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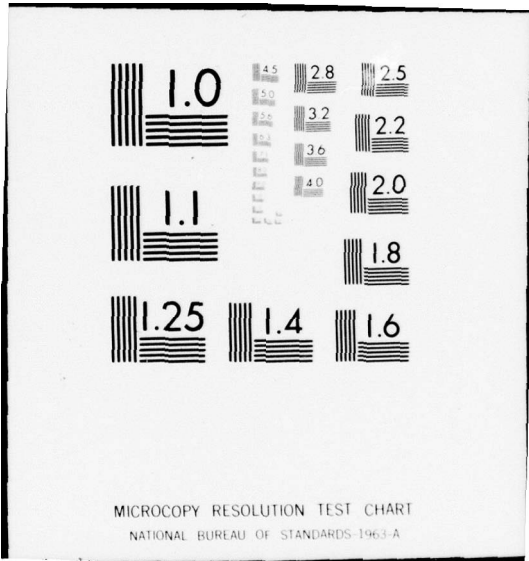
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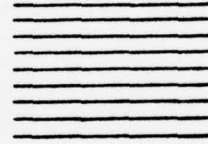


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**US ARMY INSTITUTE FOR ADVANCED RUSSIAN
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STUDENT RESEARCH REPORT

Mr. William S. Olmsted
CURRENT ASPECTS OF THE COMBAT
TRAINING OF SOVIET NATIONAL AIR
DEFENSE TROOPS

GARMISCH, GERMANY

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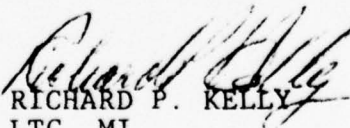
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F O R E W O R D

This research project represents fulfillment of a student requirement for successful completion of the overseas phase of training of the Department of the Army's Foreign Area Officer Program (Russian).

Only unclassified sources are used in producing the research paper. The opinions, value judgments and conclusions expressed are those of the author and in no way reflect official policy of the United States Government; Department of Defense; Department of the Army; Department of the Army, Office of the Assistant Chief of Staff of Intelligence; or the United States Army Institute for Advanced Russian and East European Studies.

Interested readers are invited to send their comments to the Commander of the Institute.


RICHARD P. KELLY
LTC, MI
Commander

SUMMARY

→ This study examines some current aspects of Soviet National Air Defense (Protivovozdushnoi Oborony Strany) combat training. Emphasis ^{was} ~~has been~~ given in this presentation to those combat training practices which ~~have~~ received considerable attention in the source material, as judged by the number of articles on a given topic or by the amount of detail used by an author in describing a certain characteristic of combat training. → Some special attention ^{was} ~~has~~ also ~~been~~ given to those articles written by general officers who presumably hold responsible positions in National Air Defense organizations. On the basis of the analyzed material, the author concludes that there are some apparent differences between Soviet combat training practices and those of the United States. Furthermore, despite some open criticism of particular situations and combat training practices, Soviet commentators on air defense combat training appear to be convinced that Soviet air defense specialists are prepared to fight effectively under the complex conditions of modern warfare. ↗

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INTRODUCTION

Soviet National Air Defense troops (Voiska Protivovozdushnoi Oborony Strany), under the command of Marshal of the Soviet Union P. F. Batitskii, now number about 500,000 men.¹ This force may be divided into four major components: (1) interceptor aviation (istrebitel'naia aviatsiia protivovozdushnoi oborony), holding some 1,800 interceptors; (2) surface-to-air missile troops (zenitno-raketnye voiska), with about 12,000 surface-to-air missile (SAM) launchers at some 1,650 sites; (3) radio-technical troops (radio-tekhicheskie voiska), operating about 5,000 surveillance radars; and (4) communications troops (voiska sviazi).

In contrast to the United States with its declining support being given to the North American Air Defense Command, the Soviet Union has emphasized and continues to emphasize air defense. One may consider the success of Soviet-produced air defense weapon systems in the October, 1973 war in the Middle East a direct result of this emphasis. An example of the importance of air defense is shown by the fact that in 1975, by decree of the Presidium of the Supreme Soviet of the USSR, a holiday for Soviet National Air Defense troops was established. This national holiday is to be celebrated annually on the second Sunday in April.²

A large part of the importance placed on national

air defense by Soviet military leaders may be attributed to the fact that many Soviet cities are within the range of even the tactical aircraft of North Atlantic Treaty Organization (NATO) nations. Furthermore, United States and British bombers are capable of striking any city in the Soviet Union.

China must also be considered another factor in the continuing emphasis being placed on air defense. One United States analyst has offered the opinion that "Even should agreements be reached with the 'capitalistic powers' on numbers of bomber aircraft, the Soviet Union still would require a sizable defense against manned aircraft along her eastern and southern borders."³

Considering these factors and others, such as the proposed development of the B-1 bomber by the United States Air Force, it seems highly likely that the Soviet Union will continue to stress national air defense in the foreseeable future. Since the Soviets stress air defense, the purpose of this paper, therefore, is to provide information on one of the important phases of air defense: combat training of Soviet National Air Defense troops, a topic which receives a considerable amount of attention by Soviet military writers.

