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Herald of Antiaircraft Defense

No 9, September 1963

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Vestnik Protivovozdushnoy Oborony, No 9, September 1963

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In Chasti and Podrazdeleniya of Our Forces

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In Honor of Our Party (page 2)

Abstract:

Describes proceedings of a chast' meeting devoted to accomplishments of the Communist Party. Maj Gen (Res) F. K. BEL'CHENKOV was a speaker at the meeting.

A Day for Outstanding Personnel (Page 2)

Summary:

Komsomol members of a chast' suggested that a day honoring outstanding personnel be held each month to publicize training achievements. The chast' commander and party committee approved the suggestion and aided in the preparations. The day was begun by outstanding personnel addressing members of their podrazdeleniya. They related how they had achieved successes in training and combat operations. A banquet was held in the evening honoring Sr Sgt GOROSHKO, Sgts DARM and KOTOVSKIY, and Pfcs SHERINBEKOV and ZAVGORODNYY who are outstanding personnel.

They Kept Their Word (Page 2)

Summary:

During the summer training period, personnel of a podrazdeleniye pledged to raise their specialty qualifications. These personnel kept their word. Pvts KUZNETSOV, KONDRATOVICH, AKSENOV, and others are now rated specialists; Sgts GISHCHAK, and LELISEYEV, Pfc IVANSKIY, and others are now specialists second class; and Sgt PARKIN, Jr Sgt SEFEROV, and Pfc PETRENKO have earned first class specialist ratings.

Skillful Soldiers (page 2)

Abstract:

Reports achievements in innovation work by personnel of Officer LITVINOV's podrazdeleniye.

(A captioned photograph by F. KONSTANTINOV on page 2 shows Tech-Sr Lt P. KALYUZHNYY, specialist first class, inspecting an aircraft.)

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Against Compromises and Oversimplifications in Combat Training -- by Col Gen Avn A. I. PODOL'SKIY (pp 3-7)

Text:

Commanders, political workers, party and Komsomol organizations, and all personnel of PVO Strany Troops correctly understand their assignments to defend the aerial borders of the motherland from any encroachment by imperialist aggressors and to develop favorable conditions for the peaceful creative labor of our people. They devote all of their strength to maintain constant and high combat readiness, to increase vigilance, and to perfect the training of every soldier, officer, crew, podrazdeleniye, and chast'. Intense, creative labor of military personnel has brought about timely and high-quality solutions for many combat training problems in the first training period and during the ensuing months of the second training period. Much has been accomplished in searching for methods to shorten the time necessary to prepare equipment for combat, for new methods for combat operation of equipment, and for maintaining equipment in readiness for combat use.

Our glorious rocketeers are successfully learning how to use the powerful weapons which are entrusted to them and how to launch them accurately in the most complex conditions. A high level of launch training was achieved by the podrazdeleniye, commanded by Officer KAPLYA. The podrazdeleniye commanded by Officer LIVENKO and many other podrazdeleniya execute training and combat launches excellently.

Personnel of fighter aviation are persistently perfecting their combat mastery. Our pilots are mastering modern interceptor aircraft and are acquiring practical skills in their combat employment in adverse weather conditions during day and night. Examples of this are the podrazdeleniya commanded by Majs VOLCHENKOV, MANZHURA, and SOKOL. Flight training plans are executed excellently in these podrazdeleniya and problems involved in introducing young officers into the ranks are successfully resolved.

Personnel of radiotechnical chasti and podrazdeleniya have achieved notable successes in detecting and tracking large numbers of targets which are simultaneously maneuvering at all altitutdes and speeds of flight and in supporting the combat operations of rocket troops and fighter aviation. The podrazdeleniya commanded by Capts VORONOV and MIKHAYLOV are producing true models of combat operations. They constantly maintain combat equipment in outstanding condition, achieve a high percentage in the training of rated specialists, and successfully solve problems involved in mastering additional specialties. Many communications podrazdeleniya and other special arms are successfully resolving combat training assignments.

The examples indicated here show that combat training among our troops is on the rise. A firm and reliable basis for the subsequent perfection of combat mastery by the personnel of the air-defense troops has been developed in the first training period. Using experience gained in the first

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training period, chasti and podrazdeleniya are carrying out plans for the second training period with better organization and are intensifying the tempo of combat training to fulfill annual plans for combat and political training completely and well.

These achievements have been obtained because of accurate fulfillment of plans and programs, because of resolute battle against compormises and oversimplification, and because of personnel training in conditions which require personnel to learn what is necessary in actual combat.

Questions of further development of cooperation between rocketeers and pilots presently have a significant place in the training of air defense rocket podrazdeleniya and fighter aviation chasti. Senior staffs should be a great help to personnel in this. They should organize combat training in such a way that it is of high quality and fully answers problems of the second training period and of the whole training year. It is also necessary to battle persistently against inertness and conservatism, the negligent regard of certain military personnel toward execution of their military obligations, and the armchair style of leadership.

For the rest of the training year, special attention should be paid to tactical training. Instructive situations are not everywhere developed in tactical training. This retards the growth of the tactical though processes of commanders and does not allow these officers to be prepared to conduct combat independently. Sometimes, questions of an operational scale predominate and questions of combat tactics with a defined aerial "enemy" are lost from view in working out tactical goals. Formalism has entered into studying the "enemy". The technical capabilities and tactical maneuvers of defined types of aircraft or pilotless vehicles and their weak and strong points are still not studied thoroughly enough.

In studying tactical disciplines, especially in conducting training on various tactical levels, it is necessary to more persistently introduce automated systems for vectoring fighter aircraft to targets and for directing podrazdeleniya by instruments. We must henceforth perfect means of early warning using all radiotechnical aids and the whole radar spectrum.

Further improvement of commander training is needed. We still have occasions when plans for independent officer training are based not on the basis of problems and training goals, but upon a principle of only filling up time. In many cases, the achieved knowledge level of officers is not considered and therefore the matter sometimes comes down to working out elementary, well-known problems. Also, little attention is paid at times to the study of theory although it is impossible to learn to use modern combat equipment or to prepare to learn to use prospective equipment without it.

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It is completely intolerable to allow elements of oversimplification when resolving complex assignments of combat training in air defense rocket chasti and podrazdeleniya. Training launches, especially those conducted for record, should be executed only against actual targets at extreme flight speeds and within a large range of variables. It is very strange that some commanders use obsolete types of aircraft for designated targets which produces the simplest conditions for training air defense rocket podrazdeleniya. Elements of oversimplification and overstatements of launch evaluations by podrazdeleniye and chast' commanders have not yet been done away with. For this reason, podrazdeleniya having high launch training evaluations do not maintain them when executing combat launches for record. All of this indicates a low level of exactingness on the part of commanders and staffs towards subordinates and deviations from known documented requirements for training and launch execution. What this can lead to can be shown by the example of the podrazdeleniya in which Officers MOZGOVOY and BAKHTIN serve. A poor launch coordination has been noted in these podrazdeleniya. Launch and radio technical crews are still trained separately in certain rocket podrazdeleniya. The principle of rocketeer coordination is disrupted by this. The capabilities of complexes are not fully utilized and the speed of launch execution is decreased.

Fighter pilots flying modern types of aircraft for the first time should concentrate all of their strength toward working out maneuvers in day or night in minimum weather conditions to intercept high-speed aircraft at any altitude. It is important to make maximum use of favorable climatic conditions in the autumn training months, to fly as often as possible, to studiously plan every flying day, and to execute methodical and purposeful flights correctly.

Fulfillment of these assignments is unthinkable without striving to get rid of conceit and self-satisfaction. The loss of flight skills by pilots in training, which happens in certain podrazdeleniya, is intolerable. Special attention must be paid to increasing the quality of aerial target interception by fighter aircraft. Interceptions must be executed without oversimplification, in complex aerial and tactical conditions, at calculated boundaries, and with maximum ranges of flight.

Shortcomings in flight training in certain podrazdeleniya are often due to poorly executed flight training methods. Moreover, methods councils do not do very much in many chasti. Check flights with commanders often take on a formal character. Certain senior commanders do not develop new and complex aspects of training in such flights. As a result, they sometimes fall behind their subordinates in training and this means that they are no longer qualified to command. Ground training is sometimes organized and carried out without consideration of assigned flight training problems. Pilots are poorly prepared in problems of tactical fighter operations, practical aerodynamics, navigation, and the use of aviation equipment. All of these questions must be in the center of attention of podrazdeleniye and chast' commanders and flight controllers.

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The personnel of radiotechnical troops must also cope with important problems. One problem is to master the methods and approaches of using equipment when working with a large number of simultaneously maneuvering targets and friendly aircraft under conditions of strong radio interference. Officer personnel must learn to quickly analyze an aerial situation, to examine "enemy" formations, and to make competent decisions concerning the employment of radar.

The pace of combat training in podrazdeleniya and chasti of radiotechnical troops indicates that somewhere sufficient attention is not yet paid to uniform and complete development among operators of the practical skills of working with targets at high altitudes. Often in the same podrazdeleniye, some operators are credited with several more target trackings than are required by combat training plans and others have not carried out the minimum number of such trackings. This has a negative effect on crew coordination and consequently on the combat readiness of the podrazdeleniye and prevents all soldiers and sergeants from being trained to be highly rated specialists. Such questions as how to determine the type of aircraft from blips recorded on a scope and how to measure speed, course, and altitude of aircraft are neglected in certain podrazdeleniya.

Examinations for qualification ratings for soldiers, sergeants, and officers are given at the conclusion of the training year. There is no doublt that the results will show that many specialists worked well during the year and increased their skills. It is the duty of every commander and supervisor to give all possible aid to their subordinates in training now, to raise their qualifications.

This does not exhaust the responsiblities of commanders and supervisors. They must be examples for their subordinates and possess high rating qualifications. Life convincingly shows that a commander without a high rating qualification cannot train or lead his subordinates well. Therefore, chasti and podrazdeleniye commanders should strive throughout the training year to become qualified first-class specialists.

Not even the smallest compromise should be allowed in training for and taking examinations. Testing requirements should be punctually fulfilled. It is time that it be understood that a supervisor introduces irreparable harm to combat readiness when he allows deviations from regulation requirements, programs, and courses, or oversimplification in the training of personnel.

Interchangeability was persistently developed in crews, sections, and teams and officers mastered additional specialties during the last annual training period in chasti of all arms. As is known, this is a necessary condition for high combat readiness of podrazdeleniya. There are many podrazdeleniya and chasti among our troops where full interchangeability has been developed in crews and some personnel have been cross-trained in the specialties of other crews. Experienced sergeants have acquired the operational

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skills of officers and technicians. A majority of officers have successfully mastered additional specialties. However, some commanders do not present themselves as personal examples and master secondary specialties instead of those important specialties on which the success of podrazdeleniya in combat operations depends.

The experience of some commanders is worthy of approval and publication. They allow officers to undergo practical training in additional specialties and duties including the fulfillment of all responsibilities for checking training or monitoring combat launches before allowing them to individually fulfill responsibilities in additional specialties.

Combined training should play a significant role in resolving complex problems of combat training. It allows training plans to be executed more completely and with better, more instructive results. It requires less expenditures of materials for tactical and other forms of training and strengthens achieved training sources of chast' and podrazdeleniye combat crews.

Special attention should be paid to methods work for the rest of this year. It is the duty of every commander to study methods work seriously and bring methods and forms of training into conformance with modern troop training requirements. Various types of trainers, imitators, visual aids, and programmed training methods should constantly be introduced into the training of personnel. Such training methods aid trainees to strengthen knowledge and acquire skill in independent, logical thought. They enliven the training process and allow the individual abilities of each trainee to be developed.

New personnel will be arriving in chast throughout the training year. To maintain the high combat readiness of troops, every measure should be taken so that young soldiers are trained quickly to fulfill the responsibilities of crew members and successfully carry on combat work before senior personnel are discharged from these posts. It is necessary to use the knowledge and especially the skill of senior service personnel to train young soldiers. Every sergeant and soldier should help train a qualified replacement for his job.

Comprehensive checks are made at the conclusion of the training year. They are a true examination for all personnel. Each soldier, sergeant, and officer should therefore show thorough individual training and skill in performing well coordinated work with crew and podrazdeleniye personnel and exhibit a constant combat readiness to destroy any aerial enemy. Officer personnel have in prospect an examination session which they should already be preparing for. Each minute of time not devoted to command training and individual study should be used for this preparation. Those officers who use all pssibilities, in free time and when on duty, to perfect their political, technical, and special training are perfectly correct.

The mistakes of last year should be avoided in carrying out examination sessions. Last year, certain supervisors conducted these sessions formally and all officers and generals were not completely tested. Individual supervisors, themselves poorly trained, did not show high exactingness toward subordinates and conducted tests with questions which had been prepared for earlier. An examination session must have the character of an enlivened, creative discussion of a well prepared chief with his subordinates. Officers should be asked those questions which enter into their training programs. Every officer should execute his service responsibilities well. It is not correct to require identical knowledge from company commanders and chast' commanders, or from technicians and engineers. A different approach is needed for each responsibility.

In fulfilling combat and political training assignments, the personnel of all arms know that the Communist Party and Soviet Government have given PVO Strany Troops great and important assignments in protecting the peaceful labor of our people who are the builders of Communism. A successful conclusion of the training year should raise the combat readiness of troops to a still higher level. It will be an important contribution in further strengthening the defensive capabilities of our native land.

(A captioned photograph by I. SEREGIN on page 7 shows Capt N. I. MAKOVKIN and subordinates working at a transparent plotting board).

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PARTY-POLITICAL WORK AND MILITARY EDUCATION

Preparing for and Carrying Out Launches -- by Lt Col D. G. VISHNYAKOV (Pages 8-11)

Summary:

Combat launches are an important aid in enabling rocketeers to master complex rocket equipment and to train for the defense of the motherland. The results of combat launches, however, depend very much on the level and quality of party-political work. The more interesting this work is, the more successfully will launches be executed. An example of this can be seen in one of our podrazdeleniya where comprehensive party-political work preceded firings.

This work and its results are the subject of this article. First, however, it must be said that there is no single formula for carrying out party-political work in preparing for launches. Everything depends on a creative approach to the job and on the initiative of political workers and Party and Komsomol workers. There is no doubt that party-political work must possess signleness of purpose, must be unceasing, and must embrace all personnel.

When it was known that the podrazdeleniye would be assigned to execute a launch, the commander and deputy commander for political affairs met with party and komsomol activists to discuss methods for mobilizing personnel for a model preparation and execution of the launch. A plan for party-political work resulted from the discussion.

Measures for the political and military training of the personnel, for military-technical propaganda, and for the dissemination of leading experience in combat training were provided in the plan. Party and Komsomol meetings, evenings of questions and answers on equipment, etc. were held. Then, a party meeting was held in which the podrazdeleniye commander spoke on the tasks of communists in the preparation for and the carrying out of launches. The report was discussed and valuable suggestions for training personnel for the launches were advanced. A similar meeting of Komsomol members was held.

After everything had been discussed, planned, and decided, the deputy commander for political affairs and leaders and activists of party and Komsomol organizations set about fulfilling their assigned tasks. Thus, soon after the meeting, Communist GUSTOKASHIN spoke before personnel on the theme, "Good organization, strong discipline, and accurate execution are the most important conditions for successfully carrying out combat launches." Conversations on the aggressive intrigues of US imperialists and on the tasks of PVO personnel in increasing vigilance and combat readiness were led by Communist MEL'NIKOV. Other lectures on the missions

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assigned the Armed Forces by the 22d Party Congress and on the duty of personnel to vigilantly guard the air borders of the motherland were read.

Party-political work and military technical propaganda were not carried out abstractly, but were coordinated with the training of personnel in the concrete missions which they had to execute. On the initiative of the party organization for example, a competition was established to find the crew which could best and most quickly ready material for travel. All crews participated. During off-duty hours, training and contents were held between individuals and crews.

To ensure the correction of shortcomings in technical training before going to the firing range, Communists CHERNYAVSKIY, LITVINOV, and OSHMYANSKIY conducted supplementary lessons and consultations on electronic and radio equipment and on the basic theory and practice of executing a launch. Several helpful technical conferences were held on the preparation of equipment for a launch.

The technical training of officers received particular attention from the podrazdeleniye commander, his deputy commander for political affairs, and the secretary of the party organization. Considering that this was to be the first launch executed by the podrazdeleniye and that the officers had no previous experience in carrying one out, the party organization on its own initiative, but with the commander's permission, organized a series of lectures for the personnel. The lectures had such themes as: "The basic principles for the rules for executing a launch," "Functional communication between systems," "The sequence for adjusting and tuning stations during maintenance," and others.

