shown that many psychological qualities which are traditionally ascribed to the flight personnel are fully essential for those who, while being on the ground, direct the actions of the crews in the air. This conclusion applies both to the operational aspect of the qualities of an individual who is a member of a GRP [flight control group] as well as his psychological features.

The special demands made on developing the willpower of flight controllers are dictated by the fact that he is under a state of stress for a very extended time. It would be hard to mention any other official who could compete with this indicator with the position of the flight controller. Even pilots who carry out difficult multihour flights have brief minutes of rest (certainly this is relative) from the psychological stresses due to interaction with other crew members. But the flight controller does not have such an opportunity. For this reason his will requires a large reserve of endurance.

It must be taken into account that often the flight controller acts without having complete or precise information. His strength of will is particularly apparent when he receives a fragmentary report, and when there is no certainty that the commands given by him are correctly received, without a partial loss of semantic content.

The need for volitional effort, as a rule, arises suddenly. For instance, a pilot does not perceive immediately the most dangerous emergency situation in the air but rather does this from an aggregate of indications. Having received the first warning of a complicating of the situation, a man in the air begins to assemble information in order to understand what has happened. His mind is preparing simultaneously with this "technical" work to combat the difficulties. But for a flight controller, any unexpectancy often occurs immediately, without any preliminary preparation of the psyche. While the volitional effort of a pilot extends only to himself (or to the crew members), the willpower of a flight controller should subordinate to his decisions all the crews in the air and engaged in carrying out various missions, all the

persons who are part of the GRP as well as everyone involved in supporting the flights.

Of course, what has been said does not completely determine such an important psychological quality for flight controllers as strength of will. Our task is merely to emphasize that this must be constantly formed, developed and trained considering the psychological features of the man who will control the flights.

--Once the pilot, Sr Lt G. Timofeyev, in coming in for a landing under instrument flying conditions, made an error and went around a second time. This did not cause any particular alarm for the flight controller, Lt Col V. Babichev, because he knew that the pilot was well trained in professional terms and the fuel supply on the combat aircraft guaranteed no difficulties. Concern arose when the landing did not succeed on the second attempt. Over the intercom the flight controller demanded that the entire control group strengthen supervision over the pilot's actions. Everyone who was involved in flight control carried out his duties with particular preciseness.

The next landing approach seemed to be going successfully. But at the very last moment, without radio warning, the pilot started around a third time. The situation was getting very tight. The danger was obvious to everyone: something had happened to the pilot and he had clearly lost the ability to complete the flight safely and in addition fuel was now running very low.

The absurdity of all this "bustle" was that the weather conditions conformed completely to the training level of this pilot. On that very day his less experienced comrades had successfully carried out a landing and Timofeyev himself had already made a flight with a high-quality landing.

Then Lt Col V. Babichev gave a command which was a complete surprise for everyone in the sky and on the ground:

"Everyone is to break off radio traffic. Let us see if this weirdo cannot come in for a landing under the simplest conditions!..."

Need it be said, an extraordinary order. Not provided by any rules and actually insulting in tone and content, it had the effect of completely suppressing the pilot's psyche. Precisely this opinion was voiced subsequently by many witnesses of the episode. But the pilot landed normally. Actually the flight controller had prevented the flight accident which was completely at hand.

Of course, this instance was analyzed with particular care. Let us leave aside all the minor details and take up one question: what was the psychological essence of the unusual decision of the flight controller? Here a particular role was played not only by professional competence but also the developed psychological selectiveness of the flight controller, that is, the ability to quickly understand the pilot's psychological state, to experience what he was feeling, and the ability to psychologically explain the pilot's conduct and give a psychological cast to the order. All of this helped the

controller quickly and correctly understand what had happened to the pilot in the air.

And that was the case.... The first error occurred because of the desire of Sr Lt G. Timofeyev to constantly make an excellent landing. He made a second circle to create better approach conditions. The second error was also the consequence of excessive endeavor. During the third approach, according to the admission of the pilot himself, he was strongly influenced by powerful unfavorable factors, that is, uncertainty in his own forces and the short fuel supply. Ultimately, and this was a sincere admission by the pilot himself, a will-fettering fear gradually gained control.

All of this was understood by Lt Col Babichev. He knew that fear, the strongest mental stimulus, could be eliminated only by a stronger stimulus. But a theoretical understanding was not enough, it was essential to quickly find this super-strong stimulus. Here Vladimir Nikolay [Babichev] was aided by the fact that he had a good knowledge of Timofeyev's character. This pilot was very ambitious. So the idea flashed in the flight controllers mind, to use self-esteem in the interests of the crucial moment. The decision was correct as the pilot roused himself and literally recovered his sight and a feeling of "injured dignity" conquered the fear.

The decision of Lt Col V. Babichev was of course vulnerable, particularly from the legal standpoint. But the officer not only did not forget what responsibility he had assumed in giving an unusual command and moreover he knew firmly that in the event of a failure no one would approve his actions and there would be no persuasive arguments for his justification. However, responsibility for the pilot's life was stronger than a fear of future rebukes. Later, Vladimir Nikolayevich put it this way: "It was easier for me, I was on the ground...."

Thus, two instances from flight practices characterizing just two psychological qualities essential for the successful activity of flight controllers, without any claim to an exhaustive completeness of their analysis. But, we feel, this is enough to draw attention to the problem of the psychological preparation of the flight controllers and to realize that this training is very specific, complicated and labor intensive and requires great scientific and practical competence. However, all expenditures are justified because they are directly linked to flight safety.

