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NIGHT BOMBING

BY

S. TYAGLOV, MAJOR, NAVIGATOR 1-CL CLASS

FROM

SOVETSKAYA AVIATSIYA, NO.3/2561, JANUARY 4, 1957

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Night Bombing
by
S. Tyaglov

The jet-bomber crews of our group are carrying out flight missions by day and night in complex weather conditions. The excellent knowledge gained from the navigational and sighting radio-technical equipment of the aircraft, the skillful utilization of all ways and methods of air navigation and bombing are their assurance for perfect fulfillment of the most difficult missions.

Practical experience shows that night and day flights under complex meteorological conditions have much in common. For example, the air navigation methods remain the same, the sequence of operating the bombing equipment, the order of searching for the target with the aid of the radar sighting device and other problems also remain unchanged. However, the work of the navigator during night flights has a number of distinctive characteristics.

The carrying out of navigational calculations, the performance of the various operations with the sighting and bombing instruments realized under poor lighting of the cabin require special precision and accuracy in actions and stable habits.

Night missions are therefore preceded by thorough and detailed preparations and briefings. Training in the handling of instruments is conducted as a rule in darkened class rooms and in aircraft cabins during evening hours. Strict timing is observed in the performance of the various operations.

During bombing flights with the employment of radio-technical means, the young navigators must report the errors originating in the performance of the equipment. The navigator is sometimes in doubt as to the working condition of the rotary (switching) system. This is due to the fact that the main attention of the navigator during flight is devoted to the operation of the devices: he observes only the pulses of ground stations and often is unacquainted with the locality over which the aircraft is flying.

The greatest difficulties arise during the piloting of an aircraft on a combat mission course. Many of our crews employ the autopilot for the purpose of guiding the aircraft toward the target. This is an adroit application and at night time it depends upon the habits acquired during day flights during visibility of the natural horizon. It is known that in order to guide the aircraft toward the target by direction the pilot employs the course indicator. Practice showed that the crew commander cannot always employ this instrument. In such cases, the night bombing results cannot be expected to be high.

In our group, we developed and introduced into application a method of piloting the aircraft along the ground track with the aid of the autopilot which is controlled independently by the navigator.

In this case, the autopilot is connected and its control is taken over by the navigator. Studying and observing the position of the aircraft relative to the ground track by the pulses on the indicator,

the navigator guides the bomber. As soon as the aircraft approaches the line of operational flight (heading) with an accuracy of 300 - 400 meters (990 - 1320 ft), the navigator, by operating the "turn" handle of the sighting device, secures an accurate approach of the aircraft to the target. The pilot at the same time strives to maintain the proper altitude and airspeed.

The piloting method adapted by our group enabled us to increase the quality of night bombing. True, the operational scope of the navigator has been increased: it is difficult for him to control simultaneously the handle of the autopilot and observe the indicator. However, by systematic and persistent training, our navigators have learned to accomplish the proper target approach by this very method. To confirm this, I would like to quote an example from my own experience.

During one of the recent night flights prior to approaching the ground track (bomb run), the intercom system broke down. Using outside communication, I requested permission from the crew commander to achieve control by means of the autopilot. Having obtained permission, I guided the aircraft toward the firing range, made a heading correction in approaching the target, sighted, and dropped the bomb on the target in an exactly fixed time.

This method of controlling the aircraft from the navigator's cabin during bombing with the employment of radio-technical means

has allowed our crew to accomplish the mission successfully.

Accurate bombing can also be achieved by still another factor - strict maintenance of a given airspeed. For the purpose of controlling the airspeed, the aircraft is equipped with a combination speed indicator which shows the actual speed of the aircraft. However this instrument produces errors which are not uniform for various flight altitudes. The navigators of our group developed a correction chart for the instrument. In this chart, we have the altitudes and flight speeds as well as the corrections for the instrument indications. The chart is located in a visible point in the navigator's cabin and is constantly used by us during flights.

All this makes it possible for our navigators to carry out the flight missions with high quality (great success), to strike the target accurately under any weather conditions, and at any time of the day.

Recently our group carried out night bombing flights. The crews carried out their tasks under complex meteorological conditions. Employing the experience-tested operational methods along the course of the combat mission, the navigators-officers Kuprichenkov, Yanashko and others accurately hit the designated targets.

Not overcome by the achievement of the title "Master of Precision Bombing", they try daily to improve their skill and habits by showing initiative toward further increase in the combat efficiency of our group.

AMONG OUR FRIENDS: THE LIFE AND TRAINING OF PILOTS OF SATELLITE NATIONS. THEY RECEIVED DISTINGUISHED AWARDS

FROM

SOVIETSKAYA AVIATSIYA NO. 4/2562, JAN 5, 1957

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Among Our Friends; Life and training of pilots of Satellite Nations

The jet aircraft has taken off smoothly from the airfield and gained altitude following a fixed course. The entire flight course from the basic point to the firing range was in a thick cloud. But even in these complex meteorological conditions, Major Ivanko guided the bomber over the given course.

The navigator 2-nd Class, Mikhal Ivanko, was an experienced pilot. He possessed excellent habits of piloting (aero-navigation) by day and night. In his group, he was called "an expert in accurate bombing". He always skillfully employs modern jet technique.

Officer Ivanko is considered an authority by his subordinates; they respect him for his war record acquired during battles with Hitler's invaders, for his courage demonstrated during World War II when he served in the Czechoslovakian AF harassing the enemy in close cooperation with Soviet units, he flew as an aerial gunner on the Il'yushin-2 attack aircraft. He flew thirty combat sorties and more than once did he have to repulse savage attacks by fascist scavengers. For his heroism in these battles and for his skill, he was awarded several medals, including the medal for heroism.

In recent years, Mikhal Ivanko graduated from the Aviation School and became a navigator. During his service in the bomber units, he was entrusted with carrying out various tasks. Under conditions of heavy clouds and by using instruments, he successfully

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bombarded targets at night. He sometimes found himself in a precarious position but his will and good training always carried him through to success.

Right at this moment, the weather is plainly unfavorable for flights... A strong wind blows in the region of the firing range. The aircraft drift sideways. Navigator Ivanko is forced to carry out complex recalculations and in spite of the extremely limited time he solves this problem without errors. The bombs which are dropped land squarely on the target. Navigator Ivanko has again demonstrated his will, calmness and expertness.

The second crew member of the bomber has also demonstrated great skill. Navigator Sr. Lt. Frants Lubomir has guided the aircraft exactly along the fixed course, found the target and dropped the bomb load on it.

After several days, both navigators were on night missions; this time they received high praise, for their expert aero-navigation and bombing.

Our military comrades - Mikhal Ivanko, Frants Lubomir as well as all aviators of the Czechoslovak AF, devote much effort and persistence to raise their combat efficiency to a still higher level. In 1956, they attained great results in this respect and in this new year, 1957, they will continue to develop their successes.

Fig. 1. Major M. Ivanko (right) and Senior Lt. F. Lubomir.

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AT NIGHT UNDER COMPLEX METEOROLOGICAL CONDITIONS

(NOCH'YU V SLOZHNYKH METEOUSLOVIYAKH)

BY

V. SIVTSOV, LT. COL.

FROM

SOVETSKAYA AVIATSIYA, NO. 8/2566, JAN. 10, 1957

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AT NIGHT UNDER COMPLEX METEOROLOGICAL CONDITIONS
by
V. Sivtsov

On this particular evening, the pilots of a certain fighter aviation wing have hopefully looked into the sky covered by heavy clouds. This night promised to be "suitable": a gusty wind blew, cloudiness reached 10 points, and around us was an impenetrable darkness.

Upon the signal given from the flight tower, 1st Lt. Usov, secretary of the party organization of the squadron, took off. He had just begun flying jets when assigned to this wing, but had succeeded in learning a good deal. Within a comparatively short time, commmist Usov learned how to handle complex flight procedures.

Now Usov is carrying out an unusual task - he is making his first solo-flight at night under complex meteorological conditions. This in itself is a special field and the pilot who qualifies in it is elevated to a still higher degree of flight mastery.

When Usov joined the squadron, not everything went smoothly with him even though the officer was no novice in flying. Recently, in complex meteorological conditions, Usov flew a trainer with the group commander Borisov on board. The pilot successfully accomplished his mission in the air but on the landing course he could not accurately maintain the assigned flight regime. The vertical rate of descent was somewhat higher than required.

The error made by the pilot did not escape the experienced eye of the group commander. Making a strict evaluation of Usov's actions in

the air, the commander reminded him of his many previous deviations from the fixed rate of descent. The reason for the error was that Usov had incorrectly diverted his attention to the navigation instruments.

Helping Usov to eliminate his deficiency, the group commander trained him in the cockpit on the ground, on a special trainer and in demonstration flights under the hood on a trainer aircraft.

"In order to maintain the rate of descent accurately" explained the commander, "it is necessary to pay the main attention to the altimeter and vertical speed indicator. At the same time, we must also pay attention to the indications of other instruments: gyro-horizon, electric turn indicator, and compass".

Training and preparing Usov for night flights under complex meteorological conditions, the group commander made every effort to transmit all his personal experience to his subordinate, not forgetting for a minute the so-called "details". Borisov thoroughly explained that, during night flights in clouds, the pilot in the cockpit often sees flashes from the signal lights on board the aircraft, flashes sometimes brighter or weaker depending upon the density of the clouds. These flashes distract the attention of the pilot from piloting the aircraft by instruments. It is therefore necessary to become accustomed to and not to react to, light flashes.

For normal operation of the pilot during night flights, it is also important to properly adjust the cockpit lighting. It should be adjusted in such a way that the instruments would be clearly visible. Bright

light is quite inconvenient: it may make it possible, for example, not to notice that the aircraft has gotten out of the clouds. In addition the pilot, having become adapted to bright cockpit illumination, will not be able to distinguish the outline of objects situated in the darkness. This hinders him in determining the aircraft altitude.

Corrections for small errors in landing approach, according to the recommendations of the group commander, should not be made in the clouds but after the aircraft leaves the clouds. "It is better to make a somewhat inaccurate approach to the distant lead* than to begin immediately to correct the deviation in the landing course" Borisov explained. Otherwise, a grave error can be committed, e. g., one may exceed the rate of descent or involuntarily produce bank and at the worst, lose judgment of distance. Under the clouds, small errors in direction can be easily corrected visually.

Great attention was devoted in training the pilot in coordinated handling of steering mechanisms especially when making a calculated turn for landing approach by instruments. During trainer exercises, the group commander required from the pilot a timely noticing of aircraft deviations from normal bank and an immediate correction of same, as well as proper allotment of attention to other navigational instruments. Usov has grasped all flight aspects well and has prepared himself to carry out a night flying mission in the clouds. Capt. Borisov was firmly confident of the actions of his subordinate.

*Or: "to the distant beaming (station)" - Editor.

The fighter piloted by Usov penetrated the clouds upwards and gained the assigned altitude. A star-studded sky was overhead and below, a dark shroud of clouds appeared.

The pilot skillfully set the aircraft on the distant homing PAR Precision Approach Radar). Several minutes of horizontal flight passed; Usov watched the instrument indications attentively. As soon as the radio-compass needle pointed to 180°, Usov immediately noted the time and reported to the operations officer about the passing of the homing zone. By an accurate coordinated turn, the pilot brought the aircraft to the computed angle. Having passed the time position in horizontal flight, the fighter began turning toward the landing course.

Now came the critical and responsible moment. The pilot was required to show great skill in order to maintain accurately by instruments the given vertical rate of descent from the clouds and, at a strictly defined altitude, again enter the distant range PAR and then gradually enter the close range PAR.

The constant training on the ground is now being applied in the air. 1st Lt. Usov has done exceptionally well in piloting the aircraft in the clouds by instruments. The aircraft descended through the clouds and flew toward the nearest radio station. Soon lights of the runways appeared ahead. The aircraft touched ground exactly at the landing "T".

Pilot Usov was highly praised for his first night flight under complex meteorological conditions.

On the same night, pilots 1st Lt. Omelin and Svedomtsev also successfully completed their night flying missions. Returning from the airfield,

each of them carried away a feeling of "a job well done". The completed flights were a new level in the attainment of flight proficiency for the pilots.

Aviation Specialists Govorkov and Turyanitsa (Mechanics) Maintain Combat Equipment in Constant Combat Readiness. They are often Praised by the Commander as Exemplary Communists.
Illustration: Privates A. Govorkov (left) and V. Turyanitsa, Ready the Aircraft for Take-off.

WE FLY BY NIGHT; IMPRESSIONS FROM FLIGHTS

AUTHORS: VARIOUS

FROM

SOVETSKAYA AVIATSIYA, NO. 9/2567, JAN 11, 1957

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We Fly by Night, Impressions from Flights
Authors: Various

Young fliers of a certain squadron are successfully adapting themselves to day and night flights under complex meteorological conditions. At present, they confidently fly in the clouds and navigate their aircraft well by instruments.

This squadron set up the following order: after each flight under complex meteorological conditions, the pilots prepare a brief report about their personal impressions which is later analyzed during classes.