Let us review the results of the military technical work. At the beginning period of training for the launches, there were some soldiers, sergeants, and even officers who had not met prescribed requirements. Now all personnel successfully fulfilled their obligations. No one received a rating lower than good for technical training.

Because of their importance, socialist competitions were designed for all enlisted and officer personnel, both on an individual and a crew basis, to master equipment better and to shorten the time necessary for the execution of the combat mission. Results were posted daily on the accomplishments of crews and weekly on those of the podrazdeleniye. Every success was highlighted in combat news letters and in special editions of wall newspapers. Thus, when Sr Sgt ALEKSEYENKO and Sgts SAGAYCHIK and BALOGUR acquired skills as technicians, their achievements were published in the newspaper. Many servicemen strived to learn the duties of their officers in the event it became necessary to replace them.

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Socialist competitions were publicized by raising panels enscribed "How We Are Achieving Interchangeability and Increasing Ratings," on which were placed the names of those crews which were progressing well toward mastering complex specialties and toward completion of preparations for examinations for ratings. The competitions were successful. The crews headed by Sgts KOLESNIKOV and KAYGORODOV were the first to achieve full interchangeability. Other crews followed suit and when it was time to leave for the firing range approximately half of the soldiers and sergeants possessed first-or second-class specialty ratings. Almost all rated specialists increased their ratings one step; those previously unrated earned third-class ratings.

The podrazdeleniye commander warmly encouraged the initiative of communists and Komsomol members which was directed at increasing skills. He often participated actively or offered advice. He suggested, for example, that the sergeants who had been in the service for a long time sponsor soldiers in their first year. Each sergeant took one soldier under his guidance and helped him prepare for his rating examination. As a result, all the young soldiers on the eve of the launchings had received a third-class rating and acted with as much skill as their senior comrades during the launches.

The long period of preparation for the launches was finished; the podrazdeleniye went to the launch range. Before the launches, it was necessary to conduct adjustment work on the equipment and review the crew members' duties. During adjustment operations, which were completed successfully, political workers and party and Komsomol activists were particularly active. They constantly reminded each rocketeer of his obligations.

Now for the last stage, the completion of the launches. In the final days preceding the launches, podrazdeleniye personnel met with rocketeers who had already completed their launches from whom they gleaned much useful advice. On the day of the launches, after a meeting, the soldiers took their places and prepared to execute their missions. Some time passed before the command was heard, but then the rockets were launched into the sky. Soon it was reported to the command post that the rating for the launch was excellent. The podrazdeleniye was congratulated for its high skill and discipline.

Although party-political work deserves praise for its role in the success of the launch, there were shortcomings in its organization. Emphasis on mass measures was often at the expense of individual work with the soldier. The difference in the approach to several categories of servicemen sometimes lowered work in general. These shortcomings, however, were corrected as they appeared. The main thing is that party-political work had a clarity of purpose and that is the key to its success.

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Officer Candidates Acquire Skills in Political Education -- by Lt Col G. Ye. GULEYKOV (Pages 12-14)

Abstract:

The author notes that graduates of his school have received technical training, but have not succeeded in mastering the skills required for educational work or for organizing party-political work in their podrazdeleniya. This is explained by too much emphasis having been placed on the technical side of training officer candidates at the school while too little attention was paid to educating them in methods for working with people. The article describes how the officer candidates themselves instigated the improvement of educational work through special courses and lectures.

(A photograph by N. PETROV of Maj BALASHOV, pilot first class, analyzing a "flight" of Capt N. BAZANOV in a trainer appears on page 14.)

If a Job Is Approached Wholeheartedly -- by Maj V. M. Kotov (pages 15-18)

Abstract:

The article describes the ability of Sr Lt Viktor UGNENKO, platoon commander, to work with his subordinates. Because of this ability he was made commander of a podrazdeleniye platoon for training young specialists. A sketch of UGNENKO accompanies the article.

Merited Authority -- (Pages 16-17)

Summary:

The name KOSORUKOV is already well known in our journal. In issue seven, it was reported how Maj KOSORUKOV, flight commander, helped Capt GRISHCHENKO land a supersonic aircraft with the left landing gear not fully extended. On 23 February 1963, KOSORUKOV was awarded the Order of the Red Star. This award is the result of the skill which Vasiliy Ivanovich KOSORUKOV has imparted to the pilots of the squadron which he commands.

Maj KOSORUKOV, as a pilot 1st class, has evoked the admiration of his commanders as well as his subordinates for his ability to successfully attack an aerial target under any conditions day or night and at any altitude or speed. KOSORUKOV strives to transmit his skills to his subordinates. He analyzes each pilot's flight, noting all the interceptor's positions, points out shortcomings and how to avoid them.

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The squadron commander takes an active interest in the undertakings of his pilots. When they decided to become rated technicians KOSORUKOV was among the/first to qualify as technician first class. As an outstanding pilot and experienced commander he was instrumental in his squadron achieving the rating of excellent. He is also a member of the chast' party committee and takes an active part in the activities of the party organization. These worthy characteristics of Maj KOSORUKOV enable him to wear the award of his government with honor.

A sketch of KOSORUKOV accompanies the article.)

Deserved Award (Page 17)

Summary:

For several years the radar site crew commanded by Sr Lt MAZUROV has held the rating of excellent. All officers and enlisted men have thoroughly mastered their equipment, achieved full job interchangeability, and can detect air targets in the shortest possible time. By broadening the profiles of its specialists the crew was able to carry out field repair work without enlisting the services of factory specialists. Much credit for the training of subordinates belongs to Sr Lt MAZUROV who mastered the complex equipment of the site within a short time and received the rating of specialist first class. For his successes in training the station crew, the commander of the military district awarded Sr Lt Anatoliy Fedorovich MAZUROV an engraved watch and the Soviet government awarded him the Medal or Combat Services.

(A sketch of MAZUROV accompanies the article.)

COMBAT TRAINING

High Organization for Flights in Adverse Conditions -- by Col A. V. LEBEDEV, Pilot 1st Class (Pages 19-23)

Excerpts:

Flights in adverse weather conditions are one of the most important and difficult elements of combat training for aviators. Their peculiarities lie in the fact that the pilot cannot see the ground, the natural horizon, and in general is cut off visually from all surroundings. Therefore, mission fulfillment and flight safety depend wholly on the pilot's ability to act efficiently, capably, and consistently. The smallest deviation from a flight regime or failure to maintain altitude, course, or time can have serious consequences.

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Experience in training personnel in adverse weather conditions accumulated in our podrazdeleniya convincingly shows that successful flights in these conditions depend a great deal on the organization, discipline, and diligence of personnel....

Those podrazdeleniya where combat training is conducted in a purposeful and organized manner are in the majority. However, facts bear witness that in some chasti and podrazdeleniya proper attention is not given to the training of personnel in adverse weather conditions. This affects the quality of mission fulfillment and the improvement of personnel skills.

In order that flights in adverse weather conditions are done efficiently and have the greatest effect on personnel training, it is first of all necessary to observe an established sequence of pilot training. We cannot tolerate the fact that some commanding officers, in accelerating the training of subordinates, violate documented regulations and begin working out new kinds of training when pilots have not yet mastered previous exercises properly....

One of the indispensible conditions for successful mastery of flights in adverse weather conditions is high-quality personnel training. In preliminary training, commanders must systematically instill a sense of responsibility for fulfillment of the flight mission in subordinates and demand that each pilot, when preparing for flight in adverse weather conditions, study his assignment and the order of its execution, know behind whom and at what interval of time he will take off, who is flying behind him -- by pilotage or by instrument, and how many aircraft are located in the air simultaneously so that he will be able to proceed in special flight conditions, and so forth.... Training sessions in aircraft cockpits and training devices must occupy an important place in preparation for flights. During training, commanders must require of pilots that they are perfectly familiarized with cabin instruments, have a firmly developed procedural sequence for instrument flying in clouds, know the procedure for approaching an airfield by using homing aids, have learned to fly confidently by auxiliary instruments, and make proper decisions upon failure of one or more instruments. This preparation on the ground will make the pilot's job in the air far easier.

Control of readiness for operations in the air has a paramount importance in preparing for flights in adverse weather conditions. The commander is obliged to check how well a pilot understands the content, order, and technique of mission fulfillment, weather conditions, the rules for using radiotechnical facilities; to what degree he has studied neighboring airfields, the peculiarities of using the aircraft, the engine, and all equipment; whether he knows how to act in special flight situations; etc.... As the experience of outstanding chasti and podrazdeleniya

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indicates, one of the most effective methods for checking the flight readiness of pilots is a checkout in the aircraft cockpit and on a training device.... /

Without efficient flight leadership, success in adverse weather conditions is inconceivable. This is why it is necessary to permit only comprehensively trained, strong willed, and exacting officers who possess outstanding piloting techniques and sufficient organizational experience to control flights. The flight controller is obliged to prepare for flights as are flight personnel. He does not have the right to begin fulfillment of his duties if he does not know the training level of the pilots who are participating in flights in adverse weather conditions, their physical fitness or cannot detect lapses in instrument flying. He must know positively when and in what operational conditions a pilot last flew. The primary attention of the flight controller should be paid to the pilots who are flying in adverse weather conditions for the first time. He should learn from their instructors before hand the quality of their training flights in order to be confident of the successful fulfillment of exercises assigned to them. The flight controller must become acquainted with the preparation of aviation equipment and the facilities for controlling flights. He should personally inspect the landing strip and the runways and check telephone and radio communications equipment.

Special responsibility lies with the flight controller when conducting flights. He must at all times know the aerial and meteorological situation, efficiently use the means of aircraft control at his disposal, give precise commands to pilots located in the air and, if necessary give them aid....

Unfortunately, some flight controllers do not display the necessary competence in evaluating aerial and meteorological situations and in making decisions. They allow compromises when controlling aircraft in the air, do not skillfully use the entire complex of radio technical facilities for aiding a pilot who finds himself in a difficult position, and sometimes simply display negligence while controlling flights....

The difficulty in fulfilling flight missions in adverse weather conditions places increased demands on meteorological services. It is known that weather conditions in the fall and winter period are seldom constant for the entire starting period. In several regions they change very sharply. Unfortunately, some officers of meteorological services do not always inform flight controllers about this in time. Instances occur when the weather deteriorates unexpectedly not only for the flight controllers but also for the meteorologists on duty. That is why flight controllers and officers of meteorological services must constantly watch over all changes in the weather and take timely measures to provide a successful outcome for each flight in the event the weather worsens....

50X1

Even with good organization of meteorological services, it is difficult to forsee all the complications which can be confronted in the air. Therefore, the pilot himself must be able to recognize forewarnings of sharp changes in the weather and know how to evaluate weather conditions which are becoming more complex and to come to an intelligent decision. All this will make it possible for him to overcome difficulties caused by changes in the weather.

High exactingness from commanders, accurate and faultless observance of the order and rules governing flight service by personnel plays an important role in organizing and conducting flights in adverse weather conditions....

Political organs and party and Komsomol organizations are called upon to render daily help to commanders to insure high quality training of personnel in adverse weather conditions....

Training personnel for flights in combat in adverse weather conditions is an important national task. Strong discipline, high organization, and efficiency in the work of our pilots and aviation specialists is a guarantee of successful fulfillment of this task.

(A captioned photograph by M/Sgt P. V. YEGORKIN on page 21 shows Capt V. KOSTENICH discussing aerial interceptions in the stratosphere with two other pilots.)

Flight Safety--by Lt Col N. V. NIKONOV (Pages 24-26) 50X1

Text:

Accurately organized landing aid support systems are important prerequisites for exemplary execution of flight training tasks. Understanding this well, our soldiers are doing everything necessary to provide reliable combat training support for pilots.

In the podrazdeleniya commanded by Officers ARISTAKHOV, ZIGMANT, and RAPOPORT, personnel exemplarily solve tasks connected with landing aid support systems, efficiently use and service equipment, and maintain it in excellent condition. Many crews of these podrazdeleniya have earned the title outstanding and are highly thought of by the pilots.

One of these crews has been led for four years by M/Sgt SHEVCHENKO. It invariably wins first place in the chast' every year. The crew members work efficiently on equipment and tirelessly improve their combat skill. Officers KHOKHLOV and BELANAS, both GCA controllers, enjoy great respect among the pilots. They accurately guide aircraft onto the glide path in any air and weather conditions and persistently improve the methods of their work.

Good reputations are held by Sgts PILYUGIN and MENYAYLOV and Pvts YEMEL'YANOV and KLEMENKO who are all junior specialists trained to the level of technicians in problems of materiel exploitation. Pvts KUZNETSOV and BONDIKOV who irreproachable fulfill their duties in supporting aircraft landings also enjoy good reputations.

The experience of outstanding podrazdeleniya testifies that a landing aid support system achieves its purpose when it is based on high skill, industriousness, personnel discipline, the correct use of equipment, and maintenance of equipment in constant combat readiness. How are these problems solved in practice? What forms and methods of work do podrazdeleniye commanders use to fulfill best the tasks of confronting them?

As is known, combat training is one of the decisive conditions for successful work by personnel. This is why active steps are being taken in our podrazdeleniye to make all soldiers experienced specialists who know equipment excellently and can successfully use it. Special attention is given to raising the quality of special training and to making maximum use of facilities for practical training.

In this respect, the experience of teaching specialists in the podrazdeleniye commanded by Officer ARISTAKHOV deserves attention. Classes are conducted regularly here on a high level with wide use of such visual aids as placards, diagrams, models, operational displays, and installations. Specialists are given weekly assignments which are

closely connected with the tasks being solved by personnel and with specific problems on the use and maintenance of materiel. Special attention is given by the soldiers to checking the improvement of their knowledge. Checking is conducted systematically and is of an individual nature. 50X1

Training sessions, usually conducted for two hours during the day when there are no flights, occupy an important place in the training of specialists. At the sessions, operators train in enunciation and the ability to evaluate aerial situations and make correct decisions. Specially prepared plotting boards, diagrams, and also station indicators and radio communications are used. The method of conducting the training sessions follows. The leader sets up a specific aerial situation, assigns problems, and transfers control of the aircraft to the operator. The latter guides the aircraft into the coverage zone of the landing station with commands for changes of course and rate of descent. Special attention is given to the control of an aircraft coming in for a landing from an estimated point and to procedures when airborne navigational equipment fails. It is characteristic that these elements are developed not only during the course of the training sessions, but also during night flights by simulating airborne instrument failures.

However, in the training of personnel in some podrazdeleniye, elements of formalism and simplification and gaps between theory and practice are sometimes observed. This shortcoming is manifested first of all because some commanders underestimate training sessions and simulated air situations. As a result, specialists do not gain the proper practice in directing aircraft onto the glide path. To confirm this, consider the following case.

In N podrazdeleniye, while checking a landing system crew, Officer SINGUR posed a simulated compass failure problem. The shift GCA controller, Officer KORNEV, and the operator, Sgt UGLOV, could not guide the aircraft onto the calculated glide path. Commands to change course were given too late and were incorrect and heading corrections were determined inaccurately. One reason for the inefficient actions of the crew was that insufficient attention was given to training sessions with simulated failures of one or another instruments in the podrazdeleniye.

In order for the GCA landing system to work accurately, the GCA controllers and operators must train continuously, study the pecularities of flight in various types of aircraft, and know the nature of pilot's actions and individual peculiarities in piloting and reacting to commands. It is also important that the GCA crew maintain close cooperation with control posts, especially with the flight controllers. They must be certain of air and weather conditions, the sequence of aircraft takeoffs and landings, and the nature of the exercises being executed by the aircrews.

Maintenance of equipment in constant readiness and in excellent condition is an important condition for successful solution of the tasks confronting personnel. A leading role in this is played by timely and high-quality fulfillment of maintenance and repair work. In our podrazdeleniye, this is given primary importance. Take for an example the podrazdeleniye where Officer BABICH is the commander. Maintenance work is planned ahead of time here. The times and duration of the work are agreed upon by the commander of the aviation chast'. It is characteristic that prior to conducting quarterly and semiannual maintenance work in the podrazdeleniye, technical conferences, special classes on the study of radio and electronic instruments, and special classes on operational methods are held. Necessary expenditures are made and materiel, spare parts, and instruments are procured ahead of time. 50X1

When conducting maintenance work in which all personnel participate, primary attention is given to an instrument check of the station, assemblies, and units, observing an established sequence and rules of equipment safety. Following semiannual maintenance work, the equipment is checked out the next flying day, i.e., the effective range, tuning accuracy, clarity of call sign sending, and operation reliability are checked. Monthly and weekly maintenance which makes it possible to forestall equipment failures is no less important.