The primary source used for this study is Vestnik Protivovozdushnoi Oborony (Air Defense Herald). This source was selected because Vestnik Protivovozdushnoi

Oborony is a monthly publication designed for National Air Defense troops and publishes articles on a regular basis within a section specifically labeled "combat training" (boevaia podgotovka).

It was decided to concentrate on the most recent twelve issues (January-December 1975) of Air Defense Herald in order to examine current aspects of combat training and, at the same time, limit the scope of the study in order that a presentation of combat training by a more or less official air defense organ could be accomplished.

"Combat training", as perceived by the author and used within the paper, describes combat training in the way Soviet writers understand this term. To the Soviets, "combat training" encompasses far more than the performance of training exercises associated with combat tasks. A Soviet military dictionary simply defines combat training as "training of individual categories of military servicemen, sub-units (podrazdeleniia), units (chasti), large formations (soedineniia), (and) staffs for the conduct of combat operations....".⁴ However, as shown by the analyzed material, Soviet combat training includes formal study in military schools, classroom study in a military unit, on-the-job training, and self-study programs.

For purposes of clarity, some general characteristics of combat training are presented first. Following this,

combat training of the four components of national air defense are discussed separately. However, it must be kept in mind that the Soviets view air defense as a system involving all personnel, a concept which is stressed in a large portion of the study material.

Within each section of the study, an attempt has also been made to summarize the shortcomings of combat training as seen by the Soviet authors.

GENERAL CHARACTERISTICS

One of the most common characteristics in a discussion of combat training is the reminder that under modern conditions of combat, there exists a highly complex, mobile, swiftly changing air environment. It is frequently repeated that since the enemy possesses highly maneuverable, high-speed aircraft capable of flying at any altitude, the time available to detect, track, and destroy these targets is extremely limited. This means that air defense crews must be highly trained and must be able to stay calm under all types of emergency situations.

With this in mind and in an attempt to make training exercises appear more realistic, a favorite method used in training is the introduction of a "hypothetical situation" (vvodnaia). In general, this means that the people responsible for training exercises work out certain types of emergency situations which could conceivably

occur during a given operation. As a training session is in progress, a controller might suddenly announce that a given piece of equipment is out of order. The trainees are then called upon to quickly come to a decision on how to overcome the difficulty and put this decision into practice.

In a further attempt to make training more realistic, the Soviets use a wide assortment of audio-visual training aids, simulators of various equipment, mock-ups, manned aircraft and radio-controlled drones. Competition is held at all levels in an effort to achieve higher results in training activities.

Another element common to the combat training of all components of air defense is the emphasis placed on the importance of knowing the potential enemy, his order-of-battle, and his air attack weapons. One of the ways in which information about possible enemies is disseminated is by the publication of articles on western (primarily United States) equipment in Air Defense Herald. These articles, appearing in a section of the journal labelled "V Inostrannykh Armiiakh" (In Foreign Armies), often concern aircraft, tend to be quite technical, and are supplemented by drawings, charts, and diagrams.⁵

The critique (razbor) is considered to be one of the most important parts of any training exercise. Here the personnel responsible for training analyze the entire

exercise, point out weaknesses, and explain how to correct them. A large role in the critique is played by a complex of recording and monitoring devices which includes cameras and recording equipment. Using the information generated by this equipment is said to lessen the degree of subjectivity in evaluating the final results.

All of the combat training is based upon sound methodology which has been gained through years of experience. One of the principles in this is the practice of proceeding from simple tasks to those more complex. Much attention is given to individualizing instruction on the basis of the level of skill of the trainee.

In the area of criticism, one of the most common is that young officers fail to show enough initiative in the decision making process. This is attributed primarily to the commanders of the young officers who have not properly trained them on how and when to make a decision.

Another area subject to frequent comment is the discrepancy between the level of theoretical knowledge and practical skills. In the area of officer training at least, this appears to be an indirect criticism of the schools of National Air Defense, who prepare air defense officer-specialists.

SURFACE-TO-AIR MISSILE (SAM) TROOPS

As might be expected, the training of missile firing crews receives a great amount of attention. One of the

peculiarities associated with the crews themselves is the fact that the potential members of a crew arrive at a unit trained only in the basics of a particular job. The preliminary training of the officers, apparently theoretical in the most part, is presumably carried out at the six officer schools for SAM troops within the system of National Air Defense Schools.⁶

The selection of candidates for a firing crew, which is comprised of a firer, a control officer, and an unspecified number of radar operators, sometimes takes place at the battalion level. This selection process is considered just as important as the formal preliminary training. A group of highly trained technical specialists observes the proceedings as the young soldiers and officers undergo hearing and sight tests and are administered psychophysiological and psychological tests. A similar process is used for the selection of operators of search and target acquisition complexes and for other specialists.⁷

Although this type of selection process appears to be in wide use, the level at which the selection takes place varies, perhaps due to the characteristics of the missile deployed in a given regiment. In some cases at the regimental level, a centralized check is made on the psychophysiological qualities, health status, and vision of those people who are to become firers.⁸

As in other areas of air defense, training of firing

crews emphasizes practical exercises which are performed with the use of simulators or on the actual equipment itself. The basis of any exercise is the training plan. Included in the plan are the theme, date and time of execution, training goals, problems to be solved, personnel rosters and lists of equipment to be used, and test questions for evaluation of preliminary training. In checking the preliminary training, the crews are first asked some basic questions and are checked on operational rules of their equipment. An actual training session starts with an alert signal.