Yes, the flight controller is on the ground. But he is organically linked to those who are in the air and to the flights. And his work should have the strongest not only social but also moral-ethical and psychological basis.

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## PRE-WORLD WAR II MIDAIR RAMMING DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 40-41

[Article, published under the heading "Years. People. Feats," by Lt Col V. Paramonov: "The Duel"]

[Text] Not envisaged by any regulation and involving a mortal risk, air rams had been employed by Soviet pilots in exceptional instances, when it was impossible to destroy the enemy plane by the firing of small-arms and cannon weapons. The rams showed the superior spirit of the Soviet pilots and a readiness to defend the motherland at any price.

What courage and skill must have been needed to carry out an air ramming on head-on courses? Among the first to do this in combat in the area of the Khalkhin-Gol River was Sr Lt V. Skobarikhin. At that time, in July 1931, he was a squadron commander from the 22d Fighter Air Regiment.

"On May 22d, our regiment scrambled upon an alert," recalled Vitt Fedorovich [Skobarikhin]. "We flew to the unit. Here we learned that we would fly into Mongolia. There combat was already underway and at first this did not go at all well for us. This was reported to the People's Commissar of Defense K.Ye. Voroshilov. Kliment Yefremovich [Voroshilov] ordered that the flights be halted and sent an appeal to the pilots in which there were the following words: 'Dear friends, remember that in the age of technology, motors and aviation, it is impossible to fight successfully against the enemy with bravery and hate alone. There must be skill and combat experience. You do not have the combat experience and skill is still lacking. Learn to fight. The instructor combat pilots are coming to your aid.'

"Soon thereafter we were visited by a large group of pilots who had participated in fighting in Spain and China. Among them were Heroes of the Soviet Union Sergey Gritsevets, Grigoriy Kravchenko, Ivan Lakayev, as well as Boris Smirnov....

"Immediately upon arrival, the pilots from the group made visits to the airfields. By their personal example, they taught the young air fighters to fight in a compact group and in close cooperation, and reminded us of the importance of a helping hand in combat.

"Boris Smirnov was assigned to our squadron. He intensely drilled each pilot. The training flights, as a rule, ended with airborne duels."

The results of the hard training were not long in coming. The combat initiative moved to the Soviet pilots. They fought the enemy with exceptional courage, showing the greatest skill. In the 22d Air Regiment, the title of Hero of the Soviet Union was awarded to 11 of the most courageous and boldest pilots: A. Balashev, N. Glazykin, N. Grinev, V. Kalachev, I. Krasnoyarchenko, A. Pyankov, V. Rakhov, V. Skobarikhin, V. Trubachenko, V. Chistyakov and A. Yakimenko. The regiment's commander, G. Kravchenko, became a Hero of the Soviet Union twice. The instructor pilot B. Smirnov was also awarded the title of Hero of the Soviet Union.

As a total in the course of the fighting in the Khalkhin-Gol River area, the 22d Fighter Air Regiment made 7,514 aircraft sorties and destroyed a large amount of Japanese aircraft, a great deal of equipment and enemy personnel. The squadron commander from this unit, Sr Lt Skobarikhin, rammed an enemy aircraft head-on.

"This occurred on the 20th of July," related Vitt Fedorovich. "That day we had made 4 combat sorties. We again took off to cover the ground troops. We were flying at an altitude of 3,500 m. All of a sudden, through a break in the clouds, I spotted Japanese fighters, the so-called bootblacks. The Japanese began to come in on our tail. They had an advantage in altitude and speed. Two enemy fighters attacked the aircraft of Sr Lt Vuss who was bringing up the rear of the formation. I realized that if we waited until the entire formation turned, he would be shot down. I gave the appropriate order to Fedor Golub and with an abrupt turn headed right at the enemy. Initially I opened up with obstruction fire and then aimed fire. I watched the enemy also come in on a frontal attack and firing. It was either breaking off the attack and then Vuss would certainly be hit or make a ram. I decided to make a ram. The Japanese pilot at the last moment lost his nerve, turned aside and for several instants was unprotected. There was no time to plan the attack. The propeller hit a wheel and only later the fuselage. I, in truth, did not see this because I had lost conscience for a certain time. My comrades said that the enemy aircraft crashed while my fighter went into a spiral. When I came to, I began to put the aircraft into level flight. Initially, I was unable to do this. But at an altitude of 800 m, I succeeded. I had a hard time getting back to my airfield and landing the fighter.

"At that time, Fedor Golub flew in. He reported to the regiment's commander that two enemy aircraft had been downed but the squadron commander had lost his life. Grigoriy Panteleymonovich [Kravchenko] smiled and pointed toward me: 'But your commander lives'."

Thus, a head-on ram was made in the Mongolian skies. The speed of approach of the aircraft was around 900 km an hour. In the award document to V. Skobarikhin, this feat is described simply and tersely: "In helping a comrade, he rammed a Japanese aircraft the fragments of which he brought back on his own plane to the airfield."

The second ramming on Khalkhin-Gol was made on 3 August by Capt V. Kustov. Having used up his ammunition, with the propeller of his fighter, he hit the fuselage of a Japanese bomber. The courageous pilot perished in the collision.

On the following day a ramming was made by the fighter pilot A. Moshin. With his propeller he cut off the stabilizer of a Japanese aircraft. It immediately dove toward the ground while Moshin landed safely back at his airfield. Aside from a bent propeller, his I-16 was undamaged.