The smallest underestimation of maintenance work or the formal condition of it negatively affects the operation of equipment and subsequently the quality of flight support. Take the incident which took place in N podrazdeleniye. During reception of overflying aircraft, the radio direction finder failed because of a malfunction of one of the radio tubes and the potentiometer. Was this by chance? No. A check showed that while conducting maintenance work, Officer KRUPSKIY and the radio direction finder crew disregarded an equipment check and as a result did not discover the loss of radio tube emissions and a disruption of the potentiometer regime. However, the malfunction did not affect aircraft landing safety since pilots utilized other means, but in other conditions, this situation could lead to tragic consequences.

As is known, certain difficulties, especially in fall and spring, require the use of mobile lighting equipment. The great expansion of cable nets and the presence of many cable connections and lights demands especially careful upkeep of equipment to eliminate short circuits, breaks, lamp burnouts, and malfunctions of electrical energy sources. Recognizing this, specialists punctually fulfill requirements of manuals and instructions and expose and eliminate breakdowns before they happen. They periodically check the power cable for insulator resistance and note measured data in a special logbook. Cables are repaired solely by means of soldering or vulcanizing with a rubber coating. Cable connections are checked by external inspection and measuring. In damp

weather, the cable and its connections are placed on supports. 50X1
Lighting equipment is checked daily by external inspection and before night flights. When necessary, it is checked with a megohmmeter.

Innovators have done much to improve the work of lighting facilities. The adoption of a proposal worked out by Officer SUMIN and Sgt ROMAS'KO for remote control of lights was of great benefit. It makes it possible to provide a more effective switching on and off of lights from the flight controller's desk. Good results were also achieved by the use of portable impulse beacons in the podrazdeleniye commanded by Officer BABICH. Flights during the day in adverse weather conditions proved that these beacons are distinctly visible through thick fog and haze making it possible for aircrews to make calculations and aircraft. The use of impulse beacons eliminates the need for landing flood lights during day flights in adverse weather conditions.

In conclusion, it should be noted that there are still many possibilities for further improvement of landing aid systems. Personnel of our podrazdeleniye well understand this and do everything possible to promote organized flight training and solve tasks without accidents or dangerous situations.

(A captioned photograph by K. FEDULOV on page 25 shows Capt. V. MIGACHEV, commander of the best flight in his chast'. Pilots in MIGACHEV's flight are capable of intercepting air targets in any weather conditions, day or night.)

Rocketeers Increase Their Mastery -- by Maj Gen Arty I.G. ZHILIN (pp 27-30)

Text:

Striving exemplarily to fulfil assignments and to maintain constant combat readiness, military rocketeers are searching for new methods to perfect combat skills and increase the level of their technical knowledge.

A convincing example of this are many patriotic campaigns such as those using the mottoes: "The knowledge of a technician for every operator," "Execute every combat assingment in an outstanding manner," "Achieve full interchangeability in crews," etc. The soldiers of the outstanding launch crew commanded by Sgt SOBOLEV a short while ago urged all rocketeers to expand the struggle for outstanding results for every day of training. They pledged to carry out combat duties faultlessly, to execute training launches with the highest evaluations, to perform equipment maintenance faultlessly, to show outstanding knowledge in all activity, and sacredly to observe the ethical principles of the moral code of the builders of communism.

It is fully understood that these patriotic campaigns are directed toward fulfilling combat training assignments with high quality, strengthening military discipline, bringing about an increase in the number of personnel who are outstanding in combat and political training and rated specialities, and perfecting the skills of every soldier.

Striving for fulfillment of assigned tasks, rocketeers have achieved great successes. In particular, there are already many podrazdeleniya where operators have knowledge equivalent to that of technicians. Equipment is maintained in constant combat readiness, all aspects of maintenance are carried out with high quality, and equipment is readied for launches in an outstanding manner in such podrazdeleniya.

How are operators trained to acquire the knowledge of technicians? Take the example of the podrazdeleniye, in which Officer POPOV serves.

Operators start to train to acquire the knowledge of technicians after they have earned first or secone class specialist ratings, i.e., when they have learned to use equipment and to execute functional responsibilities faultlessly. Independent training of operators with the guidance of officers and well trained sergeants is carried out in the podrazdeleniye so that operators can acquire a deeper mastery of the bases of electronic and radio technology and study block and system circuitry. A technical circle has been started under the leadership of Capt RYZHIKH. Training in this circle is ofter conducted by the podrazdeleniye commander. Then soldiers understand the physical reasons for circuit operations, they immediately transfer to actual study of equipment.

The training of operators to work with equipment is usually begun by training them in the skills of maintenance work and preparing combat equipment for firing. As soon as these skills are learned, the officers allow the operators to work independently on equipment, but carefully check their work after all operations. If an operator makes a mistake or is inexact in establishing a variable, his error is pointed out and its possible consequences are explaines to him.

This method of training is continued until the operators have learned to execute all maintenance checks with certainty. The operators are then allowed independently to ready station equipment for combat firing. Since they are certain that the operators can complete all maintenance on a given system correctly and precisely, the officers complicate the training and introduce various malfunctions into the circuits and working parts of equipment mock-ups.

The final step in training operators to acquire the knowledge of technicians if for the operators to work to fulfill standard requirements.

Other questions of combat and political training concerning the perfection of combat readiness and strengthening military discipline are successfully coped with in this podrazdeleniye. The rating classifications of officer personnel have been noticeably increased, interchangeability between crews has been achieved, and norms for combat operations and executing training and combat launches have been shortened. All officers held ratings at the end of the last training year and two podrazdeleniye commanders, Maj POPOV and Sr Lt. SAVKIN, had successfully passed examinations for the honary title of master. While fulfilling assignments for combat training in the 1963 training year, the officers are diligently training to increase their personal rating qualifications. 50X1

The question of the pace of preparations for examinations for higher ratings was specifically discussed at a podrazdeleniye party meeting. Criticism and self-criticism brought about more successful and higher quality officer training. At the end of the first training period, more than half of the officers were trained sufficiently well to increase their ratings and several were able to pass examin ations to receive ratings of master.

The question of cross-training and mastery of two or three additional specialties is in the center of attention of podrazdeleniye commanders. As mentioned earlier, operators are trained here to acquire the knowledge of technicians, to be able to perform any maintenance work, to correct any equipment malfunction, and to fulfill combat operations independently. The operators of certain cabins have achieved full interchangeability. Many soldiers have mastered one or two additional specialties.

Special attention is paid to the working out of norms and to the quality and precision of the work of crew members on equipment in the podrazdeleniye. Thanks to this attention, launch crews have on the average surpassed norms by 20 percent in readying launchers for launches in the first training period. While these norms were surpassed, the quality and precisions of all operations were evaluated as outstanding. These results especially relate to the crew commanded by Sgt SOBOLEV. The struggle between crews for surpassing norms in executing operations with outstanding quality is still being continued.

Party and Komsomol organizations knowledgeably influence the quality of rocketeer training, systematically compile training results, publicize leading or outstanding achievements, and strive to introduce better methods into training.1

A movement for accomplishing outstanding results in daily training received very wide publication. Launch crews taking part in this movement entered into a competition to find the best crew and pledged to increase their skills.

A special standard was developed to determine the winner of this

chast' competition. The knowledge and work of crews was evaluated according to a five-point system. An evaluation of excellent was worth 100 points, good 80 points, and satisfactory 60 points. Each second of overfulfilling a norm was worth 0.2 points. Every insignificant error in combat work lost two points. Achieving full interchangeability in a combat crew was worth 20 points. When a soldier was able to perform the duties of a sergeant, his crew received an additional 25 points. The competition was conducted in two parts: the first was within the launch podrazdeleniye and the second was on the chast' level among the best crews. 50X1

Crews worked persistently and hard during preparations for the competition. Crew coordination was systematically checked and the amount of interchangeability in all operations and the fulfillment of time norms was determined.

A special committee of officers with much operational experience and high individual ratings was set up in the chast' to check combat readiness achievements according to the competition program. The committee was headed by the chast' deputy commander.

The crew commanded by Sgt MASHINSKIY was declared a winner during this interesting and useful competition. They received the highest marks and overfulfilled norms to receive an evaluation of excellent for their work in rocket operations.

The next step of the competition was made more difficult in that rapid firing operations, the knowledge of each crew member in addional specialties, the execution of maintenance work, and economical practices in equipment operation were all checked.

When combat launches were carried out on a firing range, the podrazdeleniya commanded by Maj POPOV and Sr Lt SAVKIN showed that they were well trained and organized and that they had good discipline.

The personnel of this podrazdeleniye and the whold chast' are presently working diligently to fulfill all assignments of combat training successfully.

(Two captioned photographs by I. TIKHONOV on pages 28 and 29 show Capt S. SIDOROV explaining to Pvt V. KUTUZOV how to put on protective gear and Sr Lt Yu. SHCHUKIN checking to see if Pvt N. SHALUKHIN had properly put on his gas mask and other combat gear.)

Tubes With Additional Indices (Page 30)

Text:

Officer D. G. RATINSKIY asked the editors to explain the meaning of

the additional index (for example 6N3P-I, 6N2P-V, 6N1P-Ye) in the designations of receiving tubes, including low-power amplifiers, and 50X1 if there is a possibility of substituting ordinary tubes in place of these special tubes.

The rapid development and increasing requirements of radar have necessitated the production of high-reliability vacuum-tube and semiconductor devices. A special requirement has been created for special tubes that operate in pulsed regimes. By comparison with standard tubes that operate on continuous current, these pulsed tubes must with stand higher electrical loads since the high energy in the pulse produces an electrical shock on their electrode system. In the case of a simultaneous fast sequence of pulses, the minimum parasitic interelectrode capacitances of the tube also distory the trailing edge of the pulse.

In addition, a need developed for special tubes of increased reliability which could guarantee normal operation of equipment that is subjected to rapid, short-lived, or continuous vibrations as well as acceleration overloads. Such tubes must be able to withstand accelerations up to 10 g, and have extremely high vibration stability.

The limited service life of receiver-amplifier tubes has led to the production of tubes with increased longevity of more than 10 times that of ordinary tubes.

This is the reason for the addition of the fifth index (written after a dash following the fourth) in the system of temporary designations of vacuum-tube and semiconductor devices. The meanings of these indices are as follows:

index I indicates pulsed operation (6N3P-I = pulsed double triode);

index V indicates increased reliability (6N2P-V = double triode with high vibrational stability);

index Ye indicates increased service life (6N1P-Ye = long-lived double triode); and

index K indicates extremely high vibrational stability.

All tubes carrying these additional indices can be substituted for by ordinary tubes of the same type which do not carry the additional indices. The electrical characteristics and parameters are the same for both types. For this reason, such substitutions are permitted, but must also take into account the necessity and advisability of such a substitution since the cost of such tubes is considerably higher than that of ordinary tubes. When a whole set of tubes is being exchanged, the type with the additional index Ye should not be replaced automatically as when using tubes without the designation. They must be

checked with a tube tester. If their parameters are normal, they should be returned to the same apparatus. 50X1

How We Study Line Diagrams -- by Lt V. I. KIREYCHENKOV (Pages 31-32)

Abstract:

Discusses the training of electronic equipment operators as carried out in the author's unit. A strict sequence of training is maintained, mock-ups of equipment and trainers are used, practical training using actual equipment is done only after extensive classroom preparation, and careful attention is paid to the problem of retention of learned material. The article also stresses the importance of operators being cross-trained in additional specialties.

Combat Readiness Is in the Center of Attention -- by Col A. K. INTSE (Pages 33 - 35)

Abstract:

Discusses combat training as conducted in the radiotechnical company commanded by Capt CHEKUNOV. Successes achieved in combat training by the company are attributed to the organizational and technical skills of Capt CHEKUNOV and his deputy commander for political affairs, Sr Lt LAPIN. Operators 1st Class, Sgts MANOKOV and BELOBAYEV and Pvts KURYSHEV and PETROV are identified as members of the company.

(A captioned photograph by I. SEREGIN on page 35 shows Sr Lt B. STECH and Sgt V. MOKRENKO using tape and a blowtorch to repair a cable.)

Work Daily with Young Instructors -- by Maj Gen Arty (Res) A. A. NABOYKIN (Pages 36-38)

Text:

The profession of instructor is a complex and captivating one. It requires strenuous work, constant perfection of his idealogical and theoretical knowledge, and special and methodological skills from the man who devotes himself to this profession. Every man who decides to become an instructor, particularly in a military training institution, must remember the great responsibility which he is taking upon himself in the job of training command, military-political, and engineer personnel for the Soviet Armed Forces.

In our military training institutions there are many genuine masters of teaching and training officer candidates and students. Of course,

they didn't get that way instantly. Each of them, examining the path he has taken, can say that his achievement is the result of a strenuous attempt to possess the Leninist style of work and to perfect special and methods knowledge. 50X1

Methods training is particularly important for the instructor. Sometimes, even good specialists who have a deep knowledge in the field of technology, cannot transmit it to their subordinates and teach them what they themselves well know. Such a case comes to mind. In one of the higher educational institutions, the teaching of an important assembly of a combat system was not going well. To make the job easier the head of the institution invited the assembly designer and requested that he conduct the lesson. The designer came, the lesson was held, but the students' knowledge did not increase and the difficulty was still not overcome. This occurred because, although knowing his creation excellently, the designer could not talk about it methodically to his listeners in a popular manner or with clarity. He did not have enough of the methods skills which an instructor must posses.

Sometimes officers coming from chasti to military training institutions as instructors do not have enough of these skills. In an overwhelming majority they are experienced commanders, political workers, and engineers. They know well how to serve in the troops and in their specialties, but they have no pedagogical skills, so necessary for teaching and training officer candidates and students.

What kind of work should be carried out with young instructors so that they may quickly come into "line"? First of all, a condensed version of the lecture course on pedagogy and psychology should be read to them. In these lectures, particular attention should be paid to principals of Soviet dialectics which are necessary for conducting any lesson. Moreover, literature on pedagogy and psychology should be recommended for independent work by young instructors.

The growth of a beginning instructor is dependent to a large degree upon his working with experienced instructors in the selection and preparation of lesson materials. Here, the good methodist must help his comrade select the necessary material and show him how to work with it, plan the forthcoming lesson, and determine what training aids are necessary.

Often, young instructors are permitted to attend lessons conducted by experienced methodologists. These visits must not be accidental. They must have been planned earlier. Of course, before the class session is visited, the experienced methodologist must tell the young instructor the content of the forthcoming lecture and acquaint him with the lesson plan and method by which it will be conducted. Such visits enrich the knowledge and methods skills of young instructors.

Work should also be practiced in such a form that the preparing and carrying out of a lesson plan by young instructors is done with a group of instructors of a chair or according to a lesson plan already in use. At the end of such a lesson the head of the chair should conduct an analysis and those present should make their observations both on the form as well as on the content of the lesson. 50X1

Attendance by experienced methodologists at open lessons conducted by young instructors is of great use to young instructors. However, conducting such lessons must not be practiced with a young instructor's first steps of independent activity. He must be given a chance to look around, become well informed, become acquainted with the group, and learn about his students. At this time, periodic attendance by the most experienced methodologists at lessons conducted by the young instructor is useful. Such visits should not be frequent since it will seem to a young instructor that he is under some sort of tutelage.

After some time has expired, the young instructor can be entrusted to conduct lessons with officer candidates of a platoon in the form of open exercises. This lesson should last four hours. Of these, one hour is utilized by the instructor who is conducting the lesson with officer candidates to state to the group his method, plan, and lesson purpose; the use of visual training aids and materials; and so forth. To understand some principals visiting instructors may ask questions, but an open discussion should not ensue.

The second and third hours are devoted to conducting the lesson itself, and the fourth to an analysis of it. In the analysis, it is very important not only to point out the positive side of the lesson but also to examine shortcomings and discuss how the lesson should be conducted. Here the senior commander should give conclusions and instructions on all questions raised by those attending the lesson.

Young instructors should always strive to make the lessons conducted by them interesting. This is achieved not only by a deep knowledge of the theme, but also by being able to illustrate it with facts and examples to present material vividly and with clarity. Some instructors still do not do enough of this. For lively and substantive accounts they substitute dictated materials, which is the worst method of conducting a lesson. Those being taught fix everything the instructor reports to them by writing material down mechanically and do not try to delve deeply into the content of the material. It is necessary to protect the young instructor from such a method of work in every way possible.

As is known, an instructor conducts theoretical and practical lessons. From the point of view of organization, lessons on theoretical questions are simpler. They require only a deep knowledge of the material and the ability to present it. It is a quite different case with practical lessons. It is quite a bit more complex to organize and conduct them.