During a typical training session, "targets", either simulated or actual aircraft, operate over a wide range of altitudes and flight speeds and employ various maneuvers and jamming tactics. In order not to be caught by surprise, the crews, beforehand, study basic flight parameters, including expected detection ranges and flight altitude characteristics. Thus, for example, if an "enemy" attempts to make a surprise attack by approaching the missile complex at low altitude following local terrain features, the crew is able to react faster, since much preliminary launch information is already available.

The personnel involved in the training session are evaluated by a group of officers who check on the execution of orders, timeliness and manner of reacting to situations, clearness and operational validity of issued orders as specified by manuals and documentation procedures.⁹

One of the primary goals in the training of firing crews is to teach them how to quickly evaluate a rapidly changing, complex air situation. Much attention is given to developing cooperation among crew members and to teaching the use of automatic control systems. The firing crews are to know the potential enemy by studying his air attack weapons, his deployment, and tactics. In addition, the crew must know the capabilities of his own missile system and have a thorough understanding of efficiency of fire control.

The introduction of hypothetical situations into a training session is considered to be one of the best means of teaching the crew to react quickly. For example, as the crew trains for the destruction of a high-flying target, a training controller simulates the appearance of a low-flying aircraft. A discussion of the overall session and its peculiarities is conducted in the critique session which follows all exercises.¹⁰

Exercises on the destruction of targets at maximum range receives considerable attention. Here again, it is stressed that the firing crew must quickly evaluate a complex air situation. It is felt that the peculiarities of operating against targets at long ranges calls for the skillful use of special charts, calculation tables, and other aids. The necessity of obtaining highly reliable tracking data at maximum ranges sometimes forces the

crew to operate in a manual tracking mode.¹¹

Some of the practical aspects of training missile firing crews are centered on the operation of the remote plan-position indicator (PPI). It is demonstrated that the tuning of the PPI determines to a considerable degree the ability to analyze an air situation. The missile firing crew is taught to optimize the degree of brightness of the scope and the radar blips, to regulate the parameters of the signal and antenna rotation, to insure the availability of material for taking notes, and glass marking pencils for plotting targets. The condition of the protective glass of the PPI and the orientation marks on the glass are also considered important.¹²

In case of war, it is felt that missile launch complexes can expect enemy missile and bomb attacks. For this reason, emphasis is given to psychological training of missile firing crews. Special training in this area includes the interjection of sudden noises, explosions, and other sounds of battle into training sessions. For example, the sound track of a war film may be played over loud speakers during a practice firing session.

General Lieutenant of Artillery S. F. Vikhor', Deputy Commander of SAM Troops of National Air Defense, maintains that the best way to perfect the training of SAM units is a tactical exercise with live firing.¹⁴ General Vikhor' also states that a specific feature of

this type of training consists in the fact that the exercise begins and ends at the unit's permanent location, while its fundamental stage is performed at a firing range.¹⁵ The range training is "crowned" by the live fire exercises.¹⁶

Tactical exercises with live fire practice takes place in several stages. The first stage involves checking the readiness of personnel and equipment for the execution of combat tasks, especially under conditions of a surprise attack.¹⁷ One of the methods used to evaluate this preliminary training is to introduce hypothetical situations as the unit performs the second stage, a march to the range. These hypothetical situations might include the simulated use of contaminants by the "enemy" and sudden air and ground attacks.¹⁸ After performing the march to the range, the next stage of the tactical exercise is the performance of the practice live fire missions. During this, great effort is made to project a maximum degree of reality into the training in relation to the conditions which exist in the area of the unit's permanent location.¹⁹

Plans for the exercise and the live firing are drawn up by staff officers and emphasize a rapidly changing air environment, use of jamming by the "enemy", decoy and deception maneuvers, and flights at various altitudes. All of these features are designed to teach the missile crews

to quickly orient themselves in a complex situation, to make well-founded decisions, and to make maximum use of equipment and weapons.²⁰

Operations against high-speed, high-altitude targets are said to have special characteristics, and the missile crews are cautioned not to rely on old, standard knowledge and habits when encountering them. Despite the fact that firing against such targets has been studied and practiced for a long time, it is emphasized that the term itself has taken on a new meaning due to the advances of science and technology. For example, as speed and altitude have increased, the reflecting surface of targets has decreased. The ability to cope with such changes in weapons is said to be gained primarily through training under actual conditions.²³

It is precisely in the area of making training more realistic that a number of deficiencies have been noted. Furthermore, the deficiencies have been specifically associated with activities at the firing range.