The commissar of the 150th Bomber Air Regiment, Capt M. Yuyukin, carried out an immortal feat in the Mongolian skies. An anti-aircraft shell caught his plane afire. In preferring a heroic death to capture, Yuyukin headed his flame-engulfed aircraft at an accumulation of enemy personnel and equipment. The squadron commander of the 150th Bomber Air Regiment, Capt I. Polbin, and the wingman of M. Yuyukin, N. Gastello, fought bravely and skillfully.

The motherland had high regard for the feats of the pilots who rammed the enemy in the battles on the Khalkhin-Gol. By an Ukase of the Presidium of the USSR Supreme Soviet, Sr Lt Vitt Fedorovich Skobarikhin, Capt Viktor Pavlovich Kustov and Lt Aleksandr Fedorovich Moshin were awarded the title of Hero of the Soviet Union. The battalion commissar Mikhail Anisimovich Yuyukin posthumously received the Order of Lenin.

The unprecedented courage of the Soviet fliers and the high qualities of the Soviet aircraft made it possible for our aviators to win air supremacy and make an enormous contribution to the defeat of the Japanese aggressors. In what was then a major duel of air forces--it involved hundreds of aircraft and 660 Japanese aircraft were destroyed--the outcome was in favor of the Soviet pilots.

"Khalkhin-Gol taught the pilots a great deal," I was told in conclusion by Col (Ret) Vitt Fedorovich Skobarikhin, presently a scientific co-worker at the museum panorama "Battle of Borodino." "During the years of the Great Patriotic War (and I was involved in the air fighting at Stalingrad, on the Kursk Salient, the Dnieper and on the territory of Poland and Czechoslovakia) we were unfailingly aided by this severe frontline tempering."

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## CONSTANT VIGILANCE IN HELICOPTER MAINTENANCE URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) pp 40-41

[Article, published under the heading "Those Setting the Pace," by Lt Col V. Shmatov: "The Touch of a Master"]

[Text] For vigilance shown in inspecting aviation equipment, for detecting and promptly eliminating a malfunction which could have led to the stopping of the engine and the outbreak of a fire in the helicopter in the air, a commendation is declared to WO [praporshchik] A.S. Ageyev...

From a Unit Order

In the morning helicopters began to arrive in the maintenance unit [TECh] for repairs. In determining the scope of the work, the specialists were dubious that they would be able to complete everything within the established time. However, the TECh chief in setting the tasks emphasized:

"Tactical flight exercises are in the offing. For this reason all helicopters received by us should be ready by their start."

Several minutes later, the specialists set to work. And soon the leaders were apparent. Thus, by midday the senior group technician for helicopter and engine repairs, WO Anatoliy Ageyev, had completed a larger share of the assigned operations on the equipment. He worked industriously paying no attention to his fatigue.

The group chief, Capt V. Velichko, constantly assigns him, a master of combat skills, the most complicated and crucial technical operations. He knows that no one else can carry them out so effectively and quickly. Anatoliy Semenovich [Ageyev] has around a quarter of a century in experience. How many helicopters readied by him over this time have taken to the skies! And each time the equipment operated dependably. Moreover, Ageyev, as they say, has given wings to many specialists and has helped them gain knowledge and master the experience of high-quality performance of repairs on helicopters.

The following fact is of interest. The group chief, Capt Velichko, commenced his service here, learning from Ageyev. Precisely, Anatoliy Semenovich, having spotted the industry of the young soldier and his love for equipment,

recommended that he seek admission to the military aviation technical school. The lessons of the mentor came in handy for the officer in service. Viktor Petrovich [Velichko] frequently now consults with Ageyev on the most important questions and considers him his right hand.

This time there was a hitch for WO Oleg Silin. He had removed a unit of the fuel system and when he began to put it back, not everything went as it should. Having spotted this, Capt Velichko assigned WO Ageyev to help him.

Anatoliy Semenovich helped shape up Silin. Oleg is a first-class aviation specialist. He arrived in the subunit from another unit. Up to then he had been, as he himself commented, a "fixed-wingman." He then rapidly relearned. He had good theoretical training. But he frequently lacked efficiency, organization and the ability to plan all his work. It would happen that he would start a technical operation and then become distracted. When he returned to his job, he did not check out what he had completed. In response to a comment on this he was surprised:

"Why should I do the same thing twice? I trust myself...."

Anatoliy Semenovich taught him that it was essential to supervise himself. If you have missed something, spot this on time and promptly eliminate it.

This time, knowing Silin's character, WO Ageyev decided to check out how he had mastered the assignment. Silin, in order to remove the unit, had to disassemble nearby equipment. Had he done everything correctly and in sequence? Here there should be no mistakes. It is better to check twice and make certain that the equipment will not fail in flight.

In closely inspecting the fuel system, Ageyev saw a scarcely noticeable trail of a drop of fluid on a pipeline. It was not particularly hard for Ageyev to ascertain that this was a trail of kerosene. "From where did it leak?" wondered the warrant officer. "It looks like from this pipeline."

WO Ageyev reported what he had discovered to the group chief. After a careful inspection of the pipeline, it was ascertained that a collar holding a rubber packing had broken. In the air, in transitional flight modes, the pipeline could have broken at this point....

The analysis conducted by the group chief put everything in its place. The lamentable instance was the fault of Pfc R. Magomedov who in installing the collar had over-tightened it and WO N. Klimov who did not inspect the work of his subordinate. Both specialists were severely reprimanded. And this instance served as a serious object lesson for WO O. Silin.