Preparing for them, the instructor must remember that according to the plan a certain numbers of hours are alloted for an officer candidate or student to study one theme or another. In that time, he must not only master the studied problems, but gain certain skills for work on equipment or apparatus. This can be achieved only through skillfully organized instruction. In order that practical lessons be active and useful to the officer candidate or student, the study group must be divided into sub-groups for each of which an instructor must have been earlier trained. 50X1

When a young instructor is working for the first time, the organization of a lesson plan according to form and content and skill in using it during lessons is very complex. The lesson plan should be concise and serve as an aid for presenting material in strict sequence. To teach young instructors to compose a lesson plan and use it calls for experienced methodologists, chiefs of lectures series and chairs.

The skill of the instructor in the use of visual aids and the blackboard to depict sketches and other illustrations is very important in conducting lessons. The instructor must know how to go from the sketches to materials and back during a lesson. This is a guarantee of deep mastery of the material being taught. Therefore, it is necessary to thoroughly prepare and check lesson materials the night before.

The instructor must know how to use the autitorium, to survey it, to see and feel how the students are grasping the material. It is necessary to teach young instructors this skill with thefirst steps of independent work. They must be aided in establishing a business-like, but friendly relationship with students. Tack, attention to people, observance of party principles, implacability toward shortcomings, and responsiveness should be indispensable qualities of every instructor.

Much can and should be accomplished by party committees and party organizations in instilling these qualities in instructors. Young instructors must be more skillfully and actively drawn into the social life of the training institution and into party and Komsomol work. They must be helped to more quickly and better know the officer candidates or students which they will teach.

We have touched only several aspects of working with young instructors. But solving these questions also plays an important role in the development of instructors for our military training institutions and therefore in improving the qualities of the training of officer personnel for our troops.

Improving the Work of Technical Circles -- by Col S. S. GORBENKO (Pages 38)

Abstract:

Discusses the work done in technical circles in conjunction with formal classroom work done by officer candidates and advantages of such activity. Engr-Maj KAMENSKIY and Sr Lt KRUGLOV are identified in the article. 50X1

Careful Training -- By Engr-Maj G. G. SULEYMANYAN (Pages 39 - 42)

Abstract:

Presents advice on how to conduct training classes and deliver lectures to trainees. Lt BIBIK, training platoon commander; Capt VORONIN: and Maj SAL'NIKOV are identified possibly as members of the same podrazdeleniye.

(A captioned photograph by M/Sgt I. YEGORKIN on page 41 shows Sr Lt V. BIRYUKOV, navigator-bombardier second class and GCI controller, working at a radar scope.)

Training Long-Distance Communications Specialists for Rating Examinations by Engr-Capt Yu. V. ANOSOV (Pages 43 - 47)

Text:

The training of rated specialists is now a matter of particular responsibility for commanders, party and Komsolom organizations, and the entire personnel staff of communications chasti and podrazdeleniya.

In this article we will discuss the skill of preparing long-distance communications specialists for rating examinations.

In the solution of this problem, considerable attention should be paid on the one hand to technical preparation, i.e., to the study of materials and the physical processes that occur in sections of apparatus, principal circuit diagrams, and wiring diagrams, and on the other hand to special preparation which involves learning how to operate a particular piece of equipment and to work on it.

The most important part of the preparation of rated specialists is, as is well known, the mastering of established standard requirements. One such requirement for long-distance communications specialists is the ability correctly to conduct measurements on long-distance cable communications lines, to determine the types of faults occuring in them, and to locate and compute the distance to such a fault. As both practice and the preparation for rating tests have shown, this subject is the most complex and the most difficult to learn. A complexity here is related to the fact that actual faults in cable lines are encountered infrequently and personnel in actual practice have very little opportunity for such training. In order to avoid this situation, some supervisors

practice solving the cited problems from a neighboring communications station. Naturally this practice to a certain degree affords the possibility of taking measurements on cable lines, but essentially it is only a matter of convenience since the trainees quickly realize that the fault can be located only in the neighboring station. Also, it is understandably difficult to release circuits and channels in actually operating communications systems for training purposes. 50X1

In order to avoid this difficulty and to guarantee a systematic and consistent training plan for the determination of the nature and location of faults in cable lines, it is, in our opinion, useful to employ special training equipment and attachments.

The standardized problem is that of determining the nature and distance to the location of a fault in a cable which has a capacity of more than three quads. It should be solved with a regulation measuring device, the most frequently used being the KP-50 cable device. Of course, it is difficult to provide in a training device all the various faults encountered in a cable line, but to a certain degree even comparatively simple circuits afford trainees the possibility of learning to use equipment for detecting several different types of faults. Below are given several tested and recommended attachment circuits for training which are equivalent to the more frequently encountered cables TZB, SMKB, MKSB, etc, with a 0.9 mm conductor. By correspondingly varying the electrical values of resistance and capacitance, it is possible to obtain an attachment which is equivalent to other communications cables.

Whereas the determination of the location of a severed conductor is relatively easy, such faults as a contact of conductors with a ground or with one another, in the presence or absence of sound conductors, are more complex. When they occur, it is more difficult to determine the nature of the fault, to conduct the appropriate measurements, and compute the distance to the fault location. For this reason, in the described attachments, primary attention is given to these very faults. Although the attachments disregard capacitance to ground and between pairs, these values are not essential to training objectives.

In the first stage of instruction when the trainees have mastered the methods of measuring the go-and-return resistance of a line, insulation resistance, and capacitance with the use of appropriate devices, it is possible to train specialists in determining the location of a fault in a cable with a simple attachment in case a conductor makes contact with a ground or another conductor. Knowing how to conduct measurements and computations in these cases provides confidence for working under more complicated circumstances. The circuit of such a training attachment and its switching are given in Figure 1.

Let us consider the precise order in which it is used.

50X1

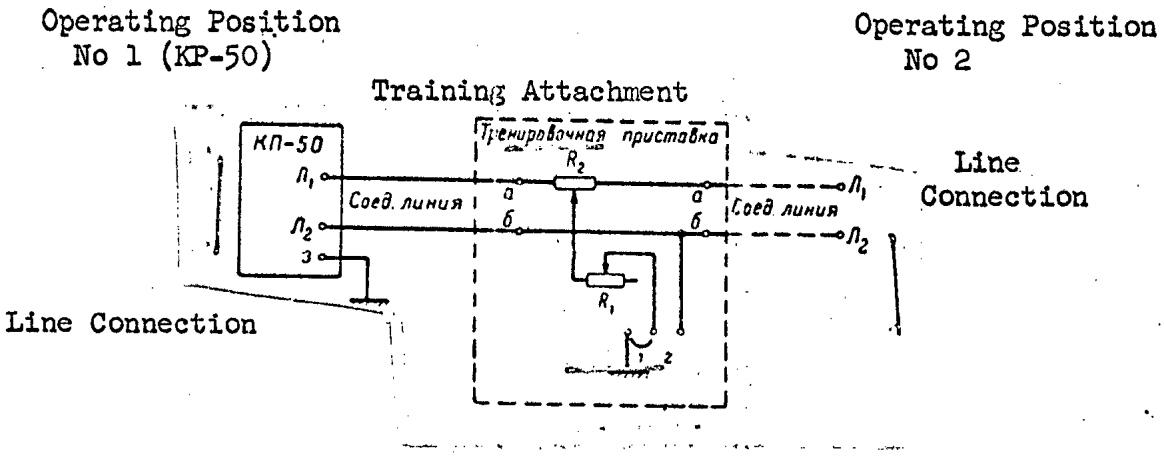

Fig. 1.

The trainee takes operating position No 1 which has a two-conductor connection from the attachment handled by the instructor. In the drawing, the broken line shows the connection of the line of operating position No 2 which may or may not be used. If it is not used, then all the required manipulations are made by the instructor. The trainee and instructor can either be right next to one another or separated by a service line which can also run to operating position No 2.

Theinstructor closes the connecting line at position 1 and at the same time grounds conductor a through resistance R_1. By varying the resistance, the instructor establishes the corresponding insulation resistance of a faulty conductor with respect to ground. By changing the position of the sliding contact of thepotentiometer R_2, he changes the distance to the location of the fault. Example distances to the location of the fault can be inscribed on the scale of R_2. It is recommended that the resistance values of R_1 and R_2 be kept initially with in the range of 1-5 megohms and 1 kilohm which corresponds to a cable pair 17.5 kilometers long.

The length of the line is told to the trainee who tests the insulation resistance of conductors a and b with respect to ground, reports on the reduction of insulation on one or the other conductor up to certain lemits, and asks the instructor to provide a short. Then, using a well-known method for determining the location of a fault, he balances the bridge and makes his computation according to the formula:

$$l_x = l \frac{2R}{990 R},$$

where l - length of cable;
R - resistance of the box.

The formula given above is valid only for the KP-50 instrument. 50X1

By repeated measurements and computations at various values of resistances of R_1 and R_2, the trainee learns to conduct these operations in minimum time with high accuracy.

With this same attachment, it is possible to train trainees to determine faults whether conductors in good working order are connected or not. Here, the instructor closes the connecting line at position 2 and by varying resistances R_1 and R_2 establishes the resistance value of the reduced insulation and the distance to the location of the fault. When he is convinced that there is contact between conductors a and b, the trainee selects the method of measurement: for example, the method of no-load operation and short-circuiting or the method of two-way measurement. These methods can be used successfully only if the resistance value of R_1 does not exceed 10 kilohms.

In the no-load and short-circuit method, the trainee measures the go-and-return resistance for the insulation conditions at the far end, that is, at the instructor's position and then under the shorted condition. These measurements can be used to obtain two values $R_{x.x.}$ and $R_{k.z.}$. Here the distance to the fault is determined by the formula

$$l_x = \frac{R_{k.z.} - \sqrt{(R - R_{k.z.})(R_{xx.} - R_{k.z.})}}{R},$$

where l - length of cable;
R - resistance of the conductor pair (loop) of a sound cable over its entire length.

The two-way method of measurement is used when there is a possibility of taking measurements at two different points. The trainee measures the loop resistance (at no-load - "insulation") from both ends, that is, both from position No 1 and the instructor, and from position No 2. When the measurement is taken at No 1, the resistance of R_1 is obtained. and when the measurement is taken at No 2, the resistance of R_2 is obtained. The distance to the location of the fault is computed according to the formula

$$l_x = l \frac{R + R_1 - R2}{2R},$$

where l_x = the length of cable;
R - loop resistance of a sound cable.

The attachment described above does not satisfy established requirements for further training and preparation for rating examinations. It is therefore necessary that more complex circuitry be used. Two such circuits will suffice as an example here. The main difficulty in designing such circuits is the great number of combinations. In the circuit

shown in fig. 2, this problem is solved by the use of jacks. 50X1

Both circuits shown (Figs 2 and 3) are computed for an equivalent cable line with 0.9-mm conductors and a length of 17.5 kilometers, They may be operated as a trainee-to-instructor system where the latter introduces the fault and by using the service line carries out the instructions of the trainee (provides a short or insulation, etc.) or they may be operated as a trainee-to-instructor-to-trainee system where the instructor introduces the fault and checks the actions of the trainee (measurements, giving of instructions, etc.) Let us consider the operation of these circuits in some detail.

The circuit illustrated in Figure 2 is designed for six lines ($Л1_1$ - $Л1_6$), which lead to a cable box or plug board at operating positions No 1 and No 2 ($Л1_1$ - $Л1_6$). Line 7 (7') is the service line. As already mentioned above, the second operating position does not have to be instrumented. In this case three sets of jacks on each line will suffice.

The first line is designed for introducing a fault of the "servered conductors" type, which is done by setting switch II_1 in the appropriate position. This switch should be a double-contact type, so that the capacitance can be changed at both ends of the line simultaneously which makes it possible to maintain a constant over-all capacitance. The second and fourth lines are identical and are used to bring the measurements up to standard. The fifth and sixth lines, through a 2-megohm variable resistor, provide a ground on one of the conductors whereas when the connecting line is at position 2-3 (shown on Fig 2 as a broken line), a contact is made between lines $Л1_5$ and $Л1_6$. Settings of switches II_2 and II_3 provide a change of the distance to the location of the fault in the steps 0 - 3.5 - 7 10.5 - 14 - and 17.5 kilometers.

Each jack set requires up to 10 two-wire cords with jacks terminated normally and with crossover. They are needed to switch-over the faulty lines and to transfer the faults from conductor a to conductor b. The cords with cross over terminals should be marked differently from the others. Short-circuiting jacks are also needed to provide a short with the training attachment. This can be done on conductors of different pairs by means of cords.

Before the attachment is switched on and adjusted, all the circuits must be tested and the numeration of the pairs and conductors at operating positions and attachment must be checked to make sure that they match. During the operation, the instructor establishes a fault by throwing over, for example, switches II_2 and II_3 to the second position. This will correspond to a distance to the location of the fault of 3.5 kilometers.

The instructor uses the cords for various switching operations in order to make sure that the faulty lines are not always on the fifth and sixth pair. For example, I H_5 with I H_4 line and I H_6 with I H_2

line. In this case, the second and fourth pairs will have faults which the trainee should determine first of all in accordance with norms. 50X1
By using the cords with crossover, it is also possible to change the faulty conductors. If two operating positions are used, the jacks on the right side of the circuit must be hooked up in order to match up the pairs with analogous switching.

By changing the value of the 2-megohm variable resistor, the instructor can at the same time change the value of the intermediate resistance at the location of the fault. If necessary, at jacks 1-2 and 3-4, the desired resistance rather than the connecting line can be connected in order to bring the transient resistance up to normal. Jack 7 is used as a service line: a telephone is hooked up to it by means of a cord and jack.

If five 100-ohm resistors are not inserted in lines I_6 and I_7, but some others (for example: 50 - 100 - 100 - 150 - 200) are inserted instead, it is possible to change the entire circuit as well as the location of the fault. Furthermore, a 500-ohm potentiometer can be inserted in place of the resistors and switches II_2 and II_3 as shown in Fig. 1. In this case, the design of the training attachment is simplified and the possibility of changing the distance to the location of the fault is increased considerably. However, if this is done, the instructor is no longer able to determine accurately the distance to the location of the fault.

Another variation of the attachment (Fig. 3) is based on the conventional 14 x 6 switchboard. In the illustration, the distribution of the jacks has been changed somewhat for the purpose of better visualization. The connections at an operating position are made here just as in the circuit shown in Fig. 2. Lines are selected by using double connecting lines with parallel jacks. If either connecting line is removed, a severed conductor is simulated. In Fig. 3 this is shown for $Л_2$ at the 7th kilometer, and for $Л_3$ at the 14th kilometer.

Connecting a single-conductor plug to the attachment by means of a cord and connecting to ground through a resistance or with each other affords the possibility for inserting a corresponding fault on any conductor of any pair. Figure 3 shows a connection of the 4th and 5th lines at the 11th kilometer and a connection of the 6th line to ground at the 7th, through a 2-megohm resistor.

Lines I_7 and I_7^1 are used as service lines. The instructor connects his telephone inparallel with the attachment. If one operating position is instrumented, all the commands are executed by the instructor with the attachment and single-conductor cords. With these circuits it is also necessary to see that the number of lines and conductors coincides before the attachment is hooked up.

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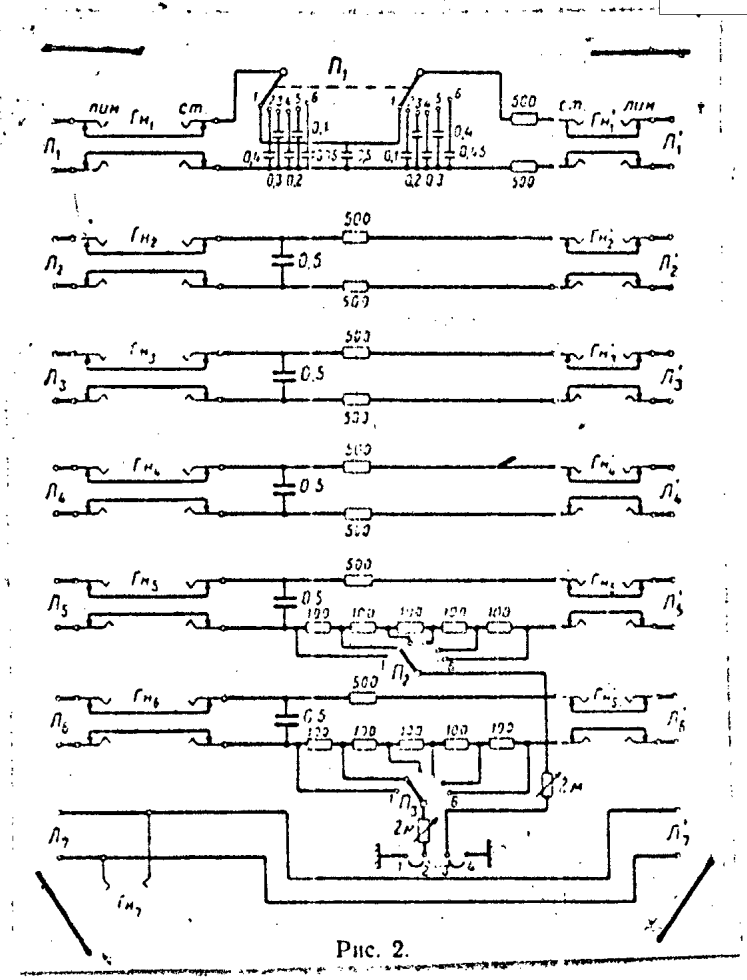

Рис. 2.