One of the criticisms is that the training at the ranges sometimes becomes too simplified. For example, there is a failure on the part of the staff officers responsible for training to simulate the sounds of combat. The missile crews are not made to wear items of personal protection for chemical and radio-active contamination.²⁴

Another area of criticism concerns the scope of

training sessions. Apparently there is some tendency to make the training very narrow. For example, practice might involve only the search for low-altitude targets or those flying in an electronic countermeasure (ECM) environment, and at the same time, no concern is given to high-altitude, high-speed targets.²⁵

Despite the claims that simulators and trainers must be used widely in the training program, there are times when they are not used, since those responsible for training do not know the capabilities of the simulators and do not know how to tune the equipment and set it up for operation.²⁶

An additional criticism of firing practice at a range is the failure to consider the particularities of the area of permanent location of the units participating in the exercise.²⁷

A claim is also made that some commanders use the time just prior to moving to the range to coach the crews so that they will receive high marks at the range.²⁸

There are some other areas in which general criticisms of SAM crews are made. In one situation, the "enemy" was making an attack using a number of aircraft. Instead of evaluating the overall situation, and determining the order of operating against the enemy aircraft, the missile firer decided to shoot down the first aircraft to come within effective range. This over-caution

and desire to guard against any type of chance happening leads to confusion and loss of time.²⁹

At times, individual missile firers don't exhibit sufficient initiative and decisiveness and merely carry out the commands coming from higher authorities. This is said to be caused by the poor preparation of the missile firers themselves and the failure of their immediate supervisors to develop initiative of subordinates.³⁰

Of some concern is the lack of experience on the part of young officers who are responsible for training. Particularly mentioned in this aspect were missile firers and control officers. This leads to formalism and the absence of real conditions in training situations. As a result, the training of crews is slowed and the crew members, in short, fail to master the skills needed in their specialties.³¹

AVIATION

Practically none of the articles concerning training of air defense interceptor pilots and ground control personnel contained references to specific situations expected to be encountered. However, many of the articles mentioned the dynamism, maneuverability, extensive operational area, and rapid changes which generally characterize modern air combat.

A great deal of material was devoted to discussions on the training of young pilots, those who had presumably

just arrived from the fighter aviation schools of National Air Defense. Only one article contained a reference to a specific school, that being the Stavropol Higher Military Aviation School for Air Defense Pilots and Navigators.³²

Soviet writers are somewhat concerned with the difference between the theoretical knowledge gained in flight school and the skills demanded by the complexity of modern supersonic interceptor aircraft and related equipment. For example, navigational training is considered to be a basic element in the combat training of interceptor pilots. This training is carried out according to a well-planned and tightly controlled schedule of activities and training sessions. Navigational flight training is an integral part of overall combat training and includes specific flying missions. Emphasis is given to the well-coordinated organizational work of training controllers.

In all aspects of navigational training, the level of knowledge of each individual is considered. The regimental navigator and flight and squadron commanders are especially cautioned to evaluate the abilities of young pilots out of flight school. It is maintained that at times, these young pilots have not performed flights in the type of combat aircraft which is held by the unit. Furthermore, these aircraft have complex navigational

equipment which the young pilot knows only in theory³³, a situation which seems to attest to the inappropriateness of initial training institutions.

To compensate for this difference between theoretical knowledge and practical skills, aviation specialists conduct practical training exercises. These practical activities are considered to be instrumental in the maturation process of a young pilot and serve to increase his understanding of the organization of air combat. For example, young pilots are taken to an operational command post where they are shown the operations of a typical radar station and aircraft control equipment. The pilots observe the actions of aircraft controllers during actual intercepts, and the entire decision-making process at the command post is explained to them.³⁴

Becoming a well-qualified combat pilot is recognized as being a long and difficult process. A student completes aviation school and receives the title, "pilot-engineer". He arrives at a regiment theoretically well-prepared, energetic, and goal-oriented. Often, however, he doesn't realize how much more hard work it takes to become a good pilot, and that the making of a good airman is not always smooth. He received an "A" at flight school in "Techniques of Flying", but his commander finds a great number of mistakes.

In establishing a training program for young pilots, many factors are considered. These include his level of

professional training, psychiatric traits, and personal characteristics such as determination and tenacity. The ability of the commander to develop these characteristics is regarded as a key issue.

The basic goal of flight training is seen as perfecting the technique of flying. In evaluating the individual pilot's status in the training program, the commander considers the number of intercepts performed, the number of flights performed (especially under adverse weather conditions), and the actions of a pilot in unusual situations. The emphasis is particularly on flying, since flying strengthens the will of the pilot, develops courage and increases his faith in the aircraft, and perfects his ability to orient himself in complicated air situations.³⁵

When a young pilot arrives at a combat unit, the first order of business is to conduct preliminary ground training. In this, the new pilot is tested on the knowledge of his job assignment, on general safety measures, and on various flight operations. A training session might be held during which the pilot is checked on his knowledge of procedures for an in-flight engine re-start.

Introductory flights are then set up for the young pilot during which a qualified instructor is in the trainer aircraft. The aim of these flights is to establish good techniques in the piloting of supersonic interceptor aircraft. These flights include the execution of various

flight figures, turns with maximum banking, dives, and high-speed zoom-climbs.

The young pilot is encouraged to be independent and to take the initiative during the introductory flights. Prompting on the part of the instructor is kept to a minimum and is resorted to only in extreme circumstances.

At times, the instructor will switch off one or another flight instrument and watch for the reaction of the trainee. For example, as the young pilot makes a landing approach, the instructor will turn off the radio compass. If the trainee experiences trouble, the instructor takes control until the trainee becomes oriented. Control of the aircraft is then returned to the student, who lands the aircraft.