Today we publish several of such impressions of young pilots about their individual flights by instruments.

1. Time Goes Slowly...by Lt. V. Degtyarev

I prepared myself for my first independent flight into the clouds with great thoroughness. I paid special attention to holding correctly to my own zone and learned various methods of returning to it in the case of deviation from it. All this appeared extremely complicated and difficult to me.

Take-off, climb, and course flying made no impressions on me. I felt the same as I had during flight into a zone under normal meteorological conditions.

I arrived in the zone under a low layer of clouds. Prior to entering, I repeated to myself the course, course (angle) of the radio

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station, and connected the chronoscope. Soon I was in the clouds. I expected that I would soon begin going over "bumps" and that it would be difficult to maintain the flight aspects. But nothing like that has ever happened. The flight on a combat aircraft produced no special sensations except that I did feel a certain tension.

During the flight, I became unexpectedly disturbed by the thought of maintaining my own position in the zone. A thought flashed in my mind: I must not lose the airfield. After a definite time of flying in the clouds I turned the aircraft 180° and began flying back. It became immediately clear to me that the time drags on very slowly. Five minutes on the ground is generally a trifle but in the air it seemed like eternity. I even thought that the clock had stopped. But I kept on relying on the clock and, having stuck strictly to the time fixed, I emerged from the cloud. Here I could see familiar reference signs and made a safe landing. I personally became convinced during this flight that when piloting an aircraft in the clouds we must always believe and trust the instruments.

2. To Enter Determinedly into the Searchlight Beam ... by Lt. V. Belov

During my first individual night flight on a combat aircraft, I encountered certain peculiarities and unusual conditions. One feature was that immediately after the take-off, it became necessary for me to change over to piloting by instruments. In day time, I usually required their help somewhat later in the flight. In addition, when flying

toward a large light orienting point, I felt a great desire to bank and observe how the region of the airfield appears from the air at night. But by force of will, I resisted this temptation and continued piloting the aircraft by instruments.

During flight in the zone and over the circle up to the third turn, I discovered no differences from daytime flights in the clouds, but the time of going into the fourth turn was inaccurate. I made this turn before the set time but I immediately discovered the error and rapidly eliminated it by myself.

I was especially disturbed before the entry into the projector a (searchlight beam). I considered this a very complicated and responsible job, and I treated it as such. The moment of entry into the searchlight beam is not very simple to determine. But I solved this successfully. I entered without hesitation into the light beam and immediately caught sight of the ground. Landing was as usual in accordance with all the rules.

3. The Gyro-horizon is the Main Thing....by Lt. I. Mentyukov

I have just completed by scheduled flight in the clouds. I still could not gather my thoughts but one thing is clear: the gyro-horizon is the main instrument in this type of flight. This of course does not mean that the other instruments are of lesser importance by any means. These instruments must be used jointly. This is clear to everyone, but the gyro-horizon must constantly be kept in the field of vision. Why?

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Because, by knowing well and considering its position in various flight aspects, one can freely set and maintain these aspects.

My flight in the clouds continued. The cloudiness sky condition was calm and I encountered therefore no difficulties. However when I was in the zone I came out several times from the clouds just to orient myself and check on my actions. On the whole the flight was uneventful.

4. Where is the Taxiway Here?.....by Lt. V. Ramzayev

Prior to taking off on a combat aircraft under complex meteorological conditions at night, I underwent long and rigid training in a cabin. I did that for the purpose of learing how to connect toggle switches automatically and not to distract by attention from the instruments during flight.

During the take-off I experienced something new. The retraction of the nose wheel had to be carried out along the line of lights (of the take-off - landing strip) which are projected at different angles.

The second strong impression was as follows: as soon as I left the boundaries of the airfield, I was immediately enveloped by darkness. This exercised an unpleasant effect on me.

Unexpected for me were the peculiarities of measuring and estimating by eye. In the zone and during the flight around the region of our airfield, the area light orienting markers appeared to be situated together in line even though they were actually

spread over great distances. However, as soon as the aircraft touched the strip everything was again in right order. Where then are the taxiways here? Apparently such a question arises in the mind of every pilot. The same question also came up in my own mind, and not accidentally. The red lights blend into one line and it is not easy (without practice) to distinguish one from another. Even when on the ground, it is necessary to exercise great caution.

5. It is Possible to Roll Out Beyond the Strip ....by Lt. V. Zimin

When preparing for night flights under complex meteorological conditions do not allow haste to overtake you. I personally checked the brightness of all lights, inspected the operation of the instruments, and adjustment and accuracy of the radio compass. Prior to take-off, I adjusted the lighting of the cockpit and rolled out for take-off. During climb, I tried to get away as smoothly as possible from the lights of the take-off landing strip while devoting my attention to the instruments. The most difficult of all the elements of flying in circle was the estimation for landing. Just like certain other of our young pilots do, I began making the fourth turn ahead of time because the area lights appeared to be blended in one line. I was continuously bothered by an obtrusive thought: I had flown too far. That thought was so strong that I increased the angle of glide and approached the runway from a lower altitude than was recommended. I made a normal landing. I paid special attention to the runway lights

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thinking how easy it is to roll out beyond the boundary of the runway at night.

6. Braking on Time is Necessary....by Lt. V. Kalinin.

I have listened to many talks about night flying but had never flown under such conditions. I have therefore awaited the flight with impatience. And here I am now in the air. What are the impressions? I admit that I expected something more, and I always kept on thinking that somehow or other it would become necessary to pilot the aircraft by the horizon. Somehow I could not believe that it was impossible to see in any direction. The fact is that it was necessary to pilot the aircraft by instruments only, but this is not at all difficult provided you pay strict attention to these instruments.

My main difficulties were connected with the execution of the fourth turn and the estimation of the distance to the ground for landing. But I carried out everything properly and made a normal landing except for the premature braking. Of course, this is not a particularly great error but, as the saying goes, braking is necessary in the proper time.

7. In the Air You are Alone.....by Lt. Yu. Klinchikov

Personally I found many unusual things during night flights. The lights were perplexing and agitating. But here I sat in the cockpit.

Again there was something new: the starting of the engine had to be done almost by touch. Finally the engine was started and the taxiing began. But where should I roll? The taxiway was poorly visible, especially when you take a casual look at the boundary lights of the runway.

After the take-off, the change from the illuminated part of the airfield into total darkness was quite unpleasant. After entering the darkness, the cockpit appears extremely isolated and you have the feeling that besides you and the instrument panel there is nothing but emptiness in the air.

Having completed the fourth turn, I caught sight of the landing strip. It appeared narrow and very close. I began thinking: greater altitude, not to miss and pass. I almost could not rid myself of that feeling.

During my first flight, I felt very strange in the beam of the searchlight. Because of this I could not accurately determine the speed during the landing run.

And furthermore, I was continuously troubled during the flight by the thought: you are flying without the instructor, you are alone..... All this seemed to urge me to pilot the aircraft more attentively and accurately.

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Fig. 1. Systematic and Persistent Training on Trainers Gives Pilots a Thorough Preparation to Carry Out Their Exercises in the Air and to Acquire Firm Practical Habits. In the Illustration: Pilot First Lt. Gavrilin Trains in Sighting and Firing Against Aerial Targets On a Modified Gunnery Trainer.

AT NIGHT AT THE AVIATION FIRING RANGE

BY

LT. COL. YU. KOMISSAROV

AND

ACTIVE INNOVATOR, BOMBSIGHT TESTING

FROM

SOVETSKAYA AVIATSIYA, NO. 11/2569, JAN. 13, 1957

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AT NIGHT AT THE AVIATION FIRING RANGE

by

Lt. Col. Yu. Komissarov

The operation of night flights over an aviation firing range has numerous characteristics and requires from the entire personnel of the firing range command great skill and knowledge of their duties, great operational coordination and strict observation of measures in securing order and safety of operations.

One of the characteristics of night operation on a firing range is the difficulty of intersecting (locating) the bomb explosion points. The observer must have acquired excellent experience in order to make a rapid and accurate determination of the point where the bomb struck and be able to operate the observation instruments confidently and faultlessly. Of no lesser importance in this case is also the dependable contact between the flight commander and the aircraft crews. Many instances became known from night practice where, by clear and continuous communication on the firing range, it was possible to prevent the causes for aerial accidents.

A good example of skillful organization in conducting night firing practices was recently shown by the personnel of a certain firing range command.

The chief of the firing range assembled his subordinates, gave them a detailed briefing on the problem and designated the time for the given operations. The job required fast and accurate action. Soldiers Dedukh and Durakov prepared the flares. Prior to fueling the flares (torches), they thoroughly cleaned the latter of all carbon deposits, washed them in kerosene and inserted new wicks. The observers, soldiers Yanuchak and Zelenko, readied the observation instruments and the lighting of working points on towers. PFC Govorov and other communications personnel checked the telephones and telephone lines connecting the command point of the firing range with the observation points. The radio operators under the supervision of PFC Shcherbakov readied the radio communication media. Private Miroshnichenko was assigned as aid to the operations officer. He made certain that the command point of the firing range was provided with the ground signal projector, rockets of various colors and other media which might be necessary at night.

Two hours prior to the beginning of the bombing, the soldiers, under command of Sgt. Listyev, drove to the points where the targets were situated. They placed the torches in special designated places.

The airfield reported by radio that the aircraft had taken off and had headed toward the firing range. Immediately the telephone operators and other soldiers of the firing range command took up their respective posts. The observers, Privates Rybkin and Drach, took up positions at the stereo-tubes (battery commander's telescope). By means of a rheostat, they adjusted the illumination brightness of the instrument scales and set their reticles (cross hair) on the green light indicating the center of the target and reported their readiness to pin-point the bomb explosions.

As the first aircraft appeared over the firing range, the crew requested permission from the operations officer to carry out their bombing practice.

Now, the main job of the soldier-observers is to accurately pinpoint the explosion. In daytime, a column of dust, smoke and debris hangs over the point of explosion for several seconds after the bomb strikes; there is sufficient time to set the reticles of the stereotubes on the point of explosion, to measure the angle and take a good reading.

It is entirely different at night; the flash of the explosion is visible for only a fraction of a second. Poor visibility complicates the orientation of the place. But the soldiers are accustomed to the difficulties of running night bombing operations. Take, for example, Private Bezrukov; he possessed several specialties of firing range operation including the job of observer. From his observation point, he had a good view of the night target situated on the bombing field of the firing range. As soon as the command point (CP) reported that a bomb had been released, Private Bezrukov immediately turned his attention toward the fires of the target and stuck to the eyepiece of the instrument. The whistle of the falling bomb was heard in the air, the flash and splash of the explosion appeared but for a moment. But this short time was sufficient for the observer to set the reticle of the instrument over the point of bomb explosion, to make a reading, enter it in the journal and transmit the findings to the CP of the firing range.

The transmitted measurements were changed here to linear distances. The plotting board today was handled by the young communist, Filatov. He picked up and recorded in the observations journal all the data about bomb deflections. His duty was to determine accurately the point of bomb explosion. Having put the telephone receiver down, Filatov took three threads, the ends of which were fastened to the reference images on the firing range plotting board of the observation towers, and placed them over the degree graduation transmitted by the observers.

The point of intersection of these threads is the point of bomb explosion. Employing a ruled grid, he calculated the bomb deviations from the center of the target in meters and together with the azimuth recorded these figures on the target sheet of the firing range. All this had to be done rapidly and accurately.

"Our job is a very delicate one and at night requires special alertness and attention" says Private Filatov. Our calculations can have no errors because the slightest deviation leads to an inaccurate determination of the bomb explosion point and this will make it impossible for the commander to make an accurate evaluation of the crew performance.

It was a dark night. The sky was covered with thick clouds. But in spite of the unfavorable weather, firing range flights do continue. The aircraft successively make their bombing runs and accurately strike at the target.

All the soldiers of the firing range command worked concertedly throughout the night. Hence, for example, after successful bombing by two crews, the lights situated in the center of the target were extinguished and the configuration of the night target became undistinguishable. The operations officer gave an order to set up the targets within the brief interval between flights. The soldiers of the firing range command carried out the order rapidly and accurately. There was no delay in the flights.

Toward dawn the last of the aircraft left the sky over the firing range and total silence came.

The chief of the firing range collected the results of the night's work, and praised the soldiers who had distinguished themselves in maintaining the night flight operations. The operations officers at the firing range also had high praise for the soldiers of the firing range command. Also the daily bulletin carried some nice words about the coordinated and accurate performance of the soldiers of the firing range command in the way they had aided the commander in conducting and controlling the bombing flights.

ACTIVE INNOVATOR, BOMBSIGHT TESTING

The pilots, and especially the navigators, of a certain bomber group mentioned the name of communist Capt. Bol'shakov with great affection. Who was this officer and how had he earned such respect from his comrades? Bol'shakov was the commander of a group entrusted with the maintenance of aircraft equipment. His slogan was: the slightest oversight or neglect might cause a disruption in the flight mission even lead to accidents. The fact that such cases did not occur here was due to a large extent to the exceptional thoughtfulness of Bol'shakov.