Figure 2.

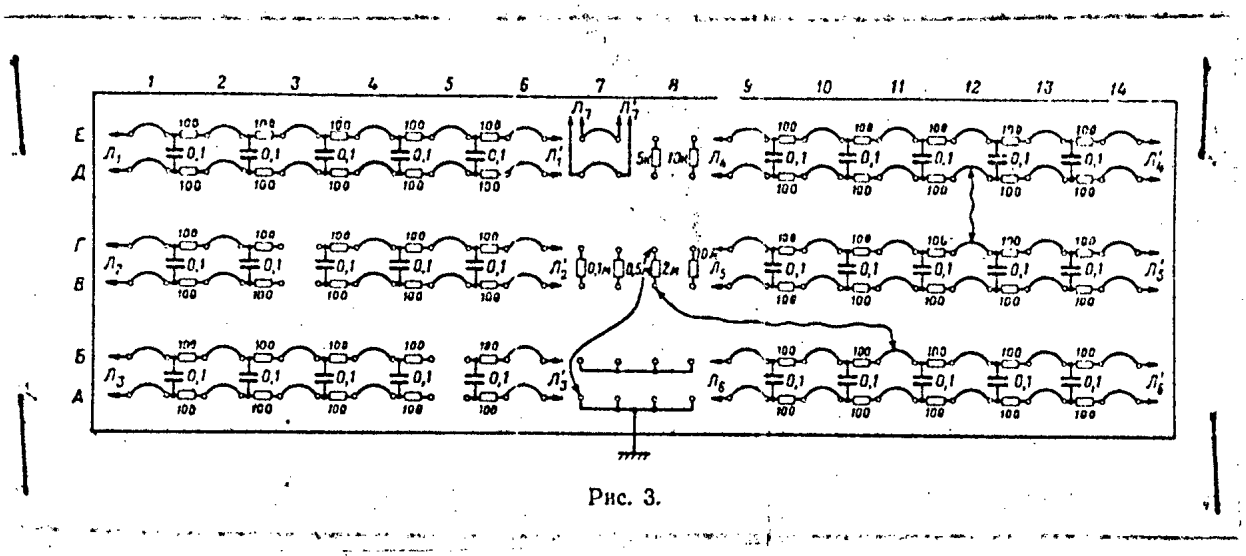

Рис. 3.

Figure 3.

At the operating positions, the measurements are conducted just as in the case of real communications lines: first, the nature of the fault is determined and the method of measurement is selected; then, all measurements are conducted and the calculation is made. From the very beginning, the trainee is obliged to make regular records in established form. 50X1

The testing of insulation resistance must be done with all conductors grounded except the one being measured. If this is not done, a fault such as the contacting of conductors with one another may be overlooked. Appropriate adjustments must be made at the operating positions in order to ground all the conductors.

In all cases of training practice the instructor can, indeed is obligated to, insert additional inputs. For instance, he can hook up as if there are no sound conductors at all in the cable. In this case, the trainee should know how to choose the method of measurement correctly: either the method of short-circuiting and no-load or the measurement of the loop from both ends.

The insulation resistance of the tested conductors in the circuits is 300-1,000 megohms which corresponds to the actual values of cable insulation. This is attained at the expense of the insulation resistance of the capacitors. In the training attachment circuit, MLT or wire-wound (0.25 - 0.50 watt) resistors and KBG paper-wound capacitors are used. The resistance and capacitance values given are rough values. If a training attachment is desired that is designed for other lengths and conductor diameters, their values must be changed accordingly.

The lines can be connected to the training attachment by means of standard knife-plug and socket units or plug-and-jack assemblies. The design configuration of the attachment may vary considerably. The simplest would be a flat panel with a protective cover.

Experience has shown that the attachment can be used successfully to prepare qualified long-range communications specialists. The time required for determination of the nature of a fault and the distance to it and for completing calculations is never more than 10-15 minutes for a specialist trained on the attachment.

In conclusion, we note that the described attachments can be used successfully for training personnel to measure insulation and loop resistances, capacitance, and asymmetry. Of course, before any such attachment is used in training, the instructor or training supervisor should carefully study the attachment itself, its operation and care, and its training possibilities.

(A captioned photograph by I. SEREGIN on page 47 shows Sr Sgt B. POPOV, radiotelegraph operator first class, operating a field

transmitter during a tactical assignment.)

50X1

EQUIPMENT AND ITS USE

Raising the Quality of Military Equipment Maintenance -- by Engr-Col V. V. YERMOLAYEV (Pages 48 - 51)

Abstract:

Discusses means of executing equipment maintenance in military units, emphasizing that modern equipment is constantly becoming more complex and that the bulk of maintenance operations has been transferred from maintenance organs to the units where the equipment is used. Podrazdeleniye commanders, Maj Tech Serv PRESMAN and Tech Sr-Lt REMIZOV are identified in the article.

(A captioned photograph by I. RYBIN on page 51 shows Sgt A. LUK'YANOV, specialist second class, inspecting the armament of an aircraft.)

Activate Innovational and Inventive Work -- by Col. F. V. YUKHNIN (Pages 52-54) 50X1

Text:

The number of innovators and inventors in the PVO Strany Troops has grown from year to year. It is sufficient to say that in 1962 there were 20 percent more than in 1961. The quantity and quality of innovational suggestions have improved. Last year more than 38,000 suggestions were offered. Eighty percent of them were put into practice. This made it possible to improve methods for preparation of materiel for combat operation, raise the quality of the materiel maintenance and repair, and increase the effectiveness of combat employment. In other words, putting inventions and innovational suggestions into practice contributed to an improvement of the combat readiness of chasti and podrazdeleniya.

The fruitfulness of innovational work can be illustrated by an example from one of the aviation chasti. Servicemen her made portable stands which make it possible to service aircraft successfully in the maneuvering area of any airfield and during rapid redeployment. A device was developed by innovators for checking an airborne apparatus which shortened all operations to one fifth the time formerly needed. This device also makes it possible for pilots to train in the aircraft cockpit during the preliminary preparation.

Innovators devote a great deal of attention to improvement of the ways and methods for automation of troop control processes. Much has been done in this direction by innovators of one soyedineniye. An apparatus designed by them made it possible to decrease drastically the number of personnel needed in command posts, to decrease the time for transmittal of information, and also to increase their authenticity. A suggestion for automatic remote control of a radar apparatus and power supply units which undoubtedly increases the combat readiness of radar podrazdeleniye is widely used.

In air defense rocket chasti, innovators are diligently searching for a way to improve methods of readying materiel, to improve the equipment itself and the means of transporting and storing it.

Innovators of chasti and podrazdeleniya have made a series of trainers and simulators which make it possible to train personnel in conditions approximating combat conditions. One of the simulators facilitates the training of radar crews for working in conditions of interference. A trainer for complex training of flight controllers, GCA controllers, pilots, and operators permits training sessions to be conducted without expenditure of fuel and wear and tear of expensive materiel.

Many other proposals have been put into practice. They all testify to the growing technical knowledge of servicement and their skill in employing the latest achievements of science and technology. 50X1

Success in innovational work is explained first of all by the important work conducted by commanders, political organs, party and Komsomol organizations, and also commissions for inventions. They have done a great deal to draw personnel into creative activities to render aid to the innovator serviceman, and to publicize active innovators.

Nevertheless, we cannot rest on our achievements. Essential shortcomings still remain in organizing and formulating innovational and inventive work. Instances of formal attitudes toward the innovator servicemen have not yet been overcome. It takes too long for many valuable proposals to be examined and take root, thus lowering their effectiveness. Several proposals remain the property of only that chast' in which their authors work even though they are of interest to others. This in particular happened with an instrument for the automatic composing of training radiograms of letters and numbers text, the PNR-2. This small attachment to 2BDA-43 telegraph apparatus makes it possible compose in six hours the number of training radiograms which formerly took six men a whole day to compose. However, no one knew about this instrument for a long time. Other proposals, such as a sensitivity chart for radio receivers, an instrument for checking telegraph channels, and others also remained relatively unknown.

The initiative of the Baku PVO District in the creation of a general design bureau and workshops did not receive widespread dissemination. Their work experience was not publicized and consequently did not become available to all chasti and higher educational institutions.

It is known that publication of outstanding experience is not an automatic affair. It is the duty of each leader. Thus, commanders, leaders, and members of commissions for inventions must constantly take an interest in the state of inventive work, bring valuable proposals to light, and take measures to put them into practice. Unfortunately, there are facts which testify that some commanders and chiefs poorly lead innovational work, do not delve deeply into the activities of commissions for inventions, and do not display a proper concern for attracting more and more servicemen into the ranks of innovators. Negligence in the work of the commission for inventions headed by Officer SELEPANOV can be explained precisely by this. Here innovational work is not planned and thematic assignments are not developed for the innovators. It is no accident that during the past year not one proposal was suggested by the servicemen.

It also appears abnormal that in some chasti and higher educational institutions innovational and inventive work is conducted somewhat one-sidedly. In higher educational institutions, for example, this work is almost exclusively devoted to the creation of educational materials while in aviation chast, it is basically directed toward the creation of different

checking stands. In related chasti parallelism can still be observed in inventive work, which leads to a superfluous expenditure of time, energy, and facilities. This is explained by a weak arrangement for publication technical information. 50X1

However, it should be noted that even a well adjusted output of leaflets, compilations, and bulletins of technical information will not yield proper results if materials set forth in them are not studied by the commissions for inventions or if innovators do not become familiar with them. Each published proposal must be studied and a concrete decision reached on it.

Concerning shortcomings in the work of the commissions for inventions, it must be noted that they do not properly publicize inventions and do not worry about the official registration of claims for them. The fact that in 1962 only 34 certificates of authorship were received among all our troops testifies to this, for example. Cases are encountered where the principal of material incentive was ignored. It is known that the author or an innovational suggestion or invention put into practice must be given an incentive award. But in the Artillery Radiotechnical Academy imeni Mar SU. L. A. GOVOROV, in the Kiev Higher Radiotechnical Engineering School, and in some chasti, some authors of proposals did not receive awards. Here and there, smaller awards are given than the minimum established by instructions. Thus, the size of the award alloted by the commission headed by Officer TYCHKOV is almost 50 percent lower than the established mimimum.

These and other facts testify that there are not a few shortcomings in the organization and leadership of inventive work. The review competition which began on the first of April for the best organization for inventive and innovational work in chasti, military educational institutions, and scientific research establishments of PVO Strany Troops should help eliminate these shortcomings and further develop the creativity of personnel.

The contest is pursuing the propose of attracting great numbers of personnel into active innovational and inventive work; improving the examination, introduction, and dissemination of proposals contributing to an increase of the combat readiness and combat skill of personnel; and bringing to light the best groups of inventers and innovators, leaders, and organizers of innovational work.

A peculiarity of the present contest is that it is being conducted among the fighting arms and services PVO Strany Troops.

The results of the contest will be announced by 31 December. For the incentive of chasti and higher educational institutions occupying the best places and receiving a favorable evaluation on combat training and combat readiness, 15 prizes have been established, ranging from 100 to 300 rubles each. This money will be used by the commanders of cited chasti, higher educational institutions, and scientific establishments to reward the most outstanding inventors, innovators, and organizers of inventive work.

In judging the contest, the qualitiative and quantitative showings of creative work, the organization and direction of inventive and inno- 50X1 vational work, the popularization of innovators and publicity for their achievements, etc., will be considered.

There is not much time left until the end of the contest. This time should be used to eliminate present shortcomings by activating innovational and inventive work.

(A captioned photograph by I. SAVIN on page 53 shows Sgt M. NESTEROV operating an electrical device. Many of NESTEROV's suggestions for improving aircraft electrical systems have been adopted and put into practice.)

(A captioned photograph by P. GORDIYENKO on page 54 shows Sgt. V. TRUNOV who invented a device for the disassembly of aircraft wheels.)

Recording Equipment Operation -- by Engr-Capt Yu. M. FOKIN (Pages 55 - 57).

Abstract:

Explains a method for recording the results of preventive maintenance inspections on electronic equipment entailing filling out a log of equipment inspection results and a record of equipment failures including all pertinent data such as time, cause location, etc.

(A captioned photograph by I. PETROV on page 57 shows Capt Tech Serv I. SOLDATOV checking work done by Specialists 1st Class Sgt MIRONOV and Jr Sgt TANIN. The caption to the photograph states that these personnel work on aviation equipment.)

Indirect Indications of Aviation Equipment Malfunctions -- by Engr-Maj V. N. FILIMONOV (Pages 58-62)

The practice of using and servicing aircraft testifies that causes of equipment failures accumulate gradually and are manifested, first by what seem minor deviations from established standards. Eventually, these deviations build up and lead to a break down of a system, unit, or instrument. For example, a deterioration or cessation of communications when an aircraft is far from an airfield is preceded by a loss of emissions of the radio output tube, failure of the flowmeter system in preceded by inaccurate measuring of fuel consumption, and so forth. All these are indirect symptoms by which it is possible to predict the possibility of a system failure in flight and consequently to forestall it.

We will take several examples of malfunctions in basic aircraft and engine systems and examine possibilities for forestalling failures of the systems in flight by analyzing their indirect symptoms.

Once when a pilot released his landing flaps, his aircraft banked sharply to the right. The aircraft straightened up in two seconds and did not again show a tendency to repeat the involuntary bank. Upon studying this incident on the ground, it was established that the reason for the unintentional aircraft bank was a difference in the operational speed of the flaps following their release. The left flap moved quickly. The right one moved slowly at first, then moved quickly two or three seconds after release. To eliminate this defect, the reversing valve, in which it was supposed the plunger was binding in one of the extreme positions, was replaced. Then, the operation of the flap system was checked on the ground with the engines running. Both flaps moved with identical speed. However, the failure was repeated in flight. A careful check showed that the reason for the unequal release of flaps was an air lock formed in the hydraulic system because of a leak in the slide valve of the emergency flap system. After removing the air from the hydraulic system, the failure did not occur again.

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The formation of air locks in the lines of hydraulic systems can happen, as is known, for widely varied reasons: because of leaks in slide valves of pneumatic emergency systems, from checking the systems on the ground when the hoses are not filled with hydraulic fluid, because of overheating of the hydraulic fluid and evaporation of light factions from it in the lines which pass near hot parts, as a result of a small amount of pressure in the hydraulic tanks, etc.

As a rule, air locks in the hydraulic system lead to temporary and sometimes to complete failure in flight of either individual assemblies or entire systems as a whole. Therefore, aviation specialists must know how to detect air locks in proper time and eliminate them.

Air locks in the hydraulic system can be detected by one or more indirect symptoms. One of the symptoms is pressure fluctuation in the system with the engines running due to periodic failure of the plunger-type pressure pump. Fluctuation is detected by chaotic movement of the cabin pressure gauge indicator. These waverings of the indicator may be between plus or minus two or more graduations on the scale. If the system does not have a plunger pump but a spur-gear pump, then instead of pressure fluctuation, it will drop 20-40 percent in comparison with the maximum, then rise to the maximum after each three to five minute period, then it will again drop sharply to the previous amount.

It is also possible to detect air locks by an increase of the fluid level in hydraulic tanks after checking engine operations. This increase is caused by heating of the fluid and also air in the line. After cooling off, the fluid in the tank decreases again.

It is possible to determine the presence of air locks by an increase of pressure in the hydraulic tank after checking the engine and the hydraulic system on the ground. Pressure in the hydraulic system in this case will be the same as during a landing following a flight. It happens as

follows. Upon checking operation of flaps for air breaks on the ground, they do not emerge simultaneously. This indicates a fall of air under the plunger of the reversing valve, causing a displacement of the plunger to one of the extreme positions. 50X1

Finally, a sign of the presence of an air lock is a pressure drop in the emergency pneumatic landing-gear and flap systems which are connected with the aircraft hydraulic system through the emergency valve.