At the completion of each introductory flight, a detailed critique is held on the ground. The instructor points out areas in which the trainee had difficulty, explains why the difficulties arose, and explains how to correct them. The work of the instructors, especially the instruction done when the flight (zveno) commander sits in the instructor's seat of a trainer, is considered to be the very foundation of pilot training.³⁶

It is not only the young pilots who need more than theory to effectively function in contemporary aviation units. All pilots must know basic aviation equipment, its operating principles, and particularities of its use.

Despite the fact that the majority of pilots now possess an engineering degree and have a vast amount of knowledge on the strength of materials, higher math, chemistry and physics, they continue to study. Combat pilots continue to train and study because aviation equipment continually changes, without practical usage, theory becomes dead stock, and it is simply impossible to learn immediately everything about a complex subject.³⁷

One of the prime goals in the methodology of flight training is to individualize the program to fit the needs of a given pilot. When the needs of individuals are not considered, the formalized flight program either becomes too easy or too difficult.

Great effort is made to exclude this formalism. A large role in this is played by the wide use of monitoring and recording equipment, which insures the objectivity of training tests and excludes the subjectivity of a training controller.³⁸

Particular attention is given to developing the initiative and active participation of combat pilots, especially in complex situations. At the same time, it is recognized that responsibility and control over a flight on the part of the aircraft controller at the command post should never be diminished.

Soviet writers claim that pilots at times seem to depend too much on the aircraft controllers. They consider that they must merely execute the commands of the controller,

and it is he who bears full responsibility for control of the flight. In one situation, due to a mix-up in the call signs of two aircraft on the part of a controller, a pilot was given the command to descend for a landing while still at a great distance from the airfield. When the mistake was finally noticed, it was considered very fortunate that the fuel reserves permitted another landing approach. On the ground, it was demonstrated that there was reason for the pilot to have noticed the mistake and to have clarified the situation with the controller. It was emphasized that, ultimately, responsibility for a successful flight is equally placed on the pilot and on the crew at the command post. The pilot should check (not doubt) the preciseness of commands from the ground, and make every effort to make the flight a success.³⁹

Initiative and independence are also emphasized in other particularly "combat" situations. It is stressed that a pilot cannot always depend on help but sometimes has to act on his own.

In one typical situation, a flight of two aircraft were performing a practice intercept mission against one of the best pilots in the unit. Just before the "enemy" was engaged, the flight leader's radio began to malfunction. It was then up to the young wingman to carry out the mission, which he eventually did after experiencing some difficulties.

Back on the ground, the wingman learned that his

flight leader did not, in fact, have a malfunctioning radio. He introduced this hypothetical situation into the training session for the precise reason of developing initiative and independence of decision-making in his wingman.⁴⁰

In the training of pilots and aviation specialists, much attention is given to preparing airmen who are able to perform tasks in more than one area. It is emphasized, for example, that every pilot should be able to check out his aircraft much as a ground technician would do. This includes a visual check of the aircraft, checking the engines (presumably with instruments), and on-board systems, preparing armaments and, in general, setting up the aircraft with everything necessary to perform an assigned combat task. This training is not all theoretical, but is carried out by means of training aids and practical exercises.⁴¹

Judging on the basis of one unnamed squadron, the level of this mixed specialization is quite high. In the squadron, sixty percent of the aviation specialists possess two or more specialties. Ninety percent of the personnel in the squadron have been trained to install armaments. The possession of mixed specialties has reportedly permitted a decrease in the time needed to prepare equipment for full combat readiness. The preparation of such specialists - "pilot-technician-mechanic" - as shown by World War II experience, can have great war-time

significance.⁴²

RADIO-TECHNICAL TROOPS

Radio-technical troops, not exclusive to National Air Defense, are defined as "special troops designed to perform radio-technical reconnaissance of an air, ground, and naval enemy, to produce interference with its radio-technical equipment, and to provide for the radio-control of weapons and aircraft..."⁴³ Radio-technical troops, who operate the radar sets and related equipment, are referred to as the "eyes and ears" of air defense.⁴⁴ Their specific task is to search, detect, track, and plot enemy targets and to provide information resulting from these tasks to higher commands and to air defense aviation and SAM units.⁴⁵

In general, the training of radio-technical troops is based on the presumption of a highly complex, changing air situation, conditions inherent in all training of air defense personnel. The radar station and other operators are frequently called upon to operate at a disadvantage as training controllers introduce hypothetical situations. At times, radar sets go "out of order", and communications lines are "damaged".⁴⁶ Due to a limited number of live targets to be tracked (at least in some areas of the Soviet Union), the training of operators is performed with the extensive use of simulators, trainers, and technical aids.⁴⁷

Radar operators apparently arrive at units immediately

after basic training. From the start of the unit training program, they study both general and technical subjects. At the end of the initial training of unspecified duration, the unit commander selects the best students for training as radar operators. The selectees are grouped according to the type of radar station at which they will eventually be working.⁴⁸

Officers undergo unspecified tactical, special and technical training using diagrams, mock-ups, and basic radar sets. Emphasis is placed on working out practical problems.⁴⁹