Captain Bol'shakov was a young communist. In the days when the 20th Congress of the Communist Party USSR was held, he came to the Party Office with a request "Please admit me to the Party. I will not spare any efforts in carrying out assignments planned by the Congress" wrote Bol'shakov in his application for party membership.

The communists unanimously accepted him as a candidate for a party member, and they made no mistake in this step. To all the qualities which were long inherent to this officer - integrity, leadership, faithfulness - he soon added still another important quality, namely that of perserving innovator.

Bol'shakov was always an innovator, but after he became a communist, he studied the resolutions of the 20th Congress of the Party and understood that the party required of him still greater efforts and intensified thoughts.

A long time ago, Bol'shakov had already become disturbed and angry over the loss in time consumed for the testing and inspecting bomber equipment. "Couldn't this be discontinued"? thought the young communist. "It must be stopped but how? One, two, three days passed and no answer to this problem could be found. Finally, a thought matured to eliminate the separate checking of the "Fire" and "Safe" drives and mechanisms and to make an instrument which would allow one to control the working condition of the entire unit.

Days of research and labor passed and such an instrument was developed. The time required for inspection of the instrument was cut in half. This not only brings a certain relief but also offers the possibility, during this saved time, to inspect bomber equipment which is twice the size of previous bomber equipment. This means greater assurance that not even one aircraft will go into the air with defective bomber equipment (armament). He hardly had time to finish with this instrument when he suddenly had a desire to find more simple and convenient ways of testing the disadjustment in vertical plane between the weapon and sight. More research, more prototypes and more labor which was not wasted. A new device appeared. It was considerably simpler in design and more convenient in operation, especially under field conditions.

These successes have kindled a still greater creative fire in the heart of the innovator. Right now Captain Bol'shakov is working on the creation of a device for checking the parallelism of the lubber line of the sight and the axis of the aircraft.

For his exemplary devotion to service and duty, for his creative innovation work, communist Bol'shakov was repeatedly rewarded. Recently, the commander of the unit handed him a monetary award and personally expressed his gratitude.

In the illustration: Captain V. Bol'shakov Examines a Bombsight.

ON A GUNNERY TRAINER

(NA STRELKOVOM TRENAZHERE)

BY

G. TROYAN

STAR

SOVETSKAYA AVIATSIYA, NO. 12/2570, JAN. 15, 1957

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ON A GUNNERY TRAINER
by
G. Troyan

At the practice target range, student Shamayev is on the trainer. He determines the angle of lead in relation to the angular velocity of the target and the range to the target. The training classes are similar to real flight conditions. Everything is done just as it is during actual aerial gunnery: the student assumes the basic position, turns toward the target, lays the gunsight reticle on it, follows the moving target and then opens fire.

Here you can see the firing results immediately. If the firing appeared inaccurate, the trainee (with the aid of the teacher or instructor) finds his error and eliminates it in the following training classes.

On an ordinary gunnery trainer, it is impossible to work out a number of elements of aerial gunnery and it is therefore impossible to make an objective evaluation of target hits. These deficiencies were eliminated by the instructors at aerial gunnery training schools. They attached a small caliber rifle to the trainer. The firing from this rifle is carried out by pressing a firing button. The improved trainer is used not only in class rooms but is also carried out into the open airfield.

The instructors, Officers Logak, Crachev, Bulanov and others have contributed greatly to the training of accurate aerial gunners. They try to conduct their classes with live demonstrations of actual models and instruments which helps to attain better results in training. Trainers, models, dummies etc., all were prepared by their own hands.

In the illustration: Student P. Butkevich and his instructor, Engr.-Maj. V. Grachev worked out on a trainer (link trainer) the elements of aiming and firing against aerial targets.

IN A WING TWICE-DECORATED WITH THE ORDER OF THE RED BANNER

(V DVAZHDY KRASNOZNAMENNOM POLKU)

BY

CAPTAIN L. GRAKHOV

FROM

SOVETSKAYA AVIATSIYA, NO. 27/2585, FEB. 1, 1957

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IN A WING TWICE-DECORATED WITH THE ORDER OF THE RED BANNER
by
L. Grakhov

The young soldiers newly assigned to a certain bomber unit spend considerable time in studying the large plaque "Battle History of the Unit" situated in the political-educational room of the unit. Their hearts are filled with pride when they realize that they will have the honor of serving in a wing having remarkable battle traditions.

Behind the modest language of numbers and facts given on the plaque is hidden the rich history of war achievements of the soldier-aviators. During the war years, this bomber group contributed greatly to the job of defeating the enemy. Each one who served in this unit during World War II performed a multitude of remarkable battle deeds.

It was in 1942. The crew of Guard Captain Pisaryuk had received a mission to destroy an important military target in the enemy rear. Having dropped the bombs on the target, the aircraft was returning toward base. Suddenly it was attacked by two Messerschmidts. The aerial gunner guard, Master Sgt. Navernov, reported this to the commander and together with another gunner immediately opened fire on the attacking fighters, but the Messerschmitts did not fall behind. Suddenly the gunner was wounded and the bomber received several shell holes from the cannon fire of the fighters which continued the attack.

Guard Master Sgt. Navarnov well realized that the saving of the crew and the bomber depended to a large extent on what he would do next. At an opportune moment, he again set his sights on the attacking fighter and fired a long burst.

The Messerschmitt began belching with smoke and went into an uncontrolled fall. After this, the second attacker pulled out from battle and the bomber returned safely to its base.

Many famous aviators began their war career in this certain bomber unit. Aleksander Molodchiy, decorated twice a hero of the Soviet Union, flew with this unit. The names of pilots V. Grechishkin, S. Kulikov, A. Krasnukhin, A. Geranin, P. Tikhonov, N. Kharitonov, and others who earned the high honors of being Heroes of the Soviet Union are written in large letters in the center of the plaque. Many were awarded with decorations and medals of the USSR and the wing deservedly carries the title "Guard Wing Twice Decorated with the Order of the Red Banner".

The soldier-aviators sacredly protect the famous war traditions of their unit and multiply these traditions by their own outstanding successes in military and political training. Everyone here is proud of the excellent crews of squadron commander Major Nikolayev, Capt. Mamedov, Yermilov and others. They all carry out their flight missions with excellent results by making accurate hits against the respective targets. The number of men distinguishing themselves in military and political training, and the number of classroom pilots, navigators, radio operators increases from month to month in this unit.

At present, the unit appears to be the leading one in the wing. Its soldiers have achieved high results in aero-navigation and bombing; for many years, the crews have flown without accidents and without damages.

The wing has veterans which have served in it since its activation. Guard Lt. Col. of maintenance services, Lobzov Mikhail Afanasevich, began his career as an aircraft mechanic. Now he is the senior engineer of the wing, a communist, a man respected by all.

Also Nikolay Ivanovich Kudryavtsev, presently aircraft mechanic, captain of technical services, has served with this wing since its inception. For his conscientious work, he recently received a valuable gift from the general. The soldiers carry on in the famous traditions of the wing and obtain new successes in their military training.

The crew of Capt. Tikhomirov consists exclusively of young airmen. 1st Lt. Nikitin, Lt. Abramov, Kozlov and others of this small united group have one common goal - the achievement of high combat preparedness. They desire to learn to fly better and to strike the target accurately.

Recently this crew received an order for a flight with prescribed itinerary with bombing. When they were aloft, the situation changed. They had to fly through clouds and bomb an invisible target. But even in these complex meteorological conditions, the young airmen completed their mission successfully and attained direct hits on the target.

And so, by increasing the military traditions of their predecessors, the airmen of this certain air wing (bomber-wing) are dependably guarding our socialist nation.

Illustration - First-class Navigator, 1st Lt. P. Kapralov, Skillfully Handles a Modern Bombsight! He Can Bomb in Any Given Weather, by Day or Night and His Results Are Always Good or Excellent. In Illustration: Officer P. Kapralov During Training in a Cockpit.

THE HELICOPTER GOES TO THE FIRING RANGE

BY

FIRST LT. YU. GRACHEV

FROM

SOVETSKAYA AVIATSIYA, NO. 31 (2589), 6 FEBRUARY 1957

PAGE 2

THE HELICOPTER GOES TO THE FIRING RANGE
by
Yu. Grachev

From behind the woods came the steady roar of an engine. The roar became louder and nearer. Soon a helicopter appeared over the pine tree tops. It hovered over the edge of the woods, then descended to about five meters and slowly approached the landing area.

The wheels of the machine touched ground and the cabin door sprang open. From the helicopter, the pilot emerged; it was Captain Nikolay Ismal'yanovich Dmitriyev. He removed the headphone; the high forehead of the pilot bore a scar. Thin lines of wrinkles ran from the corners of the eyes.

"The crew has carried out your order", Dmitriyev reported to the commander.

Judging by his outer appearance and his brief report about the difficult flight, not much could be learned about the Officer Dmitriyev, but he described his experience on the very same evening...

To fly a helicopter was a long cherished dream of Dmitriyev. This desire came to him when he saw the wingless machine for the first time in the air. The officer, of course, already knew about the existence of such an original construction but somehow he never had the opportunity to watch personally the flight of a modern helicopter. The idea of becoming a helicopter pilot was on Dmitriyev's mind continuously. The command took this desire into consideration and offered the pilot the chance of learning how to handle the new machine. He studied its construction for entire days and at night in the class room he read and studied the instructions.

His liking for the profession and his great thirst for knowledge enabled the communist officer to handle all forms of helicopter flights. All this indicates the great knowledge of the pilot, as well as his great initiative and resourcefulness.

The crew was given an order to fly out to the N-firing range. The fact is that early on the same day a truck detail was sent there with target equipment. But on their way the loaders got into trouble; a snowstorm set in. After the cessation of the storm, the roads became impassable and it was decided to call on the helicopter for the transfer of the load from the bogged-down trucks to the firing range.

At the approach to the firing range, the crew encountered a large wooded area. Thickly grown pine trees covered the earth and detailed orientation became extremely difficult. The navigator did not let the map leave his hands.

From the 30° frost outside, the inside of the windows of the helicopter cabin became coated with hoarfrost. Visibility became very poor. The pilot looked more often at the instruments and, with their help, piloted the craft.

Only 15 minutes remained to the landing point. "Previous course", reported the navigator; "Understood"...briefly answered the commander.

Dmitriyev confidently piloted the helicopter. The estimated flight time had run out. He opened the little hinged window of the cabin slightly and looked down. The frost bit at his face. Under the helicopter he could see two little houses with snow-covered roofs. A line of a sled trail was clearly visible not far to the left... and here was

an area forty to fifty meters in width; the little opening was surrounded by tall pine trees.

The pilot changed the rotor pitch and released the throttle. The helicopter descended into the little clearing in the woods. Just several seconds back he could maneuver the craft freely but soon the helicopter was closely surrounded by dark brown tree-trunks. The air-stream of the rotor kicked up a thick snow dust about four meters high and enveloped the helicopter cabin. It became necessary to retard the descent and wait until the white snow dust had subsided. It was very difficult to control the craft when it became hemmed in among tall trees and the pilot could see neither earth nor sky.

Slowly, the mist settled and the helicopter wheels made gradual contact with the snow-covered surface. The pilot was very careful. It was a swampy location where snow might conceal holes and quagmires.

The wheels of the machine began sinking in the snow drifts, suddenly it began heeling. The officer stepped on the gas and the machine became airborne, the helicopter moved forward and made its landing. The commander's order was carried out.

At one time, Capt. Dmitriyev and his subordinates had to take the job of artillery fire observer-correctors. The crew had to find the position (battery) of the imaginary opponent, report its coordinates to the observation point and then control the explosions (correct the hits of the artillery shells).

The helicopter went aloft. At a predetermined time, it appeared near the artillery firing position. The navigator made radio contact

with the ground and the crew began its search for the camouflaged battery of the "opponent".

Soon the observation point received a report - "Target down below.... coordinates...."

Soon came the roar of artillery salvos. The observers in the helicopter cabin could see how the shell explosions raked up columns of earth and smoke. The navigator immediately reported the data to the observation point.

The accuracy in the computations and proper determination of the explosion points made it possible for the artillery gunners to correct the error and neutralize the battery of the "opponent" by volley fire.

"Thanks, airmen for your aid, job well done" - spoke the artillery commander over the radio to Capt. Dimitriyev and his crew.

The pilot and navigator could see through the cabin windows how the artillery gunners welcomed them, as if inviting their comrades to increase combat efficiency still further.

Illustration - Training With Special Equipment Plays a Major Role in the Preparation of Pilots. Maj. M. Zbinyakov gives Special Emphasis to Trainers. On the Ground, he Instructs and Teaches to his Student Pilots all the Aspects of Actual Flight. Officer M. Zbinyakov supervises the training of 1st Lt. S. Savlov.