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## EFFECTIVENESS OF SPECIAL MAINTENANCE INSPECTIONS RELATED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) p 44

[Article, published under the heading "Advanced Experience into IAS Practices," by Sr Lt V. Mayorov: "Although the Parameters Are Within the Norm...."]

[Text] In the course of carrying out a flight mission, one of the aircraft's systems failed. In acting cool-headedly, intelligently and skillfully, the pilot was able to successfully complete the flight. In an inspection the engineers discovered a break in one of the lines of the hydraulic system. Could any of the specialists have promptly spotted this malfunction and prevented a near accident? Yes.

This should have been done by the aircraft technician, Sr Lt A. Moskalev. Moreover, a maintenance day had been conducted in the regiment on the eve of the preliminary preparations. And one of the points of the special-purpose aircraft and engine inspection obliged the specialist to inspect the state of the hydraulic system's lines. If the officer had done this, then undoubtedly he would have been able to promptly detect the flaw.

It is hard to overestimate the special-purpose aviation equipment inspections for ensuring its dependable operation. They are of enormous importance together with diverse preventive measures conducted by the IAS [aviation engineer service] personnel on airplanes and helicopters. For the engineer and technical personnel, in readying the equipment for flights, time is short and here it is very difficult to keep track of everything or to monitor everything with the same closeness as can be done, for instance, on maintenance days. The necessity of a special-purpose inspection is determined by the state, the conditions and times of operating the aviation equipment. Sr Lt A. Moskalev was well aware that during the maintenance day the specialists would carry out the most complicated and labor-intensive jobs on the aircraft. The officer was obliged to carefully inspect all the units and pipelines of the hydraulic system. Certainly each point of the special-purpose inspection in the plan of measures is not accidental. First of all, the IAS leadership proceeds from the results of analyzing the technical state of the missile aircraft. This is why it is essential to take a serious stance and show high responsibility in carrying out the given type of work.

Unfortunately, not all aviators carry out the special-purpose inspections with sufficient dependability. At times some of them show excessive self-confidence thinking that our equipment is sufficiently reliable and why make an extra inspection and as long as the main parameters are within the norm, there will not be any deviations.

Having read, for example, the point on inspecting the work of the parachute brake unit, the aircraft technician without a second thought signs the log for readying the aircraft for flight. Here he justifies his incorrect actions by the following: the system has not shown any deviations for a long time. The flight TECH [maintenance unit] chief is not concerned. But the experience of operating modern aviation installations shows something else. Failures and malfunctions do not occur spontaneously. The factors which cause them accumulate gradually in the operations process and all of a sudden present surprises to the IAS personnel. And the inspections which are frequently carried out by specialists in preparing the aircraft for flight do not give a complete notion of the state of the units and assemblies. For an objective and thorough evaluation of these, it is essential to have a thorough inspection employing modern check-out equipment and this makes it possible to accurately determine the potential of one or another assembly or system of an aircraft as well as promptly employ the necessary range of preventive measures.

Once, in inspecting a snap-down panel, Sr Lt A. Druzenko discovered increased play in a cable. He began to seek out the reason for this. It turned out that as a consequence of extended operation there had been wear on a guide roller. The malfunction was eliminated during a maintenance day.

Many factors provide a dependable guarantee for the special-purpose inspection. Here there are the skillful organization of the maintenance day, the high professional training of the IAS personnel, the responsibility of each specialist for the quality of maintaining the aviation equipment and, of course, a creative approach to the job.

For example, the special-purpose inspections are carried out with great effectiveness in the squadron where Officer M. Meleshko serves. There are no special secrets in the activities of his subordinates. On the eve of a maintenance day, the technicians and mechanics are acquainted with the list and scope of forthcoming work on the aviation equipment. The deputy squadron commander for IAS informs the chiefs of the flight TECH and the maintenance groups of the need for one or another inspection. Here the officers coordinate their actions in employing ground equipment and mobile units. The most complicated technical operations are assigned to experienced specialists. In detecting any deviations from the established parameters, engineers make a thorough analysis of the factors which caused these. Information about this is provided to all the IAS specialists. The results of each special-purpose inspection are thoroughly analyzed directly in the flights and groups.

For some time now the following procedure has been introduced in the squadron. The person who opens a hatch during a special-purpose inspection pencils a note on its top: which of the technicians or mechanics checked the unit and

when. Then the person who supervises the preparation of the aviation equipment does not need to look at the documents each time to determine whether the IAS specialists forgot to perform a certain operation on the aircraft.

A special-purpose inspection is an important element which with skillful use in the course of a maintenance day brings inestimable benefit. Certainly such inspections provide the IAS specialists not only with broad scope for carrying out an entire complex of important preventive measures but also great opportunities for improving their professional knowledge and skills.

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## AIRFIELD MAINTENANCE COMMANDER DEMANDS TRUTHFUL REPORTING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 87 (signed to press 3 Mar 87) p 45

[Article, published under the heading "For High Combat Readiness," by Capt V. Prudnik, chief of staff of the separate airfield maintenance battalion: "The Number of Outstanding Men Has Declined, But..."]

[Text] In comparing the results of combat training during the last training year and the previous one in the company headed by Sr Lt F. Smirnov, the battalion command noticed that the number of outstanding men had declined. Such a fact, naturally, was viewed by the leadership as an extraordinary occurrence. Certainly this subunit for several years running had been an outstanding one although albeit under a different commander. For this reason, we first were of the opinion that the reason was in the inexperience of the young company commander.