The failure of a stabilizer or aileron control system because of malfunction in the slide valve pair of the hydraulic booster can cause serious consequences. It was noted that this failure occurs most often in the air and it is not detected when pre-flighting the aircraft. It happens in our opinion, because in the first place all pilots and aviation specialists do not yet possess firm skill in detecting minor deviations in the operation of hydraulic boosters while checking them on the ground or, if they have this ability, they do not attach much importance to it. In the second place, demands of the manual on operation and regulation of aircraft equipment servicing as regards pre-flight checks for hydraulic booster service ability are essentially concentrated on qualitative assessment of a complete failure, but instructions are not given on how to make quantitative analysis of a particular disorder.

To what consequences this sometimes leads can be illustrated in the following example. During an aerial intercept flight, the elevator booster became jammed on the aircraft piloted by Capt GAR'KAVYY. After disconnecting the booster, the pilot landed at his airfield. In conversation with him, it was explained that while checking the booster prior to take off, he detected a slight increase in force when pulling the control toward himself but he supposed that the flight charging mechanism had switched on automatically. However, a check did not confirm this since, with the three positioned switch in the "heavy" position, the force required to pull the control forward increased. Having come to a completely incorrect conclusion on the malfunction in the elevator control system, Capt GAR'KAVYY decided to complete his flight mission.

It should be kept in mind that quantitative symptoms of a malfunction of any aircraft or engine system can be calculated. Thus, a malfunction of a hydraulic booster slide valve pair can be determined by an unusual amount of aileron control deviation in the extreme position, by unusual speed of control stick return from the extreme positions, and finally by an automatic pressure drop in the hydraulic system when the aircraft control stick is at the same time unmovable. Each of these deviations from the normal testifies that malfunctions appear in the hydraulic system which can lead to a complete failure of a system.

Air as the operating force for power drives is being used to a lesser degree but pneumatic systems, nevertheless, often serve as sources of failures. The braking system fails most often because of moisture freezing in reducer RV-50 when the aircraft is employed in low temperatures.

Placing reducer RV-50 under the surface fairing instead of placing it in the cockpit as previously done, lowered the frequency of this failure in dry climates. Even in regions with wet climates or with frequent alternations of frost and thaws, this recurrence was lowered significantly. 50X1

At first glance, it might seem that it is impossible to forestall a failure of the braking system due to freezing to moisture in the air reducer. However, use of indirect systems does help. The problem is that when moisture freezes in the reducer, air flows slowly through it. Because of air accumulated in section RV-50--valve PU-7 while the aircraft is parked, deviation in the operation of the breaking system is not successfully detected when the brake control lever is pressed once or twice. Reading the two-handed brake pressure gauge will in this case satisfy the technical conditions. But with each subsequent braking, maximum pressure in the breaks will decrease by 2 to 3 kg/cm^2 until it equals 0. After one or two minutes the given section will again be filled with compressed air. If the brake is activated again after this, the picture of a progressive drop from maximum pressure will be repeated.

The possibility of a failure in the system for filling the pressurizing hose of the movable part of the cockpit canopy in the event of moisture freezing in reducer PV-3 can also be detected in this manner.

In operational practice, cases of malfunctions through the fault of aviation specialists are encountered even now, especially those due to incorrect repair of parts and asemblies and inobservance of manuals when executing maintenance work, etc. Thus, on one aircraft the front landing-gear indicator light did not come on after take off. The pilot raised and lowered the landing gear twice. Since the light did not come on, he assumed that the signal light system had failed and he continued the flight. But, as it turned out, the signal lights had nothing to do with it. The light did not come on because the front strut did not lock in the retracted position and, after placing the control valve in a neutral position, the front strut fell from the housing due to the effect of gravity and the air current.

After landing the aircraft, it was established that the aircraft technician had stretched the locked spring excessively while repairing it. This resulted in a downward displacement of the lock opening lever and the locking catch. In flight, when powerful suction forces affected the strut in its flap, the lock opened.

Both the technician and the pilot were at fault. Neither of them anticipated the failure in time although it would have been possible. If, for example, the strut lock doors were opened, then when the landing gear was retracted on the ground, it would have been possible to detect the insecurity of the lock closing as soon as the front strut was raised into the housing.

After releasing the landing gear, an increase of more than 120 degrees in the angle between the locked cylinder pin and the lever bearing service is evidence of an excessively stretched locked spring. 50X1

It is also possible to determine failure according to hourly fuel consumption in flight. If it is great and a correctly functioning front landing gear warning light does not burn, then this signifies that the strut is not retracted.

Indirect symptoms of a partial failure of a system make it possible to forestall an increase of compressor pumpage in flight, the consequence of which is stalling of one or both engines.

It is known that the cause of pumpage of an engine with a high pressure axial-flow compressor is often broken or damaged vanes. An inspection to detect damage with the engine mounted in the aircraft will not be successful because of the lack of access. Therefore, indirect symptoms serve as the solitary source of information on the condition of the engine air circuit, i.e., for instance such symptoms as a deposit of metal fused (the Schoppe process) onto the turbine vane and on the inner walls of the reaction and extension pipes and an increase of gas temperature for the turbine at all established engine operating regimes within the range of automatic regulation of revolutions. This increase of gas temperature is brought about by the fact that when the compressor vanes are damaged, the losses in it are increased. With steady turbine power this would have lead to a decrease of engine revolution, but the regulator pump restores the amount of revolutions due to an increase of fuel supply into the combustion chamber. The more the vanes are damaged, the more the gas temperature rises.

It is also possible to recognize the condition of the air circuit by an increase of engine pick up time in a range from normal revolutions (NAR) to maximum. Since gas pressure in front of the turbine increases with an increase of gas temperature, air consumption through the compressor decreases, leading to a decrease of power generated by the turbine.

Signs of abnormal operation of the engine air circuit are a change of engine operating noise (in a compressor with a broken vane, a howling sound is audible), a characteristic rumbling in the compressor, and sometimes a knocking which can be caused by inobservance of some of the rules of preflight engine check out.

To shorten the usual time spent on preflight preparation of aircraft and engines, checking of the aircraft systems should be conducted simultaneously with an engine warmup at 500 to 700 RPM, exceeding the revolutions for the air by-pass bleed to open from the compressor. After engine warmup, the throttle control is shifted to the idling position. The swiftness of this shifting is not stipulated in the instructions on engine use or the regulation on equipment servicing. Therefore, a technician or pilot usually executes the shift in one and a half seconds. In this case, revolutions are increased at a slower rate than the throttle

control moves since air consumption through the engine is decreased at a slower rate than fuel consumption through the nozzle. Some specialists shift the throttle control to 200 or 300 rmps fewer than the revolutions for the air by-pass bleed to open from the compressor for approximately 10--15 seconds. In this event, engine operating characteristics to the maximum possible degree approach the limits of reliable compressor operation. If the vanes of the compressor are damaged, the limits of reliable operation are changed so that there is a greater consumption of air and nearly equals or even overlaps engine operating characteristics. Pumpage arises in the compressor accompanied by the rumbling or even knocking.

50X1

A no less serious failure is engine stalling in the air, which leads to scorching of turbine vanes or to switching off of the turbine or sometimes to both. Violations in adjusting the engine fuel apparatus are a basic cause of this failure. A precise instrument check of these adjustments requires a great expenditure of time; therefore, it is not done as a rule, between overhaul periods. However, experience shows that the possibility of engine stalling can be foretold with a sufficient degree of accuracy by using a single fuel pressure gauge attached beneath the lines of the auxiliary nozzle duct. This is done in the following manner. After warmup, the engine is idled. Then as soon as temperature and idling are established, fuel pressure is measured on a guage. These revolutions and the pressure must have an identical deviational percentage from one of the extreme permissible readings, for example, from the lower one. If this condition is not satisfied when the throttle is sharply shifted in the air, stalling is possible. If idling is regulated according to the lower limit and fule pressure according to the upper limit, then when flying at a high altitude, a hot stall will occur as a result of a small gravitational consumption of air through the engine accompanied by a rapid rise of gas temperatures behind the turbine. If idling is regulated according to the upper limit and fuel pressure according to the lower limit, a cold stall will occur. The consequences of such a stall are very dangerous when exiting on the second circle, or upon correction of a gliding prior to landing since it is not possible to quickly increase engine revolutions.

The possibility of engine stalling can also be determined by other signs, for example, by the increase of pickup time in the range from idling to normal revolutions and alsoby the nature of gas temperature temperature rise exceeds the rise of revolutions then hot stalling is possible and vice versa. Rumbling in the range from idling to normal revolutions indicates the possibility of hot stalling.

The ability to forestall equipment failure by indirect symptoms must be taught to all pilots and aviation specialists. A definite sequence of training can be developed for this purpose. First, it is necessary to learn to determine correctly which failure of an aircraft or engine system could have dangerous consequences. Whether these malfunctions occurred in the operational process or not, they are regarded as weak spots in the system. For example, weak spots for the stabilizer control system will be sticking

of the regulating or duplicating slide valve of the booster, sticking rocker DR-5, breakage or disconnection of rod ARU-2, etc. Specialists must have a clear idea of the effect exerted on the operation of the entire system by each of these malfunctions and to what consequences they can lead. After this, the study of symptoms making it possible to determine partial failure or those generating complete failure can be approached. 50X1

To master methods for detecting failures and malfunctions successfully, it is necessary at all classes on equipment preparation to dissiminate a list of failures and malfunctions compiled on the basis of work experience. Notebooks in which the names and symptoms of complete or partial failure of a system are indicated are a great help to students. These lists should be hung in the working quarters of the podrazdeleniye.

It is necessary to determine indirect symptons of failures simultaneously with the conduction of preliminary and preflight preparation, that is, without additional expenditure of work time. This method has proven itself valuable when applied to systems of which not only final, but also intermediate parameters can be checked, when they are checked only once (pressure, temperature, revolutions), or during the entire period of operation (wear and tear, clearances increases, etc.). In these cases, a deviation of parameter sizes for the established technical conditions or an inclination toward permissible limits is a symptom of a forthcoming failure.

An excellent knowledge of indirect symptoms of aviation equipment malfunctions will provide high quality preparation of aircraft for flight and execution of flights without accidents or preconditions for accidents.

(A captioned photograph by F. KONSTANTINOV on page 60 shows Tech Sr Lt N. T. ARCHAKOV, Technician 1st Class, checking an aircraft control assembly.)

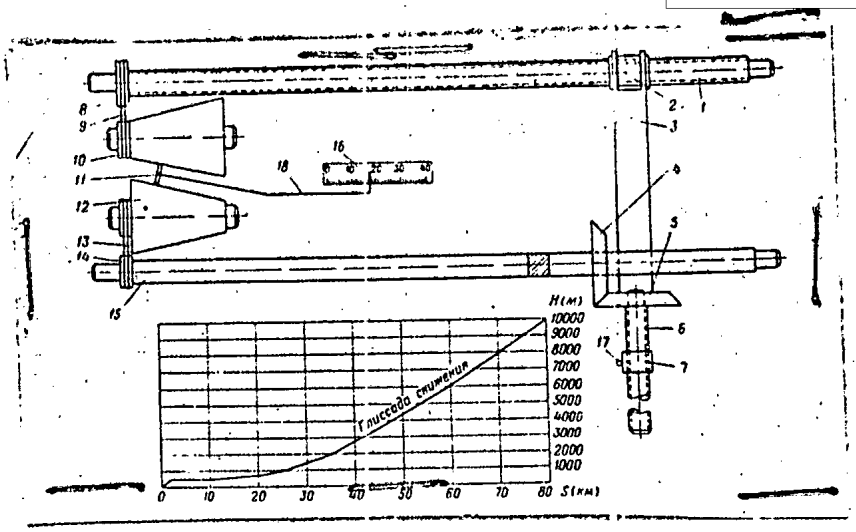
GCA Operator Training Device -- by Pvt A. P. DOMINICH (Page 63)

Text:

Training GCA operators, as is known, is associated with no few difficulties and requires much time. In order to accelerate their training by means of training sessions, particularly on non-flying days, innovators have developed a special training device. It fully simulates the movement of an aircraft on the glide path and graphically delineates it according to the operator's commands.

The training device is constructed in the following manner (see drawing): All parts and an electric motor are assembled inside a box.

50X1



Its dimensions are determined by the dimensions of screws 1 and 6 which in turn depend on the selected glide path scale and the materials available for construction. On the outside of the box, control handle 18 with graduated scale 16, screw 5 with nut 7, and pencil 17 are located. A sheet of drawing paper with a outline of the standard glide path, range, and altitude markings is placed beneath the pencil.

The training device mode of operation follows: Screw 1 is turned by the electric motor through a reducer at a constant speed. Nut 2 can move only forward along this screw since it is prevented from rotating by yoke 3. The forward motion of the nut is transmitted to yoke 3, and bevel gears 4 and 5 and screw 6 which are fastened to yoke 3. Pencil 17, which is fastened to nut 7, delineates a horizontal line. The pencil is moved vertically due to rotation of screw 1 through sheave 8 and belt 9 on cone 10. By changing the position of intermediate roller 11 along scale 16, it is possible to set any speed of descent from 0 to 40 meters a second. Controlled cone 12 through belt 13 and sheave 14 turns four-sided shaft 15 at the set speed. Bevel gear 4, which can move freely along shaft 15 lengthwise, transmits rotation to bevel gear 5 and screw 6 which is attached to bevel gear 5. Nut 7 and pencil 17 are secured from rotating and move forward only.

Two operators train on the device simultaneously. One is located directly at the device and simulates the actions of the pilot and also gives the aircraft's running coordinates i.e., altitude and range, to the other operator. The other operator located at some distance from the training device assigns the proper descent attitude to the first operator, whom he is supporting, according to the coordinates received.

The Platinotron -- by Engr-Col M. L. KHAVIN, Candidate of Technical Sciences (Pages 64-69)

Abstract:

Based on the foreign press, discusses construction, operation, and use of plationtron microwave tubes. The article includes the following table of US produced platinotron tube characteristics: 50X1

Type	Designation	Frequency Range, mc/sec	Power Mw	Gain, db	Anode Voltage, kv	Anode Current, amp	Pulse Duration sec
QK-434	Amplitron Stabilotron	1250-1350	to 3	5-20	to 70	to 70	to 5
QK-520	Amplitron	1220-1350	1.3	---	45	40	5
QK-622	Amplitron	2900-3100	3	10	55	60	24
QK-629	Stabilotron	1270-1350	---	---	---	---	---
QK-630	Stabilotron	1270-1350	0.5	---	35	---	---
QK-642	Amplitron	---	10	8	80	180	5
QK-653	Amplitron	1280-1350	5	10	96	---	---
QK-654	Amplitron	1250-1350	0.8	9	40	84	---
QK-680	Amplitron	3 cm	to 8 kw	8-16	---	---	constant
QK-783	Amplitron	2700-2900	3	12	55	65	10

Automatically Adjusting Autopilots by Engr-Maj V. A. VASILENKO, Candidate of Technical Sciences (Pages 70-72)

Abstract:

Based on the foreign press, discusses the operation and construction of advanced automatic guidance systems such as that of the Lockheed F-94C.

CYBERNETICS AND AUTOMATION

Connecting the Ural-1 Electronic Computer to Telegraph Communications Channels -- by Engr-Col A. M. MIKHAYLOV and Engr-Capt V. A. TARASOV (Pages 73-79) 50X1

Text:

A wide application of electronic computing machines (ECM) characterizes our modern age. In addition to special electronic computers used directly with various equipment, universal computers which may be located at a considerable distance from the equipment are also of great interest. In the latter case, the input of information to the computer and the transmission of the output results must be carried out over a considerable distance, i.e., over lines of communication.

Let's examine a device (fig. 1) which ensures a remote input of information and output of Ural-1 computer results over telegraph communication channels with the aid of regular telegraph equipment.

Input. ST-35 telegraph equipment sends into the line a binary code consisting of seven bits, five of which carry useful information (fig. 2). To convey a number it is sufficient to utilize only the first four bits which ensure $2^4 = 16$ various combinations sufficient for the telegraph code to represent all digits from 0 to 9. Investigations have shown that for the same number of bits it is possible to transmit with the aid of numbers more information than by the letters grouped into words. A sequence telegraph code from the line is unfolded with the aid of ST-A telegraph equipment which has a special attachment, into a 36-place number which is stored on a relay register (RR). The electronic computer reads the information from the register only after it has been completely filled. The access time to the relay register and the transfer time of the number into the NMB cell represents a single operating cycle of the computer, i.e., 10 microsec.

A special command, "Interrogation of RR," with coding "33a" is used in referring to the relay register. At this command the contents of the relay register are transferred to the cell "a" of the MD. The command "33a" can be formed only in presence of the "signal of relay-register readiness" (SRRR). After completion of this, signal W-1 is formed.