YOUNG NAVIGATORS IN FORMATION. NOTES FROM NAVIGATION AND BOMBING TRAINING

BY

LT. COL. B. PERSIYANOV AND CAPT. V. BYCHIN

FROM

SOVETSKAIA AVIATSIYA, NO. 40 (2598), 16 FEBRUARY 1957

page 2

STAT

YOUNG NAVIGATORS IN FORMATION

by

B. Persiyanov and V. Bychin

Young airmen - pilots, navigators - graduates of Military Institutions, are joining the ranks of AF-units. Full of strength and energy, they demonstrate a flaming desire to improve their flying experiences on modern aircraft. This noble trend finds willing support from our commanders who handle the young cadres with great care and attention and help them to reach their longed-for goals.

However, the training of young flying personnel is not always smooth and organized; some youths learn very slowly. There are known cases where young aviators learn to fly under complex metsorological conditions only after spending considerable time with the unit (AF-Wing). This harms the job of improving the combat efficiency and it finally leads to the point where the lagging pilots and navigators gradually begin losing faith in their own capacilities.

The experience of our own bomber wing shows that it is possible to train young cadres to fly by instruments in a much shorter training time than before. A group of young officers were assigned to our wing. The commander, of course, became interested in the level of their training. He found out that the pilots had only inconsiderable experience in flying tactical aircraft and the navigators carried out only a few bombing practices with the aid of optical sights. By order of the senior commander, the young group of aviators was formed into an individual squadron, with entirely separate flight training days scheduled for this unit. Such a

system was found to be worthwhile. The approximately uniform level of flight training of this group made it possible for the squadron commander to organize properly and conduct the flight training of the crews.

The training of pilots and navigators in the art of flying under complex meteorological conditions was simultaneous in our unit. The navigators have not waited until the pilots acquired their piloting experience. They trained strenously and by the time the pilots began flying in the clouds and beyond the clouds, the navigators were well trained in the art of bombing by means of radar bombsights.

The training of the young navigators has begun immediately after learning about the level of their education and training. We began with studies and examinations of the texts of different Technical Manuals, instructions and other documents governing flying practice. Examinations showed that not all young officers gained sufficient knowledge about the structure of the bombsight and had an uncertain knowledge about air navigation under conplex meteorological conditions and in the art of bombing from great altitudes.

We then set up a program of theoretical training of navigators. An important point of this program was the study of the material part of the bombsight and the operation of same. The training was conducted not only in class room but also on link trainers. We made good use of a transport aircraft equipped with the proper bombing devices. Flying this aircraft, the young navigators have become acquainted with the flight area and with the firing range, after which they began with practical application of air navigation and bombing with the aid of radar sights. In practice, this was done as follows:

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The experienced navigator-instructor explained to the trainees during flight the exact order of operation during flight, methods of determining navigational data, and demonstrated target bombing. After the first familiarization flights, the instructor allowed the young navigators to demonstrate their knowledge in navigation and bombing. This was done individually and as the instructor watched their actions and performances, he immediately pointed out the errors and recommended corrections. These training flights, augmented by the theoretical training on the ground, contributed to the fact that the young navigators soon learned how to handle and operate bombsights and each carried out two or three independent bombing practices.

The first phase of training was completed by taking exams from all the navigators regarding their knowledge of the technique and methods of air navigation in various conditions with the use of the radar eye. After this, we began training unit flights on combat aircraft. The construction of the jet bomber, which was assigned to us for training purposes allowed room in the forward cockpit for a second navigator-instructor.

The first flight for each young navigator was a familiarization flight; he watched the actions of the instructor who, as he was carrying out his functions, explained what and how things had to be done and conducted a detailed orientation during the flight. The trainee, with the aid and under supervision of the very same instructor, next carried out the approach to the target and the bombing.

As soon as the instructor had become convinced about the firm and reliable actions of the young navigator, he went aloft with him on a control flight and then allowed him free and independent action. The same procedures were applied in night flying training with the only exception that the number of flights and bombings at night was somewhat increased.

In our opinion such a method is effective because the young navigator starting to fly on tactical aircraft continuously receives the qualified aid and support from the instructor directly in the air. This is the reason that the trainee works confidently; he knows that if he should make any kind of error in his activities, the instructor will immediately help to eliminate it.

A common practice is that the youths are trained by many specialists, beginning with the unit and squadron navigator and ending with the wing navigator. Practical experience shows that frequent changes in instructors is harmful to training and introduces confusion in the training methods. The instructors lose their sense of responsibility for the training of trainees. That is why, in our unit, the training of young aviators was handled by instructors well experienced in real bombing attacks and in methodical navigation. We never change instructors without special reason. Continuity in training is of great importance in the successful preparation of navigators. Long interruptions in flight training have a detrimental effect on the flight habits of pilots and navigators. Taking this into consideration, we never allow flight

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training interruptions of more than two days. As a result, our young navigators have learned and acquired a good knowledge of their work and can bomb any kind of target accurately.

It is understood that the progress attained did not come right away; the instructors had to work very hard with the young trainees. For example, two years ago, officer Ushenin was assigned to our wing. Up to that time he had flown only by day and under normal meteorological conditions. In a complex situation he could not determine the position of the aircraft rapidly and accurately; he was uncertain in setting the autopilot, and committed errors in the work sequence during the aircraft's course over the ground. Regular training under the surveillance of experienced instructors-officers Babchenko and Fomichev resulted in the elimination of all these shortcomings and now Lt. Ushenin carries out his missions successfully by day and night and under complex meteorological conditions.

The problem of breaking-in young aviation cadres can be solved rapidly and very successfully. This can be followed and practiced by each commander provided he is personally concerned with its successful fulfillment.

FROM MILITARY TRAINING EXPERIENCES: HOW WE ATTACKED BOMBERS

BY

FLIGHT COMMANDER CAPT. B. IVA... HERO COMBAT PILOT 2-ND CLASS

FROM

SOVETSKAYA AVIATSIYA NO. 42/2600, FEBR. 19, 1957

PAGE 2

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BY

FLIGHT COMMANDER CAPT. B. IV... HERO Combat Pilot 2-ND CLASS

FROM

SOVETSKAYA AVIATSIYA NO. 42/2600, FEBR. 19, 1957

PAGE 2

STAT

From Military Training Experiences: How We Attacked Bombers

by

Flight Commander, Capt. B. Ivanchenko, Combat Pilot 2nd Class

Among pilots, especially young ones, one can often hear a conversation that an air engagement with a bomber is simpler than one with a fighter; the target is larger, it can be easily spotted from a greater distance and all that is necessary is to close in secretly, attack it by surprise, open fire with all cannons.....and success is in the bag.

I personally think that these comrades are very wrong. Let us discuss one element, the search for the target. Let us assume that a flight of fighters has taken off. Visual search is conducted by four fighter-pilots and from heavy aircraft. Many pairs of eyes scan the skies carefully. Each of the crew members of a multiseater aircraft has his own zone of observation and these zones mutually overlap. That means it is very difficult to approach a group of bombers without being observed. We must also remember that the enemy can detect a fighter or fighters with the aid of radar devices.

Some pilots argue this way: an aerial encounter with bombers is a very hazardous job: they usually have a powerful fire protection and to engage in a fire fight with such an aircraft is possible only from a distance.

Also these comrades are incorrect because the striking probability during long range shooting engagements decreases sharply. During the World War II, Soviet fighter pilots successfully downed enemy aircraft at close ranges. Many thousands of enemy bombers were destroyed in the air by their accurate salvos. For example, in a single air-battle, Pilot Gorovets, shot down nine enemy bombers! Pilots of the Korean Peoples' Republic (North Korea) and Chinese Volunteer pilots have successfully battled modern jet bombers of the American aggressors.

The examples quoted give sufficient proof that, on one hand, one cannot underestimate the tactical possibilities of modern bombers and, on the other hand, one must not exagnerate their fire power. Experience shows that the victor in an air engagement with one or a group of bombers is the one fighter-pilot who was well trained for this job and who has studied to the smallest details avenues of search, approach, and maneuvers for attack. The victor is the fighter-pilot who learned how to conduct properly and maintain a fire fight and who learned how to operate the equipment of the cockpit, gunsight, armament like an automat, in other words, a pilot who learned how to shoot accurately. A well-trained pilot also acts skillfully in the air; he attacks daringly, swiftly and irresistibly.

Recently, my unit was engaged in an air-battle with a bomber

flight. We prepared ourselves thoroughly for this particular flight; we figured out and fixed our combat formation and, on the basis of models, we deduced the possible avenues of maneuvering for attack. I called the main attention of my subordinates to keeping their positions in the formation. It is no secret, that if a flight unit keeps its combat formation, each pilot will have favorable firing conditions; he will select the target properly and during the attack will not interfere with the maneuvering of the neighboring pilots.

Finally our unit was in the air. Immediately after take-off, we received the command from the leader-navigator: course 300, altitude 11,000 meters (36,300 ft).

This meant that the air battle would have to be conducted in the lower layers of the stratosphere. In highly rarefied air, one cannot make sharp evolutions, thus the search for the target becomes difficult. It means that it is necessary to fly at such a formation that would not restrict the maneuver of each pilot and at the same time would not hinder the combined fire support, would secure better wariness in the air, and provide for the detection of aerial targets at maximum ranges from the fighters. Such a combat formation was selected for our specific mission.

Following the line of interception, we appeared over a solid cloud cover. This made orientation very difficult. The flight of

the fighters was watched attentively from the command point but this did not relieve us from the obligation of carefully watching the course, speed and time so that we could go independently to our own or to an alternate airfield if needed.

Within the next few minutes came a ground command "....bear left, course....." The aerial target must be somewhere near. The pilots of our group intensified their caution. The outcome of the battle depends in many respects upon the timely detection of the bombers; should the "opponent" spot us first, he would immediately begin maneuvering and try to get away; should we spot him first, we would try the surprise close-in, take up a suitable position for attack, and attack suddenly.

Just now we listen to a report from the command point "Opponent" ahead, to the right' and sure thing, I suddenly spotted a bomber group! The number of aircraft, their type, flight altitude and flight formation were rapidly transmitted by radio to the ground.

The air situation was favorable: the enemy bombers were without fighter protection. I decided....to carry out the first attack simultaneously by the entire group in close flight formation "wedge formation"....followed by repeated attacks....alternately in pairs.

There is no question about it; in order to inflict maximum

damage on the enemy and to break up his formation, we must make maximum use of the fire power of each fighter. In this, lies the value of a simultaneous attack and in addition it also has a strong demoralizing effect on the bomber crew because it reduces the fire effectiveness of their own weapons.

The repeated attack - alternately in pairs - is based on other factors. First of all at a great altitude, a pair of fighters can maneuver much easier than a whole flight; secondly, with the appearance of enemy fighters, it is possible not only to carry on the attack but also to defend ourselves; the attack by one pair of fighters is covered and supported by another pair. Both attacking variants were worked out well during flights at medium altitudes. Each pilot knew beforehand what kind of an enemy bomber formation he would have to attack. Any additional instructions from me were therefore unnecessary and I barked a short command; "Follow me all into attack!"

At a distance of approximately two km.(6560 ft), the bomber crews spotted us and immediately increased speed and changed course. But the evading maneuver of the aerial target did not stop us from closing in to a distance of effective fire or from opening fire from the camera guns with a subsequent pull-out to the right and downward. As I pulled out from the attack, I carefully watched the target-aircraft and

at the same time studied the skies. The bombers again changed the flight aspects and tried at all costs to escape our repeated attack. Taking into consideration the fact that there were no enemy fighters in this vicinity, I decided to make the repeated attack not alternately but in succession by pairs.

The excess speed gained as a result of descent gave us a chance to carry out lively maneuver. Soon our group, following in a scattered formation, again began attacking the enemy aircraft in pairs from the right side.

During this aerial battle, I watched the actions of our pilots and noticed a number of errors. For example, the young pilot Myasnikov of the leading pair lagged behind the leader, First Lt. Teplyakov. Instead of accurately maintaining a distance of 30 - 40 meters, he trailed in the rear at a distance of more than 100 - 150 meters, was late in noticing the maneuver of the leader and was late in increasing the engine rpm. Trying to catch up with the leader, he did not aim accurately against the selected target.

Next, the increased distance between the fighters of the second pair led to the lengthening of the pull-out distance. First Lt. Teplyakov ceased firing and began the pull-out and his follower had still not opened fire. The decoded frames of films brought down by Myasnikov were good but could have been excellent.

First Lt. Teplyakov also committed an error - his maneuver was too long and he hesitated with the repeated attack. This under actual

combat conditions, would be intolerable. Continuous fighter fire or small interval fire has a stunning effect on the bomber crews and lowers their will to resist. By their initiative, fast action and high attacking spirit, the fighters pin down the enemy and break up his defense organization. The second fighter pair reduces still further the already sinking morale of the enemy crews. The aerial gunners of the enemy could have taken advantage of the cessation of fighter fire and have started aimed fire against the attackers.

The experience of the first aerial battle with bombers at great altitude shows that the better the pilot training on the ground, the better the coordination of pairs and groups in flight and the better the results of aerial combat missions.