However, rash conclusions should not be made. Upon the order of the unit commander, a commission was established which included staff officers, political workers and party activists. Its aim was to study the state of affairs in the company and find the reasons for the strange metamorphosis. Here is what was established in the course of the check.

--When the order came for appointing Sr Lt F. Smirnov the commander of the motor-technical company, the fellow servicemen, in congratulating the officer on his promotion, inevitably added:

"You are lucky, the equipment is good and the training system established. The main thing is not to lose the won positions."

The young company commander responded in a restrained manner to such flattering responses. He was well acquainted with the situation in the collective, since for 6 months he had performed the duties of the deputy company commander and for this reason set to work immediately and soundly. He began his work in the new position by raising the exactingness chiefly upon himself, upon the platoon commanders and then the personnel. One recalls the first analysis carried out by Smirnov of the actions by special vehicle drivers after the flights. Then in the presence of the deputy unit commander,

the officer voiced so many comments and complaints against the aviators as they had probably not heard over the entire previous year.

Much did not satisfy the company commander: both the unenterprising actions of the man on duty at the parking area for the airfield maintenance equipment, WO [praporshchik] I. Krakhmalyuk, the slovenly appearance of the soldiers and the tardiness in the arrival of the fuel trucks to the aircraft.... All of this continued to be discussed in summing up the results of the socialist competition for the month where, incidentally, the platoon of WO Krakhmalyuk which had officially been declared outstanding was named among the "...lagging ones." The same was also said at the subunit Komsomol meeting.

Let us be frank: at that time there was not a concerned discussion between the commander and subordinates about eliminating the shortcomings existing in the company. The "quiet life" was completely to the liking of the platoon commanders and even more so for the sergeants and soldiers. In this collective many counted on the idea that the previously achieved success would be repeated, so to speak, out of inertia, without additional efforts. Moreover, under the easy hand of the former company commander, the subordinates had followed a path not of eliminating but rather concealing the shortcomings. Not wanting to wash dirty linen in public and in avoiding acute service and living problems, it was undoubtedly easier for some time to keep on the surface. And this they did. The battalion leaders and in particular the staff officers, it must be admitted, did little to delve into the heart of the activities of our pacesetters. Since the company had no extraordinary accidents or flagrant violations, it meant that things were going normally here. Such a line of argument is in the order of things and no one endeavored to dispute it.

But this was not to the liking of Sr Lt Smirnov. He did not make a concession to his conscience and continued to constantly break the principles not to his liking. The company commander was supported by his deputy for political affairs, Sr Lt Ya. Kazin. Each negative phenomenon in the subunit began to be publicized and each error given a fundamental assessment. No, the commander did not issue reprimands right and left. He endeavored to work individually with the violators and dug to the sources of the infraction. One must pay proper respect to the restraint of Sr Lt Smirnov. Not a single time, under no circumstances did he raise his voice or insult a man. Possibly, precisely respect for others, conscientiousness and purposefulness played the main role in establishing contact with subordinates.

The final turning point in the awareness of the men occurred at one of the Komsomol meetings where they were discussing the question of the authority of an outstanding man. Speakers were not prepared for this meeting, as had been the case previously. Merely a week before in a prominent place they hung up an announcement and a note to it: "The Komsomol bureau of the motor technical company urges all Komsomol members who so desire to speak at the meeting." In the report the deputy company commander for political affairs, Communist Kazin, in speaking figuratively, disclosed all of the collective's sore spots and called things by their true names. The discussion was lively and to the point.

"This is how public measures should be carried out," said Jr Sgt V. Tikhov. "At this meeting my eyes were opened to the state of affairs in the company. I ceased being a simple executor who carries out commands and came to feel my involvement and responsibility for what was occurring around me...."

Jr Sgt Tikhov was not alone in his views. He was echoed by a majority of the men in regular service. And this already shows that they have begun a reorientation of the collective from quantitative indicators of their labor to qualitative ones. Of course, meetings alone cannot alter the psychology of people and all the more force them to work differently. Sr Lt Smirnov understands this well enough and for this reason has endeavored not to lower activeness, in paying particular attention to individual work with subordinates.

At present, in comparison with the previous year, the number of outstanding men in combat and political training has declined in the collective which he leads. The company commander has recorded more shortcomings in the support of the flight shifts. Hence, from the viewpoint of statistical reporting, the subunit has taken a step backwards. However, from a standpoint of today's demands this cannot be said. The company personnel has recognized the main thing that they must not hide behind a screen of deception and seeming order! In such a question as combat readiness of a subunit, this is a harmful and dangerous phenomenon. Certainly the security of the motherland stands behind a sham assessment. And this cannot be feigned. As for the outstanding men and true masters of their job, we are confident that there will be more of them.

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LIST OF 1986 SOVIET SPACE LAUNCHES GIVEN

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[Table listing Soviet space launches in 1986]

[Text]