Special attention is given to training for operations under conditions of jamming and interference.⁵⁰ This training starts with the theory and classification of radio interference, the study of representative samples of interference as seen on a radar scope, and the study of the capabilities of a given radar set to counteract interference. The trainees receive special attention in methods of recognizing active and passive jamming, and study the means used by the enemy in producing jamming. They also learn how the jamming affects the receiving equipment of a radar station.⁵¹

Practical training begins with the study of photographs of interference as reflected on a radar scope. The photographs show interference caused by ground clutter, weather, and passive and active jamming of varying intensification and modulation.⁵²

The next stage takes place in special classrooms where interference, either real or simulated, is displayed on scopes. The trainees are taught how to identify various types of interference and to look for certain characteristics which distinguish chance interference from actual jamming. The intensity of training is increased until the operator can determine the type of interference (natural or man-made), in the course of three to five seconds.

The trainee is next shown how to counteract the interference, either using the capabilities of the radar set or with the introduction of electronic counter countermeasure equipment. This is followed by extensive practice in the detection and tracking of simulated targets under conditions of interference and jamming.⁵³

As in other areas of air defense training, that training done by radio-technical troops has been subjected to some criticism. Of some concern is that fact that at times too much attention is given to theoretical training at the expense of practical exercises. It is claimed that only constant practice can help the officers and crews learn how to foresee the actions of the enemy, to be flexible, and to seize the initiative.⁵⁴

Failure to exhibit this initiative is often associated with young officers. Young commanders of radio-technical units, it is claimed, rely too much on higher headquarters for orders and guidance. In one situation, a practice

alert was called, and a young captain simply posted his men at their assigned stations and waited. The men sat idle for an hour while the captain awaited orders from a higher command post.⁵⁵ Nonetheless, it is claimed that procrastination in modern warfare is tantamount to defeat.⁵⁶

There are also claims that some radio-technical commanders have a tendency to make training sessions too stereotyped, at times to turn the control of training exercises over to secondary figures, and do not always insure the participation of all officers in the training.⁵⁷

COMMUNICATIONS TROOPS

Equipped with radio, radio-relay, and tropospheric scatter stations, facsimile systems, and other modern equipment, Communications Troops of National Air Defense are assigned the task of establishing and maintaining communications for controlling the combat activities of air defense units.⁵⁸

With few exceptions, articles concerning the combat training of communications personnel contain few references to specific training situations and training goals. References are generally made only to training requiring the comprehensive application of communications systems, emphasizing practical solutions to hypothetical situations, and demanding great special and technical knowledge.⁵⁹

In spite of claims that communications troops possess "modern equipment", training of radio-telegraph operators

receives considerable attention in which details about specific procedures are discussed, leading one to believe that this method of communicating is still in wide use.

It is somewhat surprising to learn that radio-telegraph operators arrive at a unit, without comprehensive prior training. Therefore, one of the most important and most difficult elements of training is considered to be teaching the young soldiers telegraph code. This training, carried out at the platoon level, is said to have a systematic approach which emphasizes demonstration exercises, frequent tests, study of methodology, and discussions of experience gained in other units.⁶⁰

One of the methods used by a leading specialist is to teach the students to perceive a telegraph character by its specific melody, not by counting the number of dots and dashes. Furthermore, the first letter of the melody is that telegraph character which the student has to learn. For example, the character "iu" has a specific melody which sounds like "iulianna". (..--)

Another feature of training is that the students are simultaneously taught to transmit and to receive, which reportedly leads to a faster mastery of Morse Code. At the same time, interference is introduced and gradually increased, and the students study basic operating rules and regulations.

Once the students have mastered the telegraph code, which is expected to take approximately one month, for

the next month, training of radio operators occupies about three hours of the overall training day which also includes other combat and political training. In the second month, trainees practice to increase their speed and learn special methods of transmitting.

Equipment used in teaching telegraph characters includes electronic senders, undulators, transmitters, and simulators for radio interference. A control panel is so equipped that an instructor can simultaneously train five groups of operators using five separate programs.⁶¹

It is emphasized that responsibility for the training of radio-telegraph operators lies basically on the platoon commander, while the battalion commander is concerned with increasing the teaching skills of communications officers.⁶²

When discussing the training of officers working in the field of communications, emphasis is placed on the individualized aspect of training which depends upon the officer's level of training, his desires, and specific job duties.⁶³

Some of this training takes place within special communications exercises. In these, the officers are responsible for working out practical tasks such as establishing telegraph communications on a radio-relay line, coupling various communications channels, and transferring control of communication from one point to another.⁶⁴

Attempts are made to make the training as realistic as possible. This is accomplished by introducing various hypothetical situations into the training sessions. For example, in the training of communications repair specialists, a training controller might simulate a malfunction in a transmitter or report damage to a communications line. The specialists are then called upon to recouple communications line and to repair damaged lines, at times wearing anti-radiation gear. The repair work is done on real communications equipment and on mock-ups.⁶⁵

Considerable attention is given to stressing the need for communications security. Training in this area includes the careful study of various documents which regulate radio procedures and operations. Lectures and discussions are held which provide information on communications intelligence activities of potential enemies.