THEIR NAMES ARE IMMORTAL

FROM

SOVETSKAYA AVIATSIYA, NO. 47 (2605), FEBRUARY 24, 1957

PAGE 1

Their Names Are Immortal

Representatives of the KAUCHUK Plant workers, the Krasnaya Roza (Red Rose) Silk Weaving Plant, the Sverdlov Textile Mill, and of other enterprises in the Frunze region of the city of Moscow gathered yesterday at the Novo-Devichi Cemetery. Many of the city's high school students were among those assembled who had come to honor the memory of two generations of soldiers who had participated in the Civil and Second World Wars.

A solemn memorial meeting was convened at the graves of the soldiers who had sacrificed their lives for the happiness of the Soviet People. Secretary of the Frunze region Communist Party, V. Trofimov, opened the meeting. Speeches were made by the representative of the Soviet Veterans Committee, by a commander of a guerilla brigade I. A. Kolos, by Lt. Col. M. A. Ivashchenko, and by girl student of the 10th grade from School No. 43 of the city's schooling system L. Pozdnyak. In their fiery speeches, they spoke about the heroism and courage of the Soviet patriots who took part in the bitter battles of the Civil and Second World Wars. The Soviet people, under the leadership of the Communist Party, in bloody battle with all the enemies of our Fatherland defended the victories of the Great October Socialistic Revolution. The names of soldiers and their immortal heroic deeds became the symbol of the courage and unflinching determination of our people.

The words of the speakers sounded like a vow when they kept on assuring that the Soviet people will henceforth do everything in their power to strengthen continuously the might of our nation and protect the state interests of the Soviet Union. At the sound of taps and a funeral march, the participants of the meeting placed wreaths on the graves of the fallen soldiers. The first wreath was laid on the grave of writer-soldier Nikolay Ostrovskiy. The ribbon on the wreath bore the words "To a Heroic Fighter out of the Happiness of the People from the Young Communists of the KAUCHUK Plant".

A wreath was also laid on the grave of another famous Soviet writer, Dmitriy Furmanov, who, in his writings, glorified the heroic deeds of the Civil War heroes.

A group of youths placed a wreath on the grave of pilot Timur Frunze, Hero of the Soviet Union, who lost his life in a daring fight against overwhelming enemy aircraft. Wreaths were placed on the graves of Zoya and Aleksander Kosmodemyanskiy whose brief but rich life became a symbol of supreme sacrifice for our beloved country.

Illustration, page 1, bottom: Major I. Bitovich Conducts Class Room Instructions on Methods of Bombing from Pitching.

Illustration, Page 2, top: Aerial Gunner, Radio operator First Class Sgt. Popov is Master of his military specialty. (He fires accurately against aerial targets and always secures uninterrupted radio contact with the ground. For his progress in military training the exemplary soldier was awarded four decorations and his picture is placed among the distinguished ones). In illustration: Sgt. N. Popov, outstanding in military and political training.

NOTES OF FOREIGN AVIATION TECHNIQUE

FROM

SOVETSKAYA AVIATSIYA 1957, No. 49/2607, FEB. 27, 1957

PAGE 4

Notes on Foreign Aviation Technique

The Swiss Aerial Cannon.

Some English, Swedish and Italian aircraft are now being equipped withthe Swiss-made 30 mm. HS-825 aerial cannon (Fig. 1). It has a rate of fire of 1000 rounds per minute, high initial velocity of the shell (1050 meters/sec) and weighs 103 kg. After firing the first round, the movable system is operated by a device operating on the principle of utilizing the gas recoil. The energy of the recoil is dampened by the system of springs which return the cannon to its initial position. At the end of the rearward motion of the barrel is an additional shock absorber. The round-feeding mechanism can work on the left and right sides of the ammunition feed belt which is distinguished by great flexibility. The cradle comprising the outer frame of the cannon is made in two variants: for stationary mounting on the aircraft and for nonstationary mounting.

Landing on Different Surfaces.

Recently the news releases carried information about the construction of an aircraft adapted for take-off and landing on water, swampy regions, sand, snow, ice and other surfaces less suitable for the landing of an ordinary aircraft. It has been reported that such a machine has already undergone tests under such conditions and by its designation appears to be a Military Transport Aircraft.

The characteristic feature of this machine is that it has a boundary layer control system as well as universal landing gear

which appears to be a supplement to the conventional ones. Tests showed that the aircraft, with a gross weight of 22,700 kg (49,940 lbs.) thanks to its boundary layer control system, can reduce the take-off run from 600 to 250 meters (from 1980 to 825 ft) and the landing run from 370 to 230 m (from 1221 to 759 ft.) The fuselage is hermetically sealed because of the possibility of landing on water.

When landing on water, the stability of the aircraft is secured by two floats fastened to the wing tips.

TAKE AN EXAMPLE FROM THE COMMANDER

(BERITE PRIMER S KOMANDIRA)

BY

Z. SOROKIN, HERO OF THE SOVIET UNION

FROM

SOVETSKAIA AVIATSIYA, NO. 54/2612, MARCH 5, 1957

PP. 2

TAKE AN EXAMPLE FROM THE COMMANDER
by
Z. Sorokin

The aviators of our nation enjoy limitless admiration and respect. No wonder then that the article entitled "Aviator - the Word Has a Proud Sound" had such a lively reception among the aviators. I too would like to express my thoughts regarding this difficult and interesting profession.

Letters are addressed to me from all cities of our vast country. Young people are asking counsel and advice on how to become a real aviator.

I should say that the profession of an aviator is the profession of courageous and persistent people. An aviator is not afraid of difficulties and usually overcomes these difficulties through insistent efforts. To those who would like to become real fliers, I would like to give this particular advice: "Take an example from the commander". The commander is usually a first class aviator and our aviation-inclined youth will rapidly fall into formation provided they always listen to the counsels and recommendations of their commanders and chiefs and acquire skill, experience, courage and boldness from them.

I would like to cite an example from life in the combat zone. In September, 1941, 52 enemy aircraft appeared in one of the regions of the Arctic. At this time, seven Soviet fighters under the command of famous aviator Boris Safonov were in the air. They received an order from the command point to go immediately to the region of the Zapadnaya Litsa

River, find the enemy and to engage him in battle. Our Red Star fighters flew into the region indicated. Safonov was the first to detect the fascist bombers. Following its leader, the seven aircraft flew into a solid cloud, whence they swiftly attacked the combat formations of the Hitlerite groups. With our first attack, we drove the enemy from its planned combat mission. Taking advantage of the confusion of the fascist fliers and of our own tactical altitude, our fighters destroyed five enemy aircraft in succession. Boris Safonov was outstanding in this action; he was a daring pilot and military commander. He was the first to attack an enemy aircraft, and we, his pupils supported him by shooting down four enemy aircraft.

In this unequal skirmish, North Sea pilots Kovalenko, Pokrovskiy, and Maksimovich courageously fought the enemy. I too succeeded in shooting down one enemy aircraft. Such a success could be attributed mainly to the courage of our commander. He did not lose control during the entire battle and kept on giving timely advice (orders) to everyone of us; he attacked, and directed our attacks. Under such a fearless and daring commander, we did not pay any attention to the numerical superiority of the enemy. Safonov gave his commands with calmness and confidence:

"Attack the leader. Cover your comrade. Fire from close range." He often boosted our courage by his shouts of "Let's get at them, comrades".

By our bold attack, we broke up the plans of the enemy and forced him to drop his bomb load on his own combat lines. This made it possible for our ground forces to counterattack at the given section of the front line. All the seven fighter aircraft of our group returned safely to our base.

We fought actively, offensively and at times came out the victors from actions under extremely difficult conditions for us. Safonov taught us never to wait for the enemy but to find him, attack him daringly, destroy him and return unharmed to our home bases.

The commander devoted great attention to training of mutual assistance and rescue during aerial battles, he despised and fought against the slightest highhandedness or unnecessary risk. He attained undisputed displine and trained us in courage and bravery.

Our captain taught us that a flier must be courageous and daring. There are the undeniable qualities of everyone, especially of a combat flier, who is training for aerial combat. It is known that the enemy does not wait to be shot down; he is trying to destroy you.

Courage and boldness are by no means inherent qualities; they are inculcated in us by our Soviet actuality, by the constant training of our commanders and political propagandists. There are times when even the most courageous pilots experience a certain doubt. But under the supervision of a daring and willing commander, the pilot soon overcomes this feeling of doubt and becomes fearless. I personally underwent this experience.

In the summer of 1941 as we were pursuing enemy aircraft, I suddenly found myself alone facing three Messerschmitts. I was saved only by the fact that I did not succumb to the feeling of fear; I mobilized my entire will and energy and rapidly thought of my commander Captain Safonov and how he would act if caught in my predicament. Surely he would say: well, so what, the greater the number of enemy aircraft, the more targets for attacking.

The thought of my commander gave me a great boost and I immediately attacked the enemy and shot down one fascist plane. The remaining two Messerschmitts did not accept battle. I remember when for the first time I took off from a forward airfield I had a great desire to shoot down an enemy aircraft which I had just then spotted in the air. But I could not fulfill this desire. Between wanting to and knowing how, there is much persistent work. The know-how involved in defeating an enemy pilot came later but only as the result of tedious and constant training under the leadership of the commander.

At present, aviation technique has made a very long step forward. The fliers of the World War II could only dream and hope of thousand kilometer speeds and about the possibilities of flying in the stratosphere.

Modern jet aircraft are already flying at supersonic speeds. The terrific increase in aircraft speeds has raised the pilot requirements considerably. In order to become a successful and experienced pilot, one must learn and train a great lot. My advice to the young aviators is: pay more attention to the commander, take over and adopt the experience acquired in battles with the enemy, and learn to carry out his orders accurately and incontestably.

Doors which open wide into the blue and limitless spaces invite daring and disciplined aviators.

Illustration - Major F. Pugach in the Cockpit of a Bomber Prior to Take-off.

Navigator, First Class Communist Pugach likes his Particular Job, he Continuously improves his skill and knowledge and teaches the art of aero-navigation and Bombing Under Complex Meteorological Conditions to his Comrades in Arms.

ANTIAIRCRAFT GUIDED ROCKETS

ENGINEER V. GRENIN

FROM

SOVETSKAYA AVIATSIYA, NO. 55 (2613), 6 MARCH 1957

PAGE 3

STAT

ANTIAIRCRAFT GUIDED ROCKETS

by

V. Grenin

The constant improvement of strategic bombers and long range guided missiles capable of carrying atomic and thermonuclear warheads has considerably raised the role and responsibility of antiaircraft defense of strategically important industrial and administrative centers against possible attacks from the air.

In this connection, in recent years great scientific-research and experimental-construction projects were initiated for the development of effective means of antiaircraft defense. Included among these means, in addition to the all-weather fighter-interceptors possessing high flight and combat qualities, are antiaircraft guided missiles. These missiles are in many cases reliable weapons for combatting enemy aircraft and guided missiles.

Antiaircraft guided missiles are intended as countermeasures against bombers, and flying bombs flying at sub- and supersonic speeds, for the interception of aerial targets at great distances from the defended target and for combatting enemy guided missiles.

Guiding Antiaircraft Missiles Toward a Target. In certain types of antiaircraft guided missiles, the probability of hitting the target is more than 65%. Their effectiveness depends upon the proper selection of the aerodynamic design of the missile, its power unit, size of warhead and particularly upon the reliability and accuracy of the performance of the guiding system.

Under the term guiding system, we understand a combination of devices allowing one to control the flight of the missile and to guide it to the target. Among the existing guidance systems, the so-called "command system" and the "beam-guidance system" have acquired the broadest application.

The command system includes two radar units: a radar-direction finder, which continuously determines the coordinates of the detected target, and a control-radar watching the position of the missile. The data from both radar units are fed to an automatic computer which compiles and transmits the necessary commands to the missile, thus securing the meeting of the missile with the target.

In the case of the "beam-guidance" system, the missile goes to the target in a narrow beam of radio waves emitted toward the target by the ground radar guidance station. The axis of the beam is continuously held on the target. The missile is provided with a device which determines the deviation of the missile from that axis and generates signals which bring the missile back on the axis of the beam. These signals are amplified and transmitted to the steering mechanisms.

According to foreign press reports, both guidance systems described have a number of deficiencies. They are subjected to outside interferences and do not have the necessary guidance accuracy, especially at great ranges. In addition, the command system requires complex ground equipment and a greater number of service personnel.

In order to increase firing accuracy, self-guiding systems are used during the final stages of the flight trajectory of antiaircraft missiles.

By their mode of operation, the missiles are divided into: active, semi-active and passive. In the active system of self-guidance, the entire instrumentation system is concentrated on the missile itself. The airborne transmitter included in this system irradiates (sweeps) the target. The radio waves reflected (bounced back) from the target are picked up by the receiver of the missile and by means of a computer are transformed into commands which are in turn transmitted to the missile control organs. The advantage of this system consists in its total independence from the ground installation. However, the great weight of the airborne equipment and through it the necessity of increasing the dimensions and weight of the missile appear to be the disadvantages of the system.

The semi-active system secures the guidance of the missile by the signals of the ground station (which sweeps the target) and reflected (repulsed) by the target. In this case the missile carries only a receiving device. This allows one to reduce the weight and dimensions of the mechanisms installed on the missile.