Launch Date	Name of Spacecraft	Initial Orbital Parameters [c]				Period of Ballistic Existence, Years (Date of Ceasing Work)
		Satellite Period, min. [d]	Maximum Altitude, km [e]	Minimum Altitude, km [f]	Inclination, degrees [g]	
[a]	[b]					[h]
8 Jan	Kosmos-1715	89.4	317	207	72.8	(1-22-86)
9 Jan	Kosmos-1716	114.7	1,508	1,411	74.0	9,500
9 Jan	Kosmos-1717	114.9	1,509	1,421	74.0	(11-27-86)
9 Jan	Kosmos-1718	115.0	1,508	1,434	74.0	9,500
9 Jan	Kosmos-1719	115.2	1,509	1,445	74.0	9,500
9 Jan	Kosmos-1720	115.4	1,508	1,459	74.0	9,500
9 Jan	Kosmos-1721	115.5	1,510	1,466	74.0	9,500
9 Jan	Kosmos-1722	115.7	1,509	1,479	74.0	9,500
9 Jan	Kosmos-1723	115.9	1,524	1,483	74.0	(9-12-86)
15 Jan	Kosmos-1724	89.5	358	179	67.2	(3-15-86)
16 Jan	Kosmos-1725	104.9	1,016	989	82.9	1,200
17 Jan	Kosmos-1726	97.7	676	649	82.5	60
17 Jan	Raduga	24 hr 36 min	Close to stationary 36,667      36,490		1.2	1,000,000

[a]	[b]	[d]	[e]	[f]	[g]	[h]
23 Jan	Kosmos-1727	104.9	1,029	989	82.6	1,200
28 Jan	Kosmos-1728	89.4	305	214	70.0	(2-11-86)
1 Feb	Kosmos-1729	11 hr 49 min.	39,342	614	62.8	15
4 Feb	Kosmos-1730	89.5	333	206	72.9	(2-13-86)
7 Feb	Kosmos-1731	89.0	293	191	65.0	(10-3-86)
11 Feb	Kosmos-1732	116.8	1,538	1,497	73.6	10,000
20 Feb	Mir	89.2	319	178	51.6	--
20 Feb	Kosmos-1733	97.4	674	643	82.5	60
26 Feb	Kosmos-1734	89.6	371	176	67.1	(6-26-86)
27 Feb	Kosmos-1735	92.8	440	416	65.0	
13 Mar	Soyuz T-15	88.6	254	198	51.6	(7-16-86)
19 Mar	Progress-25	88.8	268	189	51.6	(4-21-86)
21 Mar	Kosmos-1736	89.6	278	255	65.0	(7-21-86)
25 Mar	Kosmos-1737	91.1	443	230	73.4	(12-3-86)
4 Apr	Kosmos-1738	24 hr 37 min.	Circular 36,560		1.4	1,000,000
9 Apr	Kosmos-1739	89.5	352	182	64.9	(6-7-86)
15 Apr	Kosmos-1740	90.2	396	208	72.9	(4-28-86)
18 Apr	Kosmos-1741	100.8	824	784	74.0	120
18 Apr	Molniya-3	12 hr 16 min.	40,664	638	62.9	14
23 Apr	Progress-26	88.8	274	190	51.6	(6-23-86)
14 May	Kosmos-1742	90.1	388	209	73.0	(5-28-86)
15 May	Kosmos-1743	97.8	678	657	82.6	60
21 May	Soyuz TM	88.6	241	201	51.6	(5-30-86)
21 May	Kosmos-1744	90.4	395	227	62.8	(6-4-86)
23 May	Kosmos-1745	104.9	1,024	984	83.0	1,200
24 May	Ekran	23 hr 44 min.	Close to stationary 35,629      35,476		0.3	1,000,000



[a]	[b]	[d]	[e]	[f]	[g]	[h]
27 May	Meteor-2	104.1	974	953	82.5	520
28 May	Kosmos-1746	89.2	308	195	82.3	(6-11-86)
29 May	Kosmos-1747	90.6	420	217	70.4	(6-12-86)
6 Jun	Kosmos-1748	114.5	1,496	1,407	74.0	(9-1-86)
6 Jun	Kosmos-1749	114.6	1,496	1,418	74.0	9,500
6 Jun	Kosmos-1750	114.9	1,496	1,438	74.0	9,500
6 Jun	Kosmos-1751	115.0	1,496	1,445	74.0	(9-1-86)
6 Jun	Kosmos-1752	115.1	1,495	1,457	74.0	9,500
6 Jun	Kosmos-1753	115.4	1,497	1,470	74.0	9,500
6 Jun	Kosmos-1754	115.5	1,499	1,476	74.0	9,500
6 Jun	Kosmos-1755	115.7	1,517	1,481	74.0	(8-1-86)
6 Jun	Kosmos-1756	89.7	368	182	64.9	(8-4-86)
10 Jun	Gorizont	24 hr 34 min.	Close to stationary 36,576	36,495	1.5	1,000,000
11 Jun	Kosmos-1757	88.6	252	189	82.3	(6-25-86)
12 Jun	Kosmos-1758	97.8	682	644	82.5	60
18 Jun	Kosmos-1759	104.9	1,016	985	82.9	1,200
19 Jun	Kosmos-1760	90.6	421	218	70.0	(7-3-86)
20 Jun	Molniya-3	12 hr 16 min.	40,679	640	62.9	14.5
5 Jul	Kosmos-1761	11 hr 49 min.	39,325	607	63.0	14
10 Jul	Kosmos-1762	89.2	304	196	82.6	(7-24-86)
16 Jul	Kosmos-1763	100.5	814	761	74.1	115
17 Jul	Kosmos-1764	89.8	368	182	64.9	(9-11-86)
24 Jul	Kosmos-1765	90.2	395	207	72.9	(8-7-86)
29 Jul	Kosmos-1766	97.8	679	648	82.5	60
30 Jul	Kosmos-1767	88.5	226	197	64.9	(8-1-86)
30 Jul	Molniya-1	12 hr 16 min.	40,615	658	62.9	16