Radio-telegraph operators are urged not to acquire certain habits which might give them a certain "signature" such as always transmitting an elongated dash. It is claimed that enemy communications intelligence units might then be able to determine if and when a unit has changed locations.

All personnel are cautioned not to talk excessively on radio-telephones and not to discuss information of a business nature. This is also true of radio-relay and tropospheric scatter systems.⁶⁶

Deficiencies noted in the training of communications

troops primarily concern the training of radio-telegraph operators. Sometimes, it is claimed, when the training situation becomes complicated, the relatively inexperienced men are replaced with men in their second year of service,⁶⁷ probably so that high marks can be obtained.

A claim is also made that at times the men are pushed too hard, as in trying to increase their transmission speed and in working under conditions of severe interference.⁶⁸

CONCLUSIONS

It may be concluded that Soviet military leaders today accurately foresee and comprehensively plan for virtually all aspects of engaging a highly sophisticated enemy under modern conditions of air combat. Air defense training plays an important role in the preparation of Soviet Air Defense personnel for future combat. Additionally, these comments are based to a large degree on material published in Soviet documents and are directed toward Soviet military readers. Of course it is unrealistic to assume that a complete evaluation of the status of Soviet Air Defense training may be made solely on the basis of a review of the large number of Soviet articles pertaining to this subject. However, such a review can obviously play a significant supplemental role in providing all-source information from which a more accurate judgment can be made. The employment of such a review provided valuable information on which basic evaluations

can be made. Therefore, a constant examination of Soviet military publications is definitely appropriate, particularly in view of the fact that Soviet writers have not been hesitant to discuss combat training practices and problems and perhaps more importantly, these same writers are thereby inclined to reveal specific weaknesses or deficiencies. By utilizing such a constant examination, western analysts will be in a better position to evaluate Soviet Air Defense and subsequently to be aware of particular weaknesses of the Soviet system. To illustrate this point, the author discovered that a sharp disparity exists between theoretical and practical training of new Soviet pilots, some of whom have arrived at their first unit of assignment with no practical experience in aircraft assigned to that unit. This type of information is readily accessible in the Soviet press, and it can be exploited.

According to a former Air Attache in Moscow, articles proclaiming the capabilities of the Soviet Union are not merely for external propaganda. This experienced officer maintains that a "close study of these writings....indicates that they are for internal consumption, to help prepare the nation for the possibility of a nuclear-rocket war."⁶⁹

The successful exploitation of the material discovered by means of this type of study represents a potentially vital element in assessing the capabilities of the Soviet military.

The unexpected success of Soviet air defense weapons systems in the 1973 war in the Middle East revealed a failure on the part of Western and United States analysts to adequately evaluate Soviet Air Defense achievements. If continuing de-emphasis of air defense on the part of the United States, as evidenced in the major reduction of air defense missiles and aircraft⁷⁰ is an indication of US intent to continue underestimating Soviet Air Defense capabilities, the consequences could be extremely serious in the case of a future war involving the Soviet Union. This becomes of tantamount importance as the US is considering spending \$21.4 billion in building 244 B-1 bombers whose primary mission is to penetrate the increasingly sophisticated Soviet air defense system.⁷¹

FOOTNOTES

1. This figure and those following which pertain to the various components of National Air Defense are taken from "The Military Balance, 1975-76", Air Force Magazine, Vol. LVIII, No. 12 (December, 1975), pp. 49-50.
2. "Prazdnik Voinov PVO", Vestnik Protivovozdushnoi Oborony (hereafter Vestnik PVO), No. 3 (March, 1975), p. 1.
3. William F. Scott, "Soviet Aerospace Forces and Doctrine", Air Force Magazine, Vol. LVIII, No. 3 (March, 1975), p. 39.
4. B. N. Morozov, ed., Slovar' Osnovnykh Voennykh Terminov (Moskva: Voenizdat, 1965), p. 27.
5. For example, see V. Nevedomskii, "Sistema Upravleniia Ouzhiem Samoleta F-14", Vestnik PVO, No. 6 (June, 1975), pp. 83-87.
6. Harriet Fast Scott, "Educating the Soviet Officer Corps", Air Force Magazine, Volume LVIII, No. 3 (March, 1975), p. 59.
7. A. Vatsenko, "Slazhennost' Streliaiushchego Zvena", Vestnik PVO, No. 9, (September, 1975), p. 32.
8. V. Zhurkin, "Streliaiushchim - Vysokuiu Podgotovku", Vestnik PVO, No. 2 (February, 1975), p. 45.
9. V. Konopel'kin, "O Putiakh Intensifikatsii Raketno-Strelkovoii Podgotovki", Vestnik PVO, No. 3 (March, 1975), p. 57.
10. Zhurkin, pp. 46-47.
11. A. Poliakov, "Na Predel'noi Dal'nosti", Vestnik PVO, No. 6 (June, 1975), pp. 46-49.
12. N. Pen'kov, "Osobennosti Otsenki Vozdushnoi Obstanovki Streliaiushchim Po VIKO", Vestnik PVO, No. 4 (April, 1975), p. 58.
13. Vatsenko, p. 33.
14. S. Vikhor', "Povyshat' Effektivnost' Takticheskikh Uchenii S Boevoi Strel'boi Na Poligone", Vestnik PVO, No. 7 (July, 1975), p. 39.
15. Ibid.