The guidance of a missile in the presence of a passive guiding system is realized by the electromagnetic, thermal or light radiation emitted by the target itself. Systems utilizing thermal 'infrared) radiation of targets, e. g., heat of the working aircraft engines, heating of outer surfaces (skin) of rockets, are considered the most suitable. Passive self-guiding systems operate secretly (they are not easily detected by the enemy - they do not reveal themselves to the enemy) and are comparatively slightly exposed to the effects of interferences. However, their effective range is limited.

Field of Missile Application

The mission of antiaircraft guided missiles is to destroy aerial targets at great altitudes normally not accessible (not within reach) of conventional artillery rounds and fighter-interceptors.

In its external form, the missile is a controlled rocket equipped with a cruciform triangular in plane (delta) wing with forward staggered steering units. The launching weight of such a missile is 1000 kg (2200 lb), it is 6 m. (19.8 ft) long, maximum velocity about 700 m/sec (2310 ft/sec), effective ceiling - 20 - 23 km. (12.92 to 14.86 miles) and slant range - 30 - 40 km. (19.38 to 25.84 miles). The missile is powered with a liquid rocket engine which operates on concentrated nitric acid with admixtures of nitric oxide (oxidizer) and petroleum fuel normally used for turbojet engines. The launching (see drawing on right side) is realized with the assist of a powder charge (assisted take-off [RATO]) rocket which detaches itself from the missile after exhaustion of its fuel supply.

Missiles are fired from special launching installations.

The interception of aerial targets at low altitudes is connected with a number of difficulties due mainly to the more difficult operational conditions of the guidance system instruments. At low altitudes, we have additional reflections from local objects: hills, structures, wavy sea, clouds. All this creates a background which interferes with or makes the detection of moving aerial target extremely difficult.

The main object in the development of missiles intended for use against low-flying targets is the creation of properly operating guidance

systems. According to press reports, for such targets (low-flying), a liquid-rocket missile is being developed with an effective range of up to 80 km. (51.68 miles).

As a rule antiaircraft long-range missiles are powered with ramjet engines which have a lower specific fuel consumption ratio; they can secure a high airspeed four times greater than the speed of sound and a combat range in altitude of up to 30 - 35 km. Structurally such missiles are made in the form of flying bombs (robot bomb).

By its outer appearance, one of such missiles (see drawing on left) represents an all-metal monoplane with triangular (delta) wing and the same empennage. It is powered with two ramjet engines mounted on pylons. A liquid rocket unit placed in the tail section of the missile is used as a RATO unit to accelerate the movement of missile into space. The length of the missile is 11 meters (36.3 ft.), maximum velocity - 3200 km/hr. (2067.2 miles/hr.), maximum range - 320 to 400 km. (20 - 25 miles). The guiding of the missile toward the target is apparently realized with the aid of a combined guidance system and, at the final stages of the trajectory, by means of a self-guiding system.

The broad employment of antiaircraft rocket weapons should increase the effectiveness of antiaircraft defense greatly. Steps are being taken to improve further and to increase the effectiveness of antiaircraft guided missiles. One of the measures is to equip antiaircraft guided missiles with atomic warheads. The employment of atomic charges should guarantee a sharp increase in the probability of hitting the aerial target and even destroy groups of aircraft with one single missile. As quoted

by the press, such charges (warheads) are already in the developmental stage.

Up to the present, as was stated by the Soviet Minister of Defense, Marshal of the USSR G. K. Zhukov in his speech at the 20th Congress of the Communist Party of the USSR, our country has carried out large scale work in the organization of antiaircraft defence. As a result of all these efforts, the aerial defense of our country has at its disposal a modern fighter aviation, highly effective antiaircraft artillery and antiaircraft rocket weapons.

BATTLE AT AN ALTITUDE OF 10,000 METERS (33,000 FT)

(BOY NA VYSOTE 10,000 METROV)

BY

EDUARD PARA

FROM

SOVETSKAYA AVIATSIYA, NO. 61/2619, MARCH 13, 1957

page 3

BATTLE AT AN ALTITUDE OF 10,000 METERS (33,000 FT)
by
Eduard Para

Among Our Czechoslovakian Friends

The pre-flight preparation at the N-airfield of Czechoslovakia was completed. The pilots went their separate ways knowing exactly what to do in the air. This time a difficult flight was on schedule for them. They had to find the "enemy" above the clouds and attack him at 10,000 meters, which was no easy job. To make things more complicated, the pilots were not allowed to use radar means for the detection of the enemy.

The problem of detecting and attacking the enemy was given to the flight group headed by Captain Shramek. Pilots of another flight group - Chechil, Beran, Kadlechek and Vinsh - were to act as protection for the enemy aircraft.

The take-off time for the first group approached. The engines were tested and the aircraft began rolling out toward the runway.

"No. 249....take-off!, No. 231....take-off!" commanded the operations officer.

The aircraft, having penetrated the cloud layers, kept on climbing higher and higher. The altimeter showed 1800, then 1900 meters. The clouds became thinner and finally the aircraft were above the clouds. The first pair of the flight group was visible in the distance. Having increased their speed, Kadlechek and Vinsh fell into formation with the aircraft of Chechil and Beran. In its combat formation, the group began climbing to an altitude of 10,000 meters.

Within five minutes after the take-off of the first group, Captain Shramek's group took to the air. Having passed the clouds, the aircraft of this unit assembled in formation and flew into the air battle zone. Now the Shramek group was faced with the most difficult part of the flight: to find the air-enemy and attack it. It was not as simple as it appeared to be. The fliers of Captain Chechil's group had great flight experience and were well trained in jet technique. But this time they were betrayed by condensation (vapor) trails which were visible for tens of kilometers.

Pilot Kadlechek was the first of the Chechil group to notice that and he immediately reported this fact to the leader. Having changed the flight altitude, the Captain led his group away from the give-away (revealing) trail, but this maneuver was too late because his group had already been discovered.

"On the right, in front of us, is the target", came the voice of Captain Shramek, who was first to discover the "enemy". Utilizing the advantage of altitude, Shramek was trying to get into a suitable position for attack.

Soon he shouted the command...."We shall attack!"

The pilots of his group accurately carried out the command of the leader and each one picked a suitable target for himself.

During the analysis of the flight results, it was noticed that the fliers of both groups successfully overcame the complex meteorological conditions as well as the difficulties involved in aerial encounter at great altitude.

In the illustration: Group Commanders, Captains Chechil and Shramek, Study the Film of the Gun Camera.

HIGH ALTITUDE ATTACK ON A BOMBER

BY

LT. COL. P. NOSOV, COMBAT FLIER, 1ST CLASS

FROM

SOVETSKAYA AVIATSIYA NO. 66/2624, MAR. 19, 1957

PAGE 2

Attack on a Bomber at High Altitude

by

Lt. Col. P. Nosov, Combat Flier, First Class

Modern jet bombers can operate at high altitudes and in the stratosphere. Consequently, our fighter pilots should known well how to conduct aerial battles under such conditions. They must know under existing conditions how best to utilize the tactical methods and advantages, such as attack by surprise from the most advantageous position.

The task of intercepting a high speed aerial target by a pair of fighters begins immediately after the enemy has been discovered by ground radar means. The commander, having evaluated the situation, reaches a decision, issues the necessary instructions to his men who, upon his command, roll-out and then take-off.

The approach of jet fighter-interceptors to an aerial target under present day conditions, as a rule, is carried out upon the command of leader-navigators on whose tactical maturity and operational skill very often depends not only the success of the first attack but also the outcome of the entire aerial battle.

Leader-navigators usually try to guide their interceptors into the rear herisphere into a position most advantageous for assuming the attacking position. The navigator must make not only accurate and rapid computations but he must also communicate the flight conditions to the attacking fighters in time and

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secure for them the tactical advantage with respect to the aerial target.

Modern bombers can fly at great speeds, have great maneuverability and carry powerful armament. Our pilots must strive to shoot down such targets during the first attack because during a repeated attack in the stratosphere where a maneuver with low bank and greater radii is perfectly possible, the fighters will exceed the limit of target visibility and it will become necessary to guide them for the second time toward the targets.

In order to intercept high speed aerial targets successfully at a high altitude the fighter pilots must study continuously the flight-tactical characteristics of the bombers, including their weak and strong points, and on these bases find the most effective means and methods of conducting an aerial battle.

The basic factor in carrying out bomber attacks from high altitudes is the small speed advantage of fighters. The attacks must therefore be carried out at reduced aerial-target approach speeds. This also explains the increase in space necessary for engaging the enemy; the execution of repeated attacks becomes extremely difficult.

The time the attacking fighter is along the attack curve has also increased. True, the sighting (aiming) and firing from the fighter under such conditions is much more advantageous but the fighter is exposed for a longer period to the defensive fire

of the bomber.

With the increase in altitude, the maneuverability of fighter-aircraft, especially in group formation, is reduced considerably, the excess thrust drops and as result of this the vertical rate of climb decreases. This places a demand upon the pilot to maintain accurately the most advantageous conditions of climb. He must remember and take into consideration the fact that the time of aircraft acceleration with altitude increases for many reasons; the radius and time for the execution of turns also become greater. The attack is possible at a smaller angle of approach because due to the flow separation from the wing it is impossible to create the required overload. Another possibility is that the attacking fighters may fall into the wake of the target aircraft.

The wake of jet bombers represents a disturbed air flow which is being formed behind an aircraft flying at high speed. The wake occupies about 5° angle along the horizon and deviates from the aircraft downwards by up to 8° and upwards - by approximately 2°.

With the increase in flight altitude due to the drop in air density, the power of the wake decreases somewhat but its effect on the fighter does not diminish because the fighter flies at greater angles of attack and small indicated speeds. The bomber is in exactly the same situation. For this very reason, the wake behind the bomber in climb always deviates downwards. Its harmful effect is usually felt at a distance of 1-1½ km. The fighter-

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pilot feels the severe jolting of the aircraft, and the involuntary bumps of the aircraft from wing to wing followed by considerable loss of altitude. If the fighter stays in the center of the disturbed flow at distances of less than one km, he may have trouble with engine stoppages. In addition, severe jolting makes aimed fire almost impossible.

Our fighter pilots must also keep in mind the fact that the wake is not the same for all types of bombers: it differs in size and direction. For example, in bombers with engines suspended on pylons, the wake passes much below the aircraft.

During a high altitude engagement between a pair of fighters and a jet bomber, timely detection of the enemy is of utmost importance. This is not quite a simple task. Visibility at high altitudes becomes considerable lower, the color of the sky changes: it becomes much darker toward the upper hemisphere. The solar radiation effect is much stronger here. That is why it is hard to detect an aircraft from the direction of the sun whereas visibility is much better from the opposite direction. In addition, the detection of the enemy under such conditions is further hampered by the reduction in the keenness of vision due to oxygen deficiency. Because of this it is necessary, during the search, to pay special attention to some revealing (give-away) signs: vapor and smoke trails left behind jet engines and reflections of sunlight against the aircraft.

The important task of fighters during approach is to find and occupy a suitable initial position for attack. A pair of fighters should invariably take up a position above the target with the purpose of subsequently utilizing it for acceleration during the In order to gain the element of surprise and attack suddenly, it is necessary to take advantage of the sun, haze, cloudiness, trail of target, shielded and poorly visible sectors of observation.

The attack on a bomber by a pair of fighters is carried out in various ways depending upon the accuracy of approach of the fighters to the target. These attacks can be in succession, simultaneous, or from one and two directions.

Not so very long ago a pair of fighters (leader pilot Gromov and pilot Grushevskiy follow) went up on a mission of intercepting a high speed jet bomber. The leader spotted the enemy along the intersecting courses at a range of 8 - 10 km. and decided to attack in succession from one direction from the right lower rear. The pull-out from attack was in the very same direction from which the attack came.

As a result of the air battle, each pilot attacked the target twice. The gun-camera results were excellent.

Sometime later another pair of our fighters (leader pilot Shevchenko and his follower pilot Grushevskiy) spotted a target flying at great speed and high altitude. The leader, having evaluated the aerial situation decided to attack from the lower rear.

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The attack was carried out in succession, one fighter at a time. Up to the moment the fighters appeared at the initial position, they gained the advantage in speed by approximately 150 km/hr as a result of flying at an altitude below that of the target.

From the initial attacking position, the leader of the pair, pilot Shevchenko, brought his aircraft in a angle climb and simultaneously transmitted over the radio "I am attacking". When the nose of the aircraft reached almost 8 - 10° from the target the pilot shifted the control stick and brought the aircraft into the curve of attack. After the leading aircraft went into attack the following one flew for several seconds in a straight line and then repeated the maneuver of the leader. The pull-out from attack was to the side. They did not fall into the wake of the enemy aircraft because the maneuver was well executed. This of course does not mean that falling into the wake is impossible. This can happen with a pilot who has brought his aircraft into the lower layer of the wake. The aiming (sighting) accuracy will be upset in this case.