[a]	[b]	[d]	[e]	[f]	[g]	[h]
2 Aug	Kosmos-1768	89.2	303	199	82.6	(8-16-86)
4 Aug	Kosmos-1769	93.3	456	438	65.0	--
6 Aug	Kosmos-1770	89.1	302	189	64.8	--
20 Aug	Kosmos-1771	89.6	278	254	65.0	(10-15-86)
21 Aug	Kosmos-1772	90.0	370	210	72.9	(9-3-86)
27 Aug	Kosmos-1773	89.7	366	181	64.9	(10-21-86)
28 Aug	Kosmos-1774	11 hr 49 min.	39,342	614	62.8	15
3 Sep	Kosmos-1775	90.5	415	219	70.3	(9-17-86)
3 Sep	Kosmos-1776	94.5	521	478	74.0	5.5
5 Sep	Molniya-1	12 hr 15 min.	40,558	645	63.0	15.5
10 Sep	Kosmos-1777	100.8	819	781	74.0	117
16 Sep	Kosmos-1778	11 hr 16 min.	19,154	19,129	64.8	1,000,000
16 Sep	Kosmos-1779	11 hr 16 min.	19,154	19,114	64.8	1,000,000
16 Sep	Kosmos-1780	11 hr 16 min.	19,161	19,109	64.8	1,000,000
17 Sep	Kosmos-1781	90.4	405	217	70.4	(10-1-86)
30 Sep	Kosmos-1782	97.8	677	650	82.5	60
3 Oct	Kosmos-1783	5 hr 58 min.	20,045	613	62.8	(10-8-86)
6 Oct	Kosmos-1784	89.3	305	203	64.8	(11-12-86)
15 Oct	Kosmos-1785	11 hr 48 min.	39,300	608	62.8	14
20 Oct	Molniya-3	11 hr 43 min.	38,988	645	62.9	14.5
22 Oct	Kosmos-1786	113.3	2,589	198	64.9	6
22 Oct	Kosmos-1787	89.3	290	215	70.0	(11-4-86)
25 Oct	Raduga	24 hr 39 min.	Close to stationary 36,670	stationary 36,537	1.3	1,000,000
27 Oct	Kosmos-1788	94.5	520	472	65.9	4
31 Oct	Kosmos-1789	89.3	316	196	82.6	(11-14-86)
4 Nov	Kosmos-1790	89.4	315	207	72.9	(11-18-86)
13 Nov	Kosmos-1791	105.0	1,026	972	83.0	1,200
13 Nov	Kosmos-1792	89.6	357	181	64.9	--

[a]	[b]	[d]	[e]	[f]	[g]	[h]
16 Nov	Molniya-1	12 hr 16 min.	40,817	469	62.5	12
18 Nov	Gorizont	23 hr 57 min.	Close to stationary, circular 35,824		1.4	1,000,000
20 Nov	Kosmos-1793	11 hr 49 min.	39,323	611	63.0	15
21 Nov	Kosmos-1794	114.4	1,496	1,398	74.0	9,500
21 Nov	Kosmos-1795	114.6	1,498	1,408	74.0	9,500
21 Nov	Kosmos-1796	114.8	1,498	1,423	74.0	9,500
21 Nov	Kosmos-1797	114.9	1,498	1,436	74.0	9,500
21 Nov	Kosmos-1798	115.1	1,498	1,449	74.0	9,500
21 Nov	Kosmos-1799	115.3	1,499	1,456	74.0	9,500
21 Nov	Kosmos-1800	115.5	1,498	1,469	74.0	9,500
21 Nov	Kosmos-1801	115.6	1,511	1,474	74.0	9,500
25 Nov	Kosmos-1802	105.0	1,038	985	83.0	1,200
2 Dec	Kosmos-1803	116.0	1,527	1,502	82.6	10,000
4 Dec	Kosmos-1804	90.8	448	210	70.0	(12-18-86)
10 Dec	Kosmos-1805	97.8	675	649	82.5	60
12 Dec	Kosmos-1806	11 hr 48 min	39,307	612	63.0	15
16 Dec	Kosmos-1807	89.6	370	177	67.0	---
17 Dec	Kosmos-1808	105.0	1,033	995	83.0	1,200
18 Dec	Kosmos-1809	104.2	980	960	83.0	530
26 Dec	Kosmos-1810	89.1	302	189	65.0	---
26 Dec	Molniya-1	11 hr 41 min.	39,075	484	62.7	13

A total of 114 spacecraft were lofted into orbit.

NOTE: Kosmos is the name of a series of earth satellites which have been regularly (starting from 16 March 1962) launched from Soviet cosmodromes.

The scientific program for their research envisages:

1) A study of the concentration of charged particles in the ionosphere in the aim of investigating the propagation of radio waves, corpuscular flows and low energy particles, and the energy composition of the earth's radiation belts for evaluating the radioactive danger in protracted space flights, the processes of adaptation to weightlessness, the primary composition of cosmic rays and variations in their intensity, the earth's magnetic field, the

shortwave radiation of the sun and other cosmic bodies, the upper layers of the atmosphere, and the effect of meteorite matter on the design elements of spacecraft;

2) Research on space material sciences, the influence of space flight factors on living organisms, the investigation and obtaining of definite information on the earth's natural resources in the interests of different sectors of the national economy and international collaboration;

3) The development of elements and equipment for space navigation systems (developed in the interests of determining the location of civil aviation aircraft and maritime and fishing vessels), experimental equipment designed for the system of determining the location of vessels and aircraft in distress, experimental equipment for relaying telegraph and telephone information, equipment, units and design elements for satellites under various flight conditions, including joint;

4) Obtaining up-to-date information and continuing the development of new types of information metering equipment and methods of remote research of the surface and atmosphere of the earth and the world's ocean in the interests of various sectors of the Soviet economy, science and international collaboration.