16. A. Zakharchenko, "Po Vysotnoi Skorostnoi", Vestnik PVO, No. 3 (March, 1975), p. 51.
17. Vikhor', p. 39.
18. E. Griaznov, "Poligon-Shkola Raketnogo Boia", Vestnik PVO, No. 7 (July, 1975), p. 44.
19. Vikhor', p. 39.
20. N. Vinogradov, "O Povyshenii Deistvennosti Trenirovok", Vestnik PVO, No. 1 (January, 1975), pp. 41-42.
21. V. Sukhodol'skii, "Ekzameniuet Poligon", Vestnik PVO, No. 10 (October, 1975), p. 44.
22. Zakharchenko, p. 54.
23. Ibid., pp. 52-53.
24. Vinogradov, p. 44.
25. Zakharchenko, p. 51.
26. Vinogradov, p. 43.
27. Ibid.
28. Vikhor', p. 40.
29. Poliakov, p. 46.
30. Pen'kov, p. 59.
31. Konopel'kin, p. 56.
32. A. Puzanov, "Iz Instruktorskoi Kabiny", Vestnik PVO, No. 1 (January, 1975), p. 49.
33. V. Kadyshchev, "Shturmanskaia Podgotovka Letchikov-Perekhavatchikov", Vestnik PVO, No. 4 (April, 1975), p. 63.
34. A. Ushakov, "Shturman Navedeniia i Molodoi Letchik", Vestnik PVO, No. 7 (July, 1975), pp. 51-53.
35. O. Orlov, "Stanovlenie Molodykh Letchikov", Vestnik PVO, No. 2 (February, 1975), pp. 49-53.
36. Puzanov, pp. 49-53.
37. V. Fedorov, "I Glubokoe Znanie Tekhniki", Vestnik PVO, No. 8 (August 1975), pp. 53-54.

38. V. Olin, "Metodicheskaia Posledovatel'nost' Obucheniia", Vestnik PVO, No. 4 (April, 1975), pp. 65-68.
39. A. Ushakov, "KP i Samostoiatel'nost' Letchika", Vestnik PVO, No. 3 (March, 1975), pp. 60-62.
40. V. Beliaev, "Poletami Zhivet Aerodrom", Vestnik PVO, No. 8 (August, 1975), pp. 39-43.
41. Fedorov, p. 54.
42. M. Vaniushkin, "Talalikhintsy", Vestnik PVO, No. 8 (August, 1975), p. 45.
43. Morozov, (ed.), p. 192.
44. "Ravnenie-Na Znamia Pobedy", Vestnik PVO, No. 5 (May, 1975), p. 40.
45. G. Suleimanian, "Kogda Situatsiia Konfliktnaia", Vestnik PVO, No. 6 (June, 1975), pp. 63-64.
46. Ibid., p. 64.
47. V. Komissarov, "Podgotovka Operatorov", Vestnik PVO, No. 12 (December, 1975), p. 47.
48. A. Kholod, "Esli Tsel' V Pomekhakh", Vestnik PVO, No. 2 (February, 1975), p. 58.
49. V. Fedoseev, "Initsiativa Komandira Radio-Lokatorschika", Vestnik PVO, No. 1 (January, 1975), pp. 54-55.
50. The Soviets translate the Russian word pomekhi as "interference". Organized interference is translated "jamming". See A. E. Chernukhin, (ed.) Russko-Angliiskii Tekhnicheskii Slovar', (Moskva: Voenizdat, 1971), p. 568. Thus, when encountering the word pomekhi in the Soviet sources, the author has translated this as "jamming" when the direct or implied meaning has been interference organized by an enemy.
51. Kholod, p. 58.
52. Ibid., p. 59.
53. Ibid.
54. V. Kul'pinski, "Predvidenie v Deistviiakh Ofitsera-Lokatorshchika", Vestnik PVO, No. 3 (March, 1975), p. 67.
55. Fedoseev, pp. 55-56.

56. Kul'pinskiy, p. 65.
57. Ibid., p. 67.
58. V. Belov, "Distsiplina Sviazi", Vestnik PVO, No. 2 (February, 1975), p. 61.
59. G. Poverennyi, "Stanovlenie Molodykh Ofitserov-Sviazistov", Vestnik PVO, No. 4 (April, 1975), p. 72.
60. A. Bedzhanian, "Rezervy-V Metodike", Vestnik PVO, No. 1 (January, 1975), p. 57.
61. Ibid., pp. 58-59.
62. G. Belostotskii, "Podrazdelenie Sviazistov Vysokoi Klassnosti", Vestnik PVO, No. 10 (October, 1975), p. 53.
63. Poverennyi, p. 72.
64. Ibid., p. 73.
65. V. Ivanov, "O Kompleksnom Podkhode K Obucheniiu Sviazistov", Vestnik PVO, No. 12 (December, 1975), p. 52.
66. Belov, p. 62.
67. Bedzhanian, p. 59.
68. Ibid.
69. Scott, William F., p. 36.
70. "Military Balance 1975/76", p. 47.
71. "B-1 Warning", The Stars and Stripes, February 10, 1976, p. 28.

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