Of great importance in modern aerial warfare is the two-way (from two different directions) attack on a bomber by a pair of fighters. The pilots of our group employ this method quite frequently. For example, a pair of our fighters headed by expert pilot Sidel'nikov recently took off to intercept a high speed jet bomber. The attack was carried out from the rear, above and to the side of the target. The aerial target maneuvered in speed and direction. Under these conditions, our pilots decided to attack simultaneously

from two directions: the leader from the right and the follower from the left. One of the aircraft was in a precarious position but the other one made his attack with perfect success. The pilots made two photo-camera films each and accomplished their mission successfully.

During aerial engagements between a pair of fighters and a single bomber, the most effective attacks are those carried out in succession from one direction and with minimum possible time intervals. From the tactical viewpoint, attacks from different directions are also advisable because such maneuvers break-up the defensive fire concentration of the bomber.

Our fighter-pilots should be able to handle all these attacking methods to perfection and apply them skillfully during aerial encounters with enemy bombers.

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BOOK ON ROCKET ENGINEERING CRITIQUE AND BIBLIOGRAPHY

BY

LT. COL. ENGINEER V. GLUKHOV AND MAJ. ENGINEER K. TOLSTOGANOV

FROM

SOVETSKAYA AVIATSIYA, NO. 66/2624, 19 MARCH 1957

page 3

BOOK ON ROCKET ENGINEERING CRITIQUE AND BIBLIOGRAPHY
by
V. Glukhov and K. Tolstoganov

The book written by V. I. Feodosyev and G. B. Sinyarev* and published recently by Oborongiz (Office for the Publication of Defense Literature, USSR), is devoted entirely to the bases of rocket engineering. It appears to be the first attempt to generalize the group of problems connected with the theory, design principles and performance of modern rockets. The book is intended for readers familiar with the bases of higher mathematics and theoretical mechanics. This book will no doubt also stir up interest among aviators.

The first chapters of the book are devoted to the general problems of rocket travel and design of pilotless flying machines. Conclusions derived from the Tsiolkovskiy formula for an ideal rocket speed and from the Meshcherskiy equation regarding the thrust of a rocket engine are explained in a quite popular manner. The reader becomes acquainted with a variety of structural designs of jet devices and particularly with various types of rockets. This includes long range rockets with a speed of up to 3300 m/sec (10,890 ft/sec) and range of up to 5000 km. (3230 miles), meteorological rockets with a rate of climb of up to 2200 m/sec (7260 ft/sec), and ascent up to an altitude of more than 400 km. (253.4 miles).

The book familiarizes the reader with the basic elements of a rocket - the propulsion unit and processes occurring in the combustion chamber.

*V. I. Feodosyev, G. B. Sinyarev. Introduction to Rocket Engineering, Oborongiz, 1956, 375 p. price 9 rubles 70 copecks.

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The book also discusses the structural characteristics of jet and rocket engines only and for a perfect reason because the construction of powder (solid fuel) engines is quite simple.

Of great interest are the chapters devoted to external ballistics of rockets. Given here are data about the terrestrial atmosphere and its characteristics, physical bases of supersonic flow around bodies and the creation of an artificial satellite of the earth etc. However, it should be mentioned that the system of differential equations for rocket armament is more powerful than regular cannon armament (artillery). It should be remembered that in the long run, the firepower of an aircraft is determined by the damage inflicted on the enemy. And if we speak about unguided missiles, then it is still too early to discuss their advantages in comparison with the firepower of cannons on modern aircraft.

It is said on page 75 that the rate of gas discharge from the nozzle "due to the processes occurring in the engine, is greater than the speed of the rocket and as a result of it we have thrust". Such statement is contrary to the truth. In order to produce thrust in a jet engine, it is necessary that the rate of motion of the discharge gases be greater than the rate of motion of the intake air. The rate of motion of discharge gases is determined not only by the rate of outflow but also by the mass of the discharge gases and thrust may also originate when the rate of outflow is smaller than the speed of the rocket.

The authors divide the rocket control systems into autonomous and non-autonomous. This is much too primitive. Such a breakdown does not give a clear picture about the multitude of systems and principles of

of their design. It would have been more advisable to divide control systems in accordance with the movement of the missiles into inertia and astronavigational (autonomous); remote control with visual, radiotelemetering or television control of the flight; self-guidance based on light, heat or radar contrast of targets and also combination guidance systems.

The description of the gyroscope appears to be inaccurate. We read on one of the pages that it is "a massive, precision balanced flywheel rotating at great angular velocities". Immediately on the following page we read: "the gyroscope represents a symmetrical body with one fixed point and this point appears to be its center of gravity". It is asked then which of the definitions is correct? The truth is that any given flywheel, especially a well balanced one, apparently has not one fixed point but a geometric place of fixed points, i. e., an axis of rotation. Therefore, up to the point when a flywheel is not placed in a special suspension device which secures at least two degrees of freedom, it cannot be called a gyroscope. The second definition given by the authors to the gyroscope is more proper but still not accurate. There are gyroscopes in which the center of gravity is not a fixed point, i. e., it does not coincide with the center of suspension.

In spite of all the flaws, the book will bring some aid not only to students of higher technical institutions (as it is stated in the foreword) but also to a wide circle of readers-aviators.

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TOWARD THE 40TH ANNIVERSARY OF THE GREAT OCTOBER REVOLUTION

(NAVSTRECHU 40-LETIYU VELIKOGO OKTYABRA)

FROM

SOVETSKAYA AVIATSIYA, NO. 77/2635, MARCH 31, 1957

page 1

TOWARD THE 40-TH ANNIVERSARY OF THE GREAT OCTOBER REVOLUTION

At the airfield of the N-Reconnaissance Unit we see great activity. The aviation specialists prepare the machines and equipment for flight; in the air the crews work to improve their proficiency.

Here we see the experienced pilot, communist Capt. P. Narozhnyy. He trained many of the young aviators. For his excellent work and achievements the officer was awarded many valuable gifts and received thanks (commendations) from the commander of the regional AF. Right now the captain is watching the actions of young aviator Lt. S. Ovsyannikov who is training in an aircraft cockpit.

The aerial photo cameras must always be in tip-top shape and function properly. The cameras are being readied by photo-specialists under the supervision of technician Lt. I. Pivovarov. Prior to fixing the cameras on the aircraft it would do no harm to check once more the interior of the camera and this is exactly what Lt. Pivovarov and senior mechanic private T. Baybozov are doing.

The flights concluded. Navigator, Lt. V. Puchkov came into the photo-lab; he studies the negatives made a day before. Mission well done.

On the illustration below you see subordinates of Capt. S. Dumayev. The specialists are making a certain rapid and good repair. In front Private A. Konovalov tests the headlights.

TACTICAL TRAINING OF NAVIGATORS IN GROUND CONTROL OF INTERCEPTION

BY

LT. COL. I. BORISENKO, HERO OF THE SOVIET UNION

FROM

SOVETSKAYA AVIATSIYA NO.79/2637, APR. 3, 1957

PAGE 2

Tactical Training of Navigators in Ground Control Interception

by

Lt. Col. I. Borisenko

The navigator plays an important role in guiding the aircraft toward aerial targets and in the execution of the commander's combat intentions. Together with his aides and specialists of radio stations, they solve such an important problem as calculation of the boundaries of climb and interception, guidance of fighters into initial position, and if necessary again direct the pilots into repeated attacks.

It is perfectly understood that such complex problems can be successfully carried out by the navigator only if he himself possesses high tactical training, follows tactically proper methods of guiding, and with consideration of the concrete aerial situations, employs the most advisable and effective methods of combatting the "enemy". The navigator must have a thorough knowledge of the flight-tactical characteristics of friendly as well as foreign aircraft and must continuously improve the methods of guiding under any meteorological conditions.

Acting in the proper manner are those commanders and chiefs who strive for the tactical training of navigators and training in making combat estimates of all command points. Great experience in this respect was acquired by the K-unit. The training of soldiers in the art of navigating pursues both the idea of increasing their theoretical knowledge and of developing

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certain habits during the period of special and complex training in actual and simulated flights of the fighter aircraft.

During theoretical practices, the officers make navigational calculations of interception flights under normal and adverse meteorological conditions and become acquainted with the mechanisms, with the operation and rules governing the use of radio media and brush up their skills directly at the PPI (plan position indicator). Making navigational computations, they concentrate their basic attention on such elements as the determination of boundaries for the climb of fighters, boundaries of interception, determination of basic points from which the fighters turn toward the target, and time periods for the issuance of commands, etc.

The value of such training practices consists in that they are conducted in group exercises. The students take an active part in solving tactical problems. The instructor builds up concrete aerial situations, indicates the basic data (position of the target, its airspeed, altitude, course and the home base of the fighter aircraft) and demands independent solutions of the problems presented. Each navigator must rapidly, within a time limit fixed by the instructor, compute the boundary for climb of the fighters and interception of the target. Such a training method has found full justification. It offers the possibility of attaining a high performance efficiency and develops a tactical way of thinking in the officers.

Highly instructive are the classes conducted by Maj. Lepelenko. Himself a past fighter-pilot, a veteran of the war, he possesses a broad tactical knowledge and has attained great experience in guiding fighters both from the plotting board and by the plan position indicator (PPI). This officer devotedly teaches the young navigators and conveys to them his skill and experience.

The ability of the navigator to guide fighters directly by the PPI is a highly important and necessary function; that is why the command point at the N-unit trains its navigators in proper utilization of this method. The navigators train in radar application and thus develop experience in securing interceptions. Similar training practices are often conducted during days of regular training flights. The navigator-operator then carries out his functions and duties under the supervision of an experienced officer.

A characteristic example in this respect is Officer Kondriyev. He has been at the command point for a short time only. At first he learned to guide fighters from the planning board. Assiduously gaining knowledge of the tactical methods of guiding, the officer has continuously improved the quality of his performance. Then he began studying the methods of PPI homing.

Major Lepelenko has often been interested in this officer and helped him many times. The navigator also devoted much time on individual training. He prepared critical reviews of the

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results of each homing and discussed the experience of his comrades with interest. Now Officer Kondriyev is an expert navigator at the command point.

The tactical training of navigators in many respects guarantees the reliability and proper opportunity of intercepting aerial targets. This has been confirmed by the actions of officers Lemyakin, Borovitskiy, Gorylev who control interception flights of fighter pilots flying aircraft equipped with radar sights. The navigators are well acquainted with radio devices and interception methods and they daily improve their experience in PPI homing. Because of this they do successfully solve the most difficult tactical problems. For their outstanding performance in carrying out their duties, Lemyakin and Borovitskiy were presented valuable gifts.

There are many other navigators who handle tactical problems well; they find effective methods of guiding (homing) the interceptors and demonstrate great initiative and utilize various ways of solving complex problems. But unfortunately this cannot be said about all the navigators.

This occurs because individual commanders and chiefs of staffs do not attach too much importance to the training of navigators in ground control of interception, and seldom take the trouble of expanding the scope of their tactical knowledge. The tactical training exercises are sometimes on a low level.

The tactical knowledge of navigators in ground control of interception is being attained not only during the process of planned exercises but also by assiduous and thorough independent work. Independent training is the basic method of training any given officer. There are also some among the navigators who show no interest in tactics. Among the latter ones we can include, for example, Captain Korol'. He is insufficiently accurate in the guiding (homing) interceptors in the stratosphere and makes errors.

We cannot consider as normal the fact that certain navigators have a poor knowledge of the flight-tactical characteristics of aircraft.

The true medium of improving the tactical skill of officers in conducting ground control of interception is a combined review and criticism of interception flights, but even this form of training is not always universally applied.

A continuous improvement of the tactical experience of navigators in ground control of interception means the achievement of better results in the solution of problems regarding interception of any given aerial targets. The aviation commanders and chiefs of staffs should strive continuously for the tactical training of officers in ground control of interception.

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IN A COMPLICATED SITUATION: TRAINING IN ANTI-ATOMIC PROTECTION

BY

LT. COL. I. TITOV

FROM

SOVETSKAYA AVIATSIYA NO.79/2637, APR. 3, 1957

PAGE 2

In a Complicated Situation: Training in Anti-Atomic Protection
by
Lt. Col. I. Titov

At the airfield, preparations were being made for scheduled flights. Suddenly and unexpectedly from the command point came a warning signal about atomic danger.

The duty officer at the aircraft parking zone rapidly put on his gas mask and then repeated the alarm signal by ringing a bell.

The aviation specialists, acting on the impetus of defense, immediately removed the covers from their aircraft and kept them in combat readiness. The pilots, Captain Orlov, First Lt. Muzhavirov, Captain Piksasov and other officers belonging to the units of Majors Abramov and Lyulina had already come running to their jet fighters. They immediately took their places in the cockpits of the aircraft so that upon the first given command they would rapidly take off, intercept the "enemy" or remove the aircraft from the atomic attack. Soon the order came from the command point for the fighters to take-off. The jet aircraft rolled out, going for the take-off. Minutes have passed from the moment the "Atomic" alarm was sounded.