Kosmos-1716--Kosmos 1723, Kosmos-1748--Kosmos-1755, Kosmos-1778--Kosmos-1780, and Kosmos-1794--Kosmos-1801 were orbited by a single carrier rocket.

Raduga is a communications satellite for on-board relay equipment designed to provide telephone and telegraph communications and broadcast TV programs. It is equipped with multitruunk communications equipment operating in the centimeter radio wave band. The first Raduga satellite was launched on 22 December 1975.

Mir is an orbital new generation scientific station and the basic unit for constructing a multipurpose, permanently operating manned facility with specialized orbital scientific and economic modules.

The total length of the station is 13.13 m. Like the Salyut station, it consists of four compartments. The widest diameter of the working compartment is 4.2 m. The total weight after orbiting is 21 tons. For the Mir station, an orbit has been chosen with an altitude of 300-400 m, with its plane inclined to the plane of the equator by 51.6 degrees. Five or six men can work on board it. The station is equipped with a new docking system with six (instead of the five on the Salyuts) docking units.

Due to the employment of relay satellites of the Luch type (Kosmos-1700) the Mir station dependably, virtually around-the-clock is linked with the Mission Control Center and this creates significant conveniences for the crew and makes it possible to transmit from the station scientific and telemetric information on a time scale close to real, while its on-board computers may be linked into a single complex with the powerful ground computers, thereby opening up an opportunity for automatic control and monitoring of the station's systems in conducting scientific experiments.

The control system for the orbital facility of the Mir station can solve the problem of the station's orientation relative to the center of mass, the correction of its orbit as well as aiming transport spacecraft and scientific modules to the station. The modules, like transport ships, which have approached the Mir station to within a distance of several hundred meters, now fly around it and themselves dock to the main docking unit and then with the aid of a mechanical manipulator can be shifted to one of the four side peripherals located on the station's transfer compartment.

The station's power supply system includes two (instead of the three on the Salyuts) solar battery panels around 30 m long with a total area of almost 80 square m. These charge the storage battery powering the on-board DC 28.5-volt network. This increases the dependable operation of the entire electronic, electrical, radio and other equipment.

The station for the first time uses personal cabins for the crew members and a washing unit.

The Soyuz T-15 is a spacecraft designed for orbital flights around the earth as well as for delivering crews to the multipurpose manned facilities. On 15 March 1986, the spacecraft docked with the scientific station Mir. From 15 March through 5 May, working successfully on the station was the first crew consisting of the Soviet cosmonaut-pilots L. Kizim and V. Solovyev. For the first time in the history of cosmonautics, this crew made interorbital transfers with a return, having carried out the work on two spacecraft: Mir and Salyut-7--Kosmos-1686 (5 May--separation from the Mir station, 6 May--docking with the Salyut-7--Kosmos-1686 orbital complex, 25 June, separation from Salyut-7--Kosmos-1686 orbital complex, 26 June, docking with Mir station).

Progress-25, -26 are automatic cargo spacecraft. The purpose of the launch was to deliver expendable materials and various cargo to the Mir orbital station. On 21 March 1986 at 1416 hours Moscow time, there was the docking of the Progress-25 spacecraft with the Mir--Soyuz T-15 orbital manned complex and on 25 April, the docking of the Progress-26 spacecraft with the Mir station.

Molniya-3 is a communications satellite (a further modernization of the Molniya-1 and Molniya-2 communications satellite) for supporting operation of the long-range telephone-telegraph radio communications system and the transmitting of programs from the USSR Central Television to the points of the Orbita network and for international cooperation. The launch of the first Molniya-3 satellite was made on 21 November 1974. The on-board satellite equipment employs the centimeter frequency band making it possible to increase the number of telephone and telegraph channels and improve the quality of television images in comparison with the Molniya-1 satellite (see the equivalent table for 1985).

The Soyuz TM is an improved spacecraft designed to deliver crews to multipurpose manned complexes of the modular type. The Soyuz TM spacecraft was developed on the basis of the manned Soyuz T spacecraft. It employs new

systems including for rendezvous and docking, radio communications, emergency rescue as well as a new combined propulsion unit and parachute system.

The aim in launching the Soyuz TM spacecraft is the comprehensive experimental development of the spacecraft in an automatic flight together with the Mir orbital station. On 23 May 1986 there was a docking of the spacecraft with the Mir scientific station.

Ekran is a television broadcasting satellite with on-board relay equipment providing in the decimeter wave band the transmitting of programs from Central Television to a network of collectively used receiver units. The first Ekran satellite was launched on 26 October 1976.

Meteor-2 is a satellite for a space meteorological system with on-board equipment for obtaining global images of cloudiness and the underlying surface in the visible and infrared ranges of the spectrum both in a storage mode as well as in a direct transmission mode; in addition, it is employed for continuous observations of flows of penetrating radiation in near space and for obtaining global data on the vertical temperature distribution. The first Meteor-2 satellite was launched on 11 July 1975.

Gorizont is a communications satellite for providing around-the-clock long-distance telephone and telegraph radio communications and for transmitting television programs to the stations of the Orbita and Moskva systems as well as for use in the international Intersputnik satellite communications system. The first Gorizont satellite was launched on 19 December 1978. It carried multitrunder relay equipment operating in the centimeter wave length.

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