To convert the sequence telegraph code into a parallel one, which forms a 36-place number, ST-A or ST-35 telegraph equipment and the relay register are used (fig. 3).

On the vertical lever of the ST-A perforator are mounted insulating cams, and on a special bracket opposite them are mounted four groups of normally opened contacts (fig. 4). After the selector bars have occupied positions in accordance with the code arriving from the line, the horizontal perforator levers begin to move and close the contacts on the bracket in

accordance with the incoming code. The parallel code from these contacts is admitted to the brushes of the RR step-by-step switch. The +100-50X1 voltage is fed through the contacts of the telegraph equipment and the contacts of the step-by-step switch to the windings RSM-1 of the relay register (fig. 4). Now, the contacts close and the relay automatically blocks the following circuit: +100 v, contacts RSM-1, contacts of relay R_2, K-bell and ground. As a result, the sequence telgraph code is converted into a parallel code and is stored on four relays (tetrad) of the relay register.

Subsequent connection of the tetrads of the following numbers ensures the operation of step-by-step switch ShI-11. A contact group, mounted over the perforator punch, is used to supply a signal to actuate the rotor of the switch. The +100-v voltage is fed through this group K_1 (fig. 4) in the first place to the four normally open contacts mounted on ST-A. The incoming information is registered on the tetrad, the punch drops and the normally open contact in group K_1 closes the power supply circuit of R_1. Through relay R_1 contacts and contacts of R_3, power is supplied to the winding of the step-by-step switch (SS), its rotor turns one step and moves its arms to the contacts (field) of a next tetrad. Having moed up, the punch will set the contact group into normal position and the +110-v voltage will be connected to the contacts of ST-A, Thus the circuit will be ready to receive a next digit.

Computer Center
Start

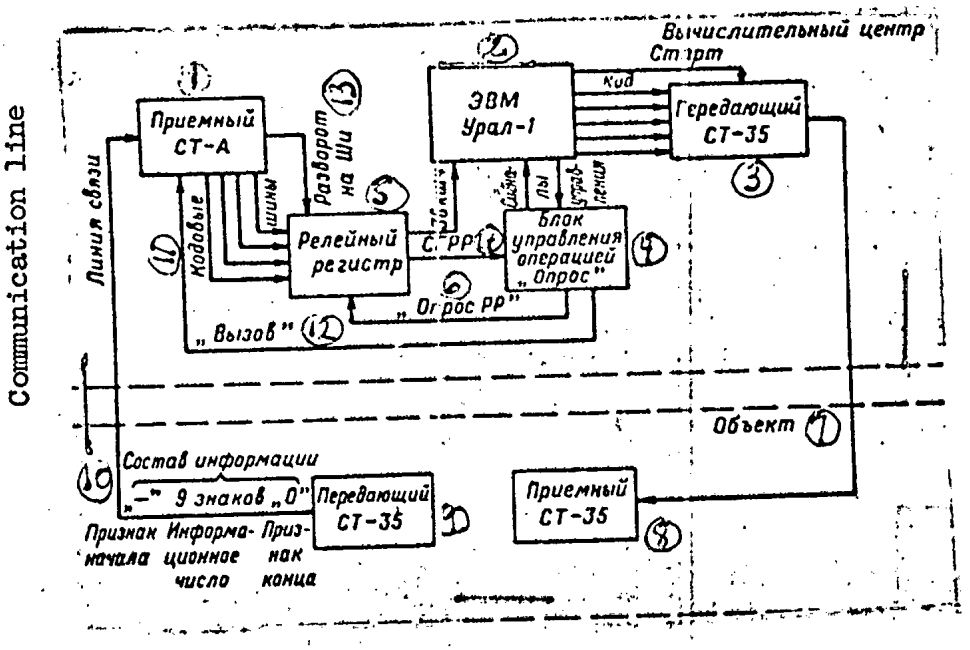
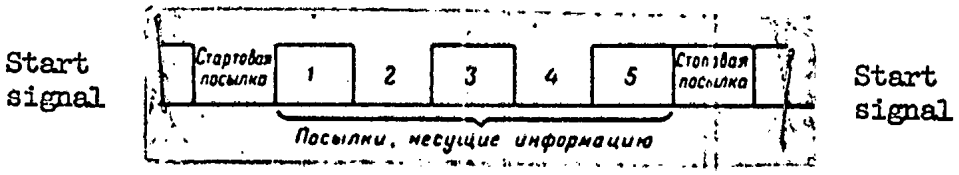


Fig. 1

1. Receiving ST-A
2. Computer Ural-1
3. Transmitting ST-35 Control signals
4. "Interrogation" Control Unit
5. Relay Register
6. "Interrogation of RR"
7. Object
8. Receiving ST-35
9. Transmitting ST-35
10. Composition of Information

"-", Start Sign	9 digits, Information number	"0" End Sign

11. Code busbars
12. "Call"
13. To Step-by-step switch
14. SRRR-signal of readiness of RR



Signals Carrying Information

Fig. 2

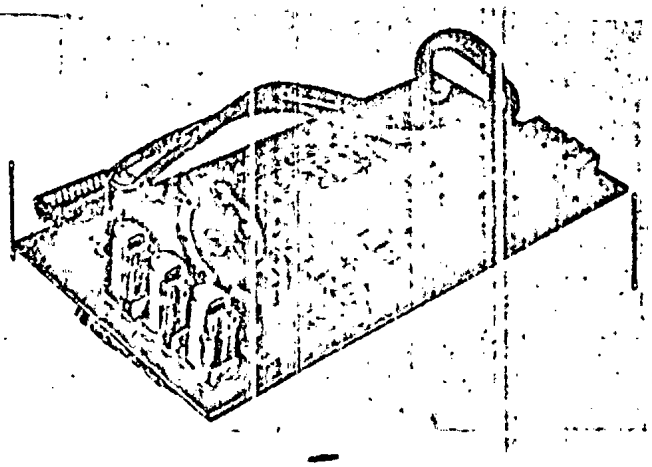


Fig. 3

The operating cycle of the step-by-step switch and the cycle of transmission of full information from nine digits (36 binary bits) is carried out in the following manner: the information consists of the sign "-" which indicates the beginning of the information number, of 9 digits which comprise the information number proper, and of the signal "0" which indicates the end of the information number. For example: -5349817260, --3756312050, -7519633210, -1111111110. The beginning of information sign

is transmitted by the "-" key. It has a code (fig. 5). Here 1 and 2 are currentless transmissions and 3, 4, and 5 are current transmissions. Or with such a combination will the contacts of relays R_{05}, R_{06}, R_{07}, and R_{08} contact the +110-v source and ready the supply circuit of the step-by-step switch, the rotor of which will move a single step and connect the first tetrad of the number consisting of relays R_{32}, R_{33}, R_{34}, and R_{35}. After the sign "-", the 9 information digits are transmitted. 50X1

The last transmission after the information number is the sign "0" which is transmitted by four current signals with the aid of relays R_{04}, R_{03}, R_{02}, and R_{01}. Thus, the +110-v voltage is fed to the relay R_3 winding through the normally opened contact K_1 and the in-sequence closed contacts of relays R_{04}, R_{03}, R_{02}, and R_{01}. The relay R_3 now blocks out and disconnects the winding of the step-by-step switch from the power supply on the side of the relay R_1 contacts (fig. 4). The relay-register readiness signal is fed through the contacts of relay R_3 to the control unit (potential +140 v) and the step-by-step switch stops in the eleventh position. The relay register remains in such a position until the arrival of command "33a" at the relay R_4 which then operates and supplies +110 v voltage to relay R_2. Simultaneously this voltage is applied on the winding of the step-by-step switch.

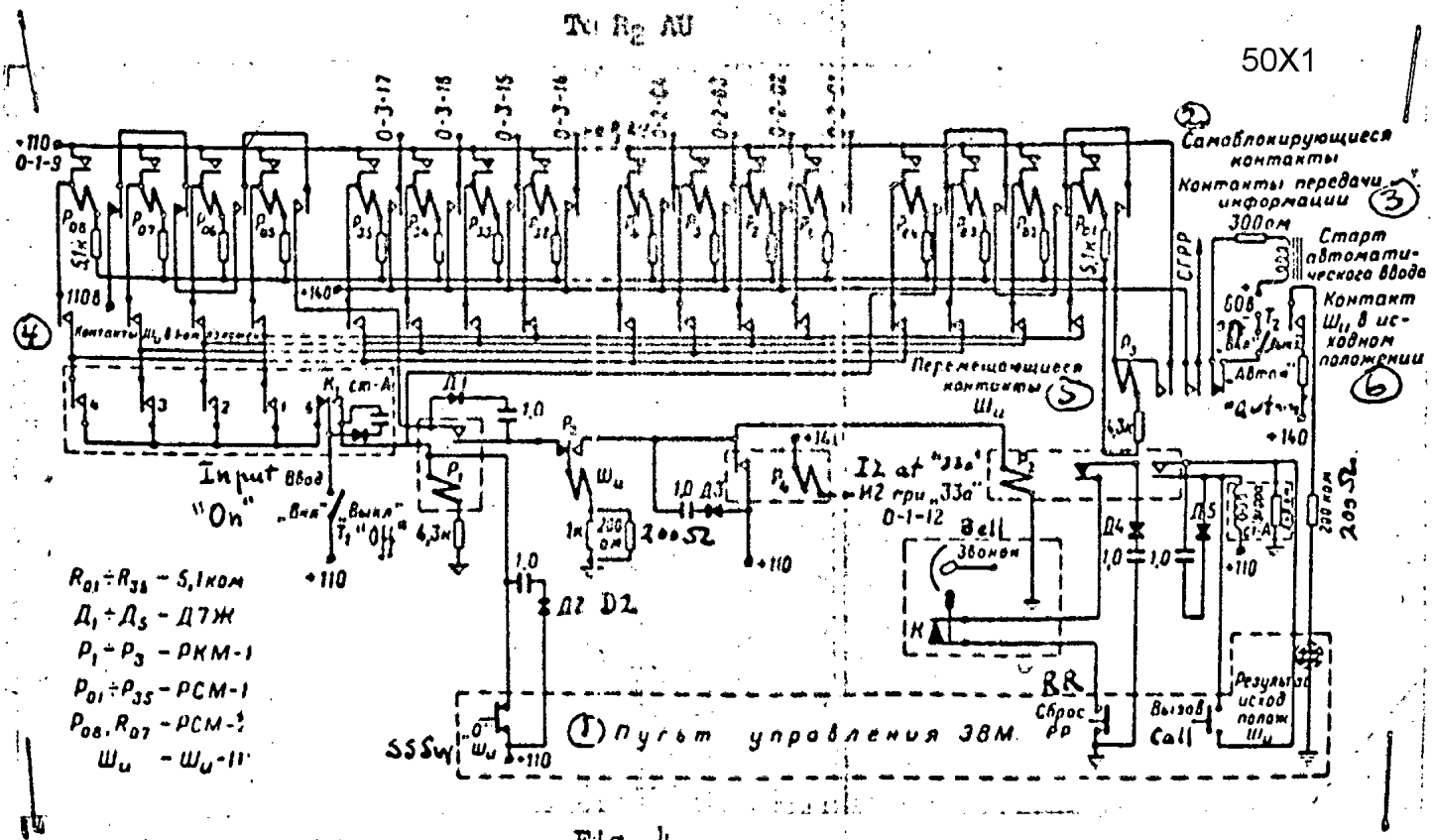


Fig. 4

R_{01} to R_{35}	- 5.1 kohm	
D1 to D5	- D7Zh	
R1 to R3	- RKM-1	
R_{01} to R_{35}	- RSM-1	
R_{08}, R_{07}	- RSM-1	
SSW	- SSW - 11	SSW - Step-by-step switch

1. Electronic computer Control desk
2. Self-blocking contacts
3. Information transmission contacts
   300 ohms
   Automatic
   Input Start
4. Contacts of the SSW in the 1-st position
5. Moving contacts of the SSW
6. Contact of Step-by-step switch in initial position

... The period for which the relay R_4 winding is energized is determined by the pulse duration the control-unit univibrator. This period is equal to 30-40 microsec. Now the step-by-step switch makes its 12-th step and returns to initial position. The bulb "Initial position of the step-by-step switch" lights on the control desk. The normally closed contact of relay R_2 opens and disconnects the power supply circuit from relays R_1-R_{35}. Self-locking is removed from the relay register and all the relays return to their initial positions. The contacts of relay R_3 remove the signal

of readiness of the relay register. Simultaneously, the +110-v voltage is fed through the contacts of relay R_2 to the electromagnet "Digit", the armature is pulled in, and the lever drops to actuate the key "digit" of 50X1 the ST-A. The code "Digit" is also fed to the transmitting ST-35. This indicates that a next number can now be transmitted. On the transmitting equipment the signal bulb "Input" lights up. The operating scheme of the signal bulb "Input" is as follows: when the key "Digit" on the input ST-A operates, the code is transmitted into the line and is admitted to the electromagnet of the transmitting ST-35. The connecting rod of the digit type lever is lifted by the printing clip and closes contact K_8 (Fig. 6), relay R_8 operates and sets into self-blocking position. Now the power will be fed to the signal bulb "Input" through the closed contacts of this relay. When the key "-" pressed, the connecting rod of the type lever moves upward and breaks the blocking circuit of the signal-bulb relay R_8, the relay contacts open and disconnect the signal bulb. During the transmission of "Digit," the step-by-step switch makes another step and prepares the circuits for the reception of the coded signal "-" indicating the beginning of information.

If an error was introduced during the transmission of an information number, such an error can be erased from the relay register, thus preventing its entry into the computer. For this purpose, a lever is mounted on the hammer of the bell. When the key "Zv" is pressed at the transmitter ST-35, the bell cam operates at the receiving ST-A and strikes on the contact K of the breaker (Fig. 4). The contact opens and removes the self-blocking of relays R_1-R_{35}. When an error in the number has been detected, the information number is completed to 9 digits by adding any random digits, and instead of adding the end-of-information number sign (instead of "0") the key "Zv" is pressed to ring the belltwice. Now the step-by-step switch will return to initial position and will be ready for reception of new information. After this the sign "-" is given again indicating the beginning of the information number repeated which is now because of an error in the first operation.

If the electronic computer "Ural-1" is occupied at any instant by a slowing operation, the received information will be stored on the perforated tape of the AT-A equipment. For this purpose, the T_1 (input) is set in position "Disconnected", the signal "++" is supplied and the bell is rung several times. When the toggle switch T_1 is in the cut-off position, power is disconnected from the step-by-step switch so that it cannot move. With this signal, the information from the transmitter ST-35 is registered on the perforated tape. When the electronic computer becomes available, the information from the tape of the ST-A equipment enters the computer. To enter such information, the toggle switches T_1 and T_2 (Autom") are set into position "Cut in". A 60-V voltage is impressed through the contacts of relay R_3 of the electromagnet for the start of automatic input. The electromagnet lever strikes the arm of the stop lever (fig. 4), the driven ratchet makes a contact with the driving ratchet, and the information begins to to enter into the relay register. As soon as sign "0" arrives to indicate the end of the information number, the relay R_3 operates and by breaking

50X1

the contacts it disconnects the power supply to the electromagnet start. The stop lever will disengage the driven ratchet, the entry of information will be discontinued, and the ST-A will come to the "stop" position.

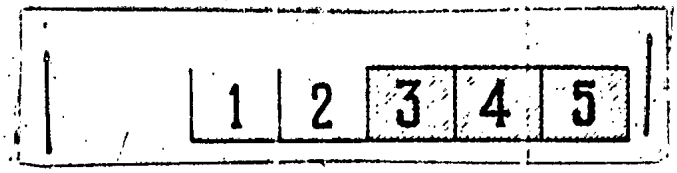


Fig. 5

"Input"

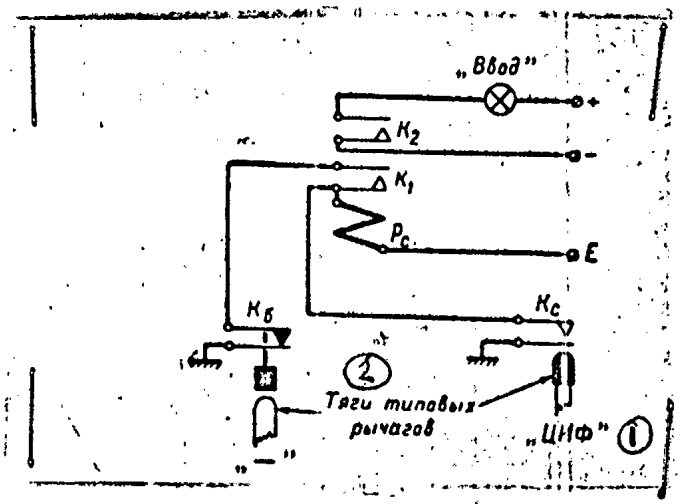
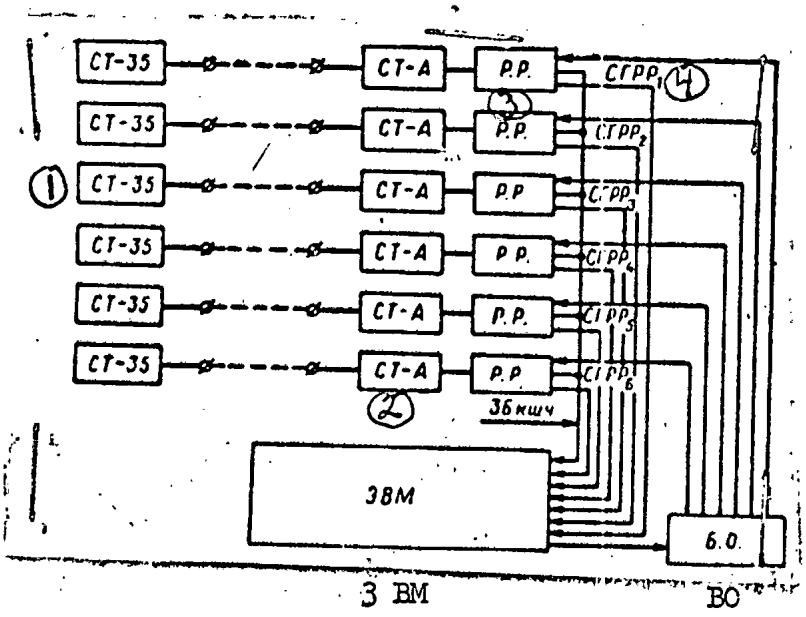


Fig. 6

1. "DIGIT"
2. Connecting rods of the type levers



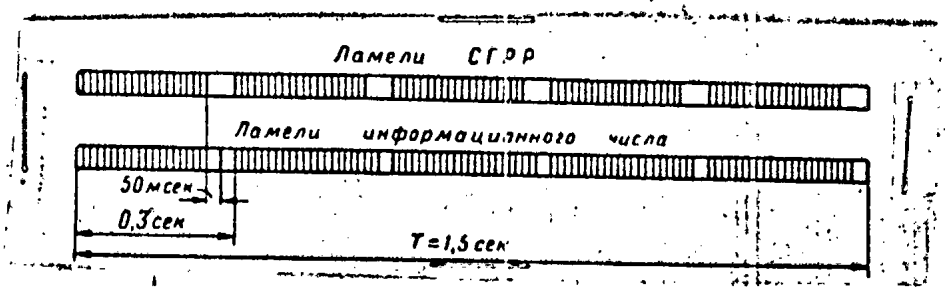
50X1

1. ST-35
2. ST-A
3. RR- Relay register
4. SRRR- Signal of readiness of Relay Register

Fig. 7

After the relay register has been interrogated, command "33a" will be admitted. The contacts of relay R_3 will close the power supply circuit of the electromagnet for the start of automatic input and the entry of the next group begins: the "-" sign, the information number of 9 digits, and the "0" sign. After all of the information has been entered, a terminating information number is introduced consisting of 9 "1" digits. After receiving this terminating information number, the electronic computer will not generate any commands "33a". Now 9 code combinations "3v" will be placed on the perforated tape in place of the information number so that nothing is admitted from the relay register and R_3 breaks the power supply circuit of the electromagnet start. The computer begins to solve and the information can be registered on the perforated tone.

Lamellas of the signal of readiness of the Relay Register
Lamellas of the information number



50 microsec
0.3 sec
T = 1.5 sec

Fig. 8

50X1

Information input from several directions is carried out in a similar manner. To interrogate the relay register on each of the 5-6 directions, there is a unit consisting of a lamellar distributor with two brushes (fig 7) mounted on ST-A equipment which is connected to the channel of the main information source. These brushes connect in sequence the +140-v power source to the busbars leading to R_g AU of the computer (36 binary bits) and to the contacts of relay R_3 which generate the signals of readiness of the relay register (fig 4). The outlets from the relay registers are connected in parallel, while the outlets for the SRRR (signal of readiness of the relay register) have individual busbars which determine the information address depending on the channel on which it has arrived.

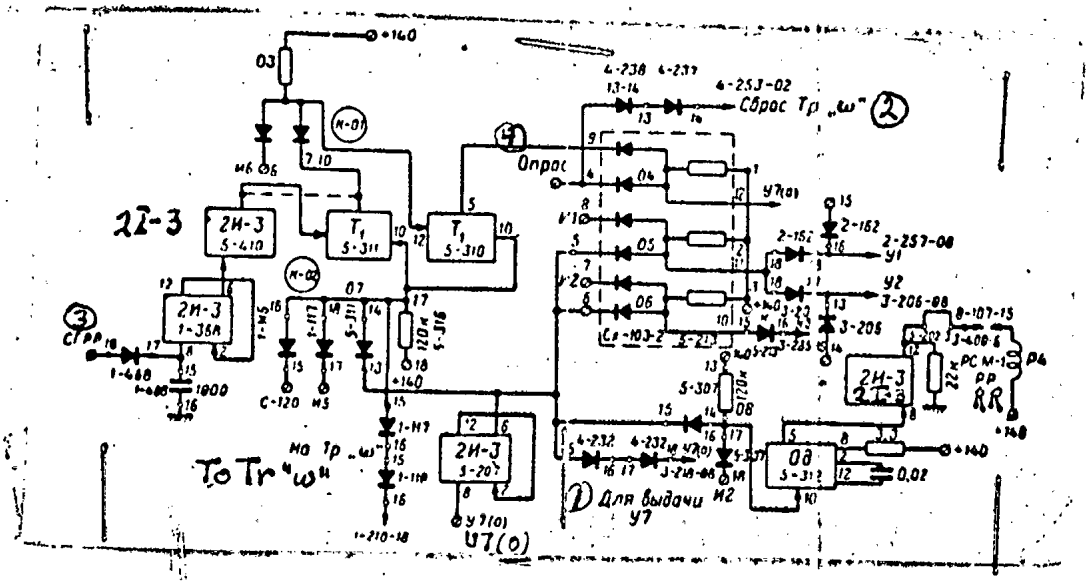


Fig. 9

1. For output of U7
2. Reset Tr "ω"
3. SRRR
4. Interrogation

Reading of information is made from a relay register on which the +140-v voltage is impressed and from which the signal of readiness of the relay register was received. The information and the SRRR (Signal of readiness of the relay register) lamellas are of different length. This is done to avoid losses of information. When the SRRR is received by the computer while the brush is traveling over the end of the SRRR lamella, there still will be no loss of information because the brush of information lamella (36 Binary bits) will still be on the lamella for another 50 microsec and the +140-v voltage will still be admitted to the busbar leading to R_g AU of the Ural-1 computer (fig. 8).

If the results of computation will be led through a single channel, then the SRRR (signal of readiness of the relay register) busbars can be connected in parallel. Now the command "33a" will be admitted to relay R_4, to which, in this case, the +140-v voltage source in the lamella distributor will be connected. The information number is admitted to the computer

50X1

from the same relay register through 36 busbars. The registers will be connected in sequence by the lamella distributor and the information from them in turn will be taken and fed to the computer.

Control block of the interrogation operation. The input information of the computer is recorded in the relay register and changes independently of the cycles of operation of the computer. In the control unit for the interrogation operation, the code channels from the relay registers are connected with the code busbars of the key board for entering information on register AU of the control desk. Therefore, for the transfer of a number into Sm AU it is necessary to form signals similar to U1, U2, and U3, while for recording a number in the cell MB it is necessary to form signal U7.

The performance of the unit is as follows: the leading edge of the signal of readiness of the relay register sets the T_1 (5-311) into unique position by opening the gate K-01. To improve the leading edge and to eliminate the interferences originating in the SRRR circuit, the signal of readiness of the relay register passes through a circuit consisting of two diodes, capacitance, and three inverters. The operation-preparation trigger (5-310) prevents the possibility of signal U7 formation during the interrogation operating cycle. Under the condition of singular position of trigger 5-311, the trigger T_1 (5-310) is set in a unique position by pulse I-6 and only alter this dues the U-7 output gate open.

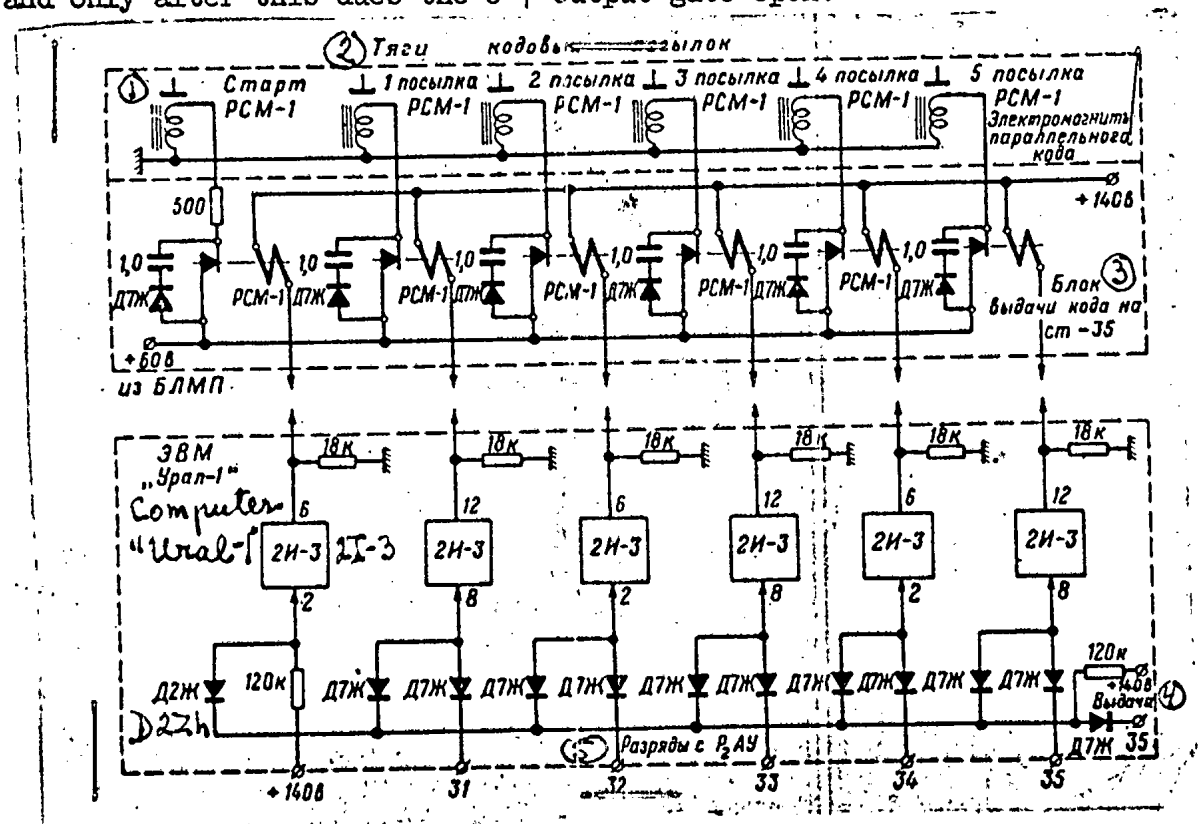


Fig. 10

1. Start RSM-1	1-st Transmission RSM-1	2-nd transm. RSM-1	3-d transm. RSM-1	4-th transm. RSM-1	5-th transm.
2. Connecting rods of the Doded transmissions					50X1
3. Output unit of the code to ST-35					
4. Output /					
5. Columns from R_2AU					

On the relay register is stored the code which must be transferred to MB. When a high-level interrogation operating signal appears on the command busbar Dsh, a U7 (0) signal is generated which is formed at the gate K-02 with the aid of cell 2I-3 (5-207). From here, the signal is admitted to the inverted 3-218 input. The signal U7(0) also opens the gate Skh 103-2 (5-213) and forms signals U1, U2, and U3. The number from the relay register is transferred to Sm and then recorded in the cell MB, because the U7 signal has already been formed.

At the beginning of "an interrogation" operation the TrW should be reset. For this purpose, the potential of this operation is combined with the potential of other operations at which the resetting of TrW takes place. If during the operation "33a" the signal U7(0) is formed, the pulse 15 passes through the gate K-0..., which opens the potential of this signal. When the SRRR signal is absent, the signals U7(0), U1, U2, and U3 are not formed. After the appearance of signal U7, the pulse I2 triggers the univibrator (5-312) for 30-40 microsec. This univibtator triggers the relay R_4 through the inverter (5-410) and controls the end of reception of the number by clearing the relay register, by setting the step-by-step switch into intial position, and by transmitting the call to the transmitting point. The input of a number to the computer requires 10 microsec.

Output of computation results from the electronic computer. The solution of the problem, which must be transmitted to the telegraph equipment and then to communications channels, is released on the 35-th operation for five highest places R_g(Sm) of the arithmetic device (fig 10).

From the outputs of the 35-31 places of R_gAU (R_2), the signals are fed to the inverter 2N-3, the plate voltage of which is fed through the windings of a RSM-1 type relay. A 18-kiloohms resistor is inserted in the ground circuit to ensure proper tripping of the relay. The normally opened contacts of these relays close the supply circuit of the coding electromagnets, the armaturs of which are connected with the aid of connecting rods to the intermediate levers of ST-35 which in turn actuate the contact levers. This circuit incoproates a spark quenching circuit consisting of a diode and capacitor.

Depending on the results of the solution, to the coding relay RSM-1 are fed either current or current-free signals, i.e., the relay operates in accordance with the parallel telegraph code from the electronic computer. Simultaneously with the output of the five coded signals, there

50X1

is also produced the current signal of the start. The latter signal acts on a corresponding electromagnet and forces it to strike the stopper-lever of ST-35 with its starting lever. The driven ratchet engages the driving ratchet and into the line is transmitted a sequence telegraph code of the signal ccoming from the electronic computer.

The coded combination is stored in the following manners in accordance with the incoming coded information, the code electromagnets begin to operate. Each electromagnet is connected to intermediate connecting rods which determine a given combination on the contact levers. After operation of the stopper lever, the clipping blade drops and fixes the intermediate levers for a single cycle of coded-combination transmission.

The distributing clutch acting on the contact levers through the contact springs forms the sequence telegraph code and sends it to the communication line. On the tape of the converter and on the output receiving instrument located at a considerable distance from the computer, is registered a sign corresponding to the code received from the computer. The speed of operation of such an output device is determined by the mechanical speed of the ST-35 instrument and is about 6-7 signs per second. The results of the solution can be expressed in numbers or letters of the Russian or latin alphabet.

After the output of each sign at the end of a cycle, the clipping blade lifts and the intermediate levers, under the action of retracting springs, come into mesh with the contact levers. The spring tension can be regulated by special screws. If the results of the solution should be delivered in the same direction from which they were received, (in presence of 5-6 directions) then at the output are installed ST-35 instruments, one of each direction, and the free columns from the thirtieth to the first are utilized.

The described device has already been built and tested. The device is simple and convenient in operation. It possesses a high degree of reliability and stability during operation.

On the Book Shelf (Page 80)

Abstract:

Gives brief descriptions of the following books and brochures published by Voyenizdat:

Istrebiteli nad goluboy liniyey (Fighters over the "Blue Line") by Col A. P. KALININ (112 pp., 30 kopecks); concerns World War II aerial combat in the region of Kuban.

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Kryl'ya krepnut v polete (Wings Are Strengthened in Flight) by Col M. I. GOLYSHEV (32/pp., 5 kopecks); concerns flight training.

Avtomatizatsiya v PVO (Automation in PVO) by Engr G. P. BUBNOV (96 pp., 17 kopecks); based on foreign press material, discusses modern means of aerial attack and air defense including automation of air defense systems and automated command post operations.

Rasprostraneniye UKV i radioreleynyye linii (Ultra-short Wave Propagation and Radio Relay Lines) by Engr-Lt Col Y. I. DAVYDENKO, Candidate of Technical Sciences, (136 pp., 25 kopecks); discusses radio wave propagation in antennas and space, the influence of the surface of the earth and meteorological phenomena on ultra-short wave propagation and on radio repeater operations, and means of achieving reliable radio relay communications.

Izmereniya na rasstoyanii (Telemetry) by Engr-Lt Col F. I. BARSUKOV, Candidate of Technical Sciences and Docent, (72 pp., 12 kopecks); explains radio telemetry in popular form.