After the departure of the aircraft, the mechanics and junior aviation specialists disposed of the remaining aircraft by placing the machines in shelters situated beyond the boundaries of the airfield and then they rapidly sought shelter in pits and

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trenches. All other personnel immediately put on their individual means of protection. Here also the personnel have demonstrated the good training they received.

An "atomic explosion" was produced. A bright flash illuminated the airfield and then surrounded it, and a large smoke cloud rose high into the sky. "Fires" broke out beyond the boundaries of the airfield. The special automobile of private Tolkachev "caught fire". But the military driver remained calm; he picked up the fire extinguisher and squirted a strong stream of foam on the flame and put out the fire. Tolkachev was aided by soldiers from the maintenance crews. In other places, fires were also being successfully extinguished.

About this time, two dosimetering specialists, Jr. Sgt. Seregin and Private Fota arrived at the scene. These soldiers had learned how to handle well and operate the dosimetric devices which make it possible to discover contaminated areas, and to determine the degree of radioactive contamination of the place and equipment.

The commander gave the order: "Determine the extent and mark the boundaries of the contaminated area!". The "radiation" level for the particular area was found to be safe, but three aircraft were "contaminated" above the permissible limit.

"Decontaminate the aircraft"! ordered Engineer Lt. Bekasov. The tow-truck emerged from its shelter, hooked up the aircraft, and towed it away to the dosimetering control station where the aircraft was again inspected.

"The level of radiation was found to be above the permissible limit" notified the dosimeter operator, Sgt. Seregin.

The aircraft was taken out to the decontamination area and the crew began working on it. Aviation specialists under the supervision of First Lt. Kudryashov work fast, thoroughly and properly.

However, certain errors were committed in the processing of the first aircraft because some of the aviation specialists had not acquired sufficient experience yet. During the flushing of the lower part of the aircraft, the men allowed the water to be spattered over the already treated upper surfaces of the fuselage. It is clear that in such a situation the decontamination would have become incomplete.

The supervising officer immediately pointed out this error to the aviation specialists. The second aircraft, subjected to a greater degree of contamination was decontaminated with much greater care and skill. Together with the tow truck, it was pulled through a special shower installation prepared under the supervision of Officer Gil'. This arrangement consisted of an arc-shaped system of pipes through the small holes of which strong streams of water were coming out under great pressure. This produced an original "shower" which flushed the aircraft clean from top to bottom including the landing gear, wings and empennage.

To one side of the washing point, the decontamination of

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weapons went on. This job was supervised by Officer Yelovev. The automatic guns and rifles were washed with a special solution. Aviation specialists Sgt. Fedosenko, Jr. Sgt. Kirilyuk and others, after repeatedly applying the solution, completely disassembled and cleaned all small arms: each part was thoroughly wiped with patches and then lubricated with a thin layer of oil. The used-up patches were buried.

The actions of the entire personnel under simulated conditions of an atomic attack were critically analyzed from every possible angle by the commander. He noted that the decontamination of any aircraft should be carried out by its own crew without outside assistance. Under war conditions, it may become necessary for the crew to decontaminate the aircraft on its own and for such a job, one must be trained right now.

Acting under simulated conditions, the soldiers obtained good practical training; they have acquired still further knowledge and are learning constantly what is necessary for successful realization of a combat mission under the most adverse conditions of modern warfare.

Fig. 1. Simulated atomic explosion.

Fig. 2. Chemist-inspector Private M. Fota determines the degree of contamination of the aircraft parking zone.

Fig. 3. Decontamination of an aircraft by means of a special shower installation

Fig. 4. Senior dosimeter operator Sgt. N. Seregin tests the quality of a fighter decontamination.

Fig. 5. Complete decontamination of weapons.

Photo by: V. Burnosvistov.

BOMBER ATTACK FROM A HIGH ALTITUDE

(BOMBOVYY UDAR S BOL'SHOY VYSOTY)

FROM

SOVETSKAYA AVIATSIYA, NO. 82/2640, APRIL 6, 1957

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BOMBER ATTACK FROM A HIGH ALTITUDE

The N-Aviation Air Base, April 5. (From our correspondents).

On the staff, in classes and at the airfield of the N-bomber air base placards were posted and appeals about the approaching 40-th anniversary of the October Revolution calling for further development and improvement in honor of the great celebration. The entire military training of pilots, navigators, technicians and mechanics was conducted under the sign of further improvement in military training of crews of individual wings and flight groups.

A jet bomber has just taken into the air. Included in its crew are the young communists, pilot 1st Lt. Belyayev, navigator Lt. Grishin, aerial gunner and radio operator Private Gorulev. The aircraft broke through the clouds and came out into the blue spaciousness of the sky. The earth is hidden from the eye but these aviators carry out their duties skillfully.

Soon they were over the firing range. The navigator is attentive and concentrated (calm and collected). He has just spotted the target and takes over control. The aircraft is on battle course. Now he must demonstrate extreme calmness, accuracy and clearness of action. The young communist, Grishin, possesses such qualities. In spite of the high altitude and complex conditions, the bombs strike the target with accuracy.

In reviewing the flight results, the commanding officer commended the performance of the aviators highly.

High praise for good bombing was also obtained by the crews of young communist Lt. Muratov, 1st Lt. Mitrofanov and others. The unit bulletin carried special announcements about the new successes of the young officers who responded with patriotic deeds to the resolution of the Central Committee of the Communist Party USSR calling for preparedness for the celebration of the 40-th anniversary of the Soviet regime.

ON THE FRAMES OF GUN CAMERA FILM

BY

CAPT. N. KOSTIN

FROM

SOVETSKAYA AVIATSIYA No.84/2642, APR. 9, 1957

PAGE 2

On the Frames of a Gun Camera Film
by
Capt. N. Kostin

The aviators entered the photo-lab. Being in the lead of the group, Lt. Ignatenko inquired of the specialist examiner of aerial photography:

"How did my film turn out, is it possible that I was again a little too late in pulling my aircraft out from the attack?"

"It appears to me, Comrade Lt., that the film frames indicate otherwise" answered the aerial photography examiner. "This time it looks as if you were too hasty in opening fire."

Lt. Ignatenko took the film from the hands of Pfc. Kupriyanov and began an attentive study of frame after frame. At this point, he was approached by First Lt. Topil'skiy.

"It is perfectly clear", said the First Lt. "that the sighting device has not yet developed an angle of lead and you had already opened fire."

Maj. Kal'chenko was also interested in the results of his firing.

"One minute, Comrade Major" said Pfc. Kupriyanov" I will now decode your film." Placing the film in the decoder, the Pfc. became absorbed with his work.

As the decoding of the film neared an end, tension among the onlookers slowly mounted. Major Kal'chenko heaved a deep sigh

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and together with the photogra hic technician, began counting the number of frames he had exposed.

"Eight, nine, ten" he whispered to himself. Suddenly, in the tense stillness, he spoke out loudly "twelve!"

The pilots warmly congratulated Maj. Kal'chenko for his successful execution of the aerial firing exercises.

The aviators had long left the photo-lab and the decoders, Pfc. Kupriyanov and Pvt. Koluh, still continued working on the development of films.

By eight o'clock in the morning, the commander was to have the aerial firing records on his desk. The commander's evaluation of the military training of each aviator will depend to a large extent on the reports of the decoder and upon the data which he himself will enter in the records. From this one can understand what a responsible job he has been entrusted to the aerial photography specialist.

Proceeding with his work in the development of films, Pfc. Kupriyanov fully realizes his personal responsibility for the assigned job. The experienced, scrutinizing eye of the photo-specialist (decoder) discerns everything on the frames of the film: has the pilot taken the proper angle of lead, was fire opened too soon or too late, what was the angle of dive, what was the lateral error..... Before his eyes on the frosted screen of the decoder the entire complex of actions of the pilot in the air passes in review. That is why Lt. Igntenko, who now carries out all his

aerial gunnery exercises with excellent results, is as before a frequent visitor at the photo-lab.

"How is my film?" one can hear his cheerful voice asking. The results of aviator aero-training exercises are on the frames of the film. No errors are possible in their evaluation.

Fig. 1. Pfc. V. Kupriyanov Working on the Decoding of a Gun Camera Film.

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TACTICAL TRAINING OF FIGHTER PILOTS

BY

FIRST LT. YE. MOSKOV

FROM

SOVETSKAYA AVIATSIYA NO. 87/2645, APR 12, 1957

PAGE 2

Tactical Training of Fighter-Pilots
by
First Lt. Ye. Moskov

The aviators have assembled in class. They listened attentively to the lecture of Officer Pisetskiy entitled "Characteristics of Piloting Technique and the Tactics of Fighter Aircraft during the Interception of a Speedily Maneuvering Target in the Stratosphere".

The lecturer has explained the important theoretical problems clearly and understandably. With particular thoroughness, he explained the effect of speed and altitude on the zones of possible attacks; he elaborated on the flight-tactical qualities of the modern fighter at altitudes close to the practical ceiling of aircraft. In order to broaden the scope of the subject, to help the pilots, especially the young ones, how to faster and better understand the subject, the officer used means of demonstrating; he quoted examples of experiences of Soviet combat fliers during World War II and he also thoroughly analyzed aerial training battles which were carried out by this particular unit.

....At one time the pilots of Major Gornichev's squadron were faced with the following task: to intercept a group of "enemy" aircraft, attack and "destroy" it. The meteorological situation up to the moment of take-off had worsened considerably: cloudiness reached up 7 - 8 points, the ceiling of its lower layer was at a minimum. This made the flight mission very complicated.

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However, the pilots were very well trained for flight and they worked smoothly in an organized fashion. They kept a strict time interval during take-off and maintained the proper course and rate of climb.

Having broken through the clouds, the fighters climbed to the necessary altitude and soon took up their position in combat formation. They kept their intervals and distances in formation while the interceptors flew along a fixed course. The formation chosen by the group warranted sufficient freedom of maneuvering, convenience in searching and timely detection of the target.

The orders given by the navigator of ground control of interception about the changes in flight aspects were executed rapidly and accurately. After a certain period, the leader of our fighter group received a message from the ground that the "enemy" aircraft were to the left-front. The position of the interceptors was tactically suitable for a surprise attack.

Having reported to the command point about the detection of the target, its composition, altitude, course and having received permission to attack, Major Gornichev made a proper evaluation of the situation, skillfully changed the combat formation and led his group on the approach toward the "enemy".

The bomber crews, having spotted the attackers, began maneuvering in direction but in vain. The outcome of the aerial "battle" was a foregone conclusion. The first fighter attack was swift and

irresistible. As became evident during the decoding of films, all the pilots had fired their camera guns with excellent results.

"This example has again confirmed that a perfect knowledge of aircraft piloting within a group at high altitude, combined with a skillful organization of combat formations and maneuvering are the decisive factors of victory in an air-battle" emphasized the lecturer as he explained, by means of a drawing on the blackboard, the dynamics of an air engagement.

Other complex flight missions were also thoroughly analyzed by Officer Pisetskiy. The lecture, based on concrete examples, was interesting and constructive.

For several days, the pilots of the unit attended class exercises on the tactics of air battles of fighters at higher altitudes. The officers took active part in discussing the subject. They not only shared the experience acquired but expressed their opinions, introduced suggestions concerning the most expedient maneuvers and ways of attacking fighter groups in aerial engagements.

Pilot First Class Ponomarev discussed certain characteristics of piloting in the stratosphere. Hence, during flight at speeds close to maximum, the control stick is affected by certain pulling forces; the aircraft begins dropping its "nose". In order to maintain the aircraft in a horizontal position, we must carry out timely and energetic operations with the steering mechanisms which sometimes require great physical strains on the control organs.

"During air battles at altitudes close to the practical ceiling"

interjected the commander "it is prohibited to produce great bank during the pull-out from attack, otherwise the interceptor lags behind the "enemy", loses sight of the latter, and cannot make a repeated attack. Pilot Ponomarev, for example, pulled out from attack in an opposite direction which allowed him to hold the target within the field of his vision at all times."

Squadron Commander Maj. Pornichev, supported by his experience of flying at high altitudes, expressed the idea about the expediency of employing a closed combat formation (mass formation) after the detection of the aerial target, assuming that the maximum effect in attacking a bomber group is achieved when the fighter group follows in wedge formation.

Officer Maslennikov spoke about various tactical methods of conducting aerial battles. He thinks that an attack from behind and at a higher altitude gives the attacker immense advantages. For example, if the fighter, having ceased firing, passes over the bomber and does not turn away from it, the gunner of the enemy crew is deprived of the possibility of conducting aimed fire against it.

Of great interest was the appearance of Officer Gnilo, Hero of the Soviet Union, who had gained great experience in the air battles during World War II.

The aviators not only shared the combat training experiences but also discussed the factors hindering them in the perfection of

their professional experience. Sometimes simplifications and slackenings were allowed in the practice of training the flight personnel. And so, free individual air battles by a pair of fighters are often conducted in a pre-reconnoitering zone after both pilots arrive in that zone. And we know that this could never be the case during actual war! The search for and detection of the target, approach to it and finally the sudden surprise attack...that is what should precede each simulated (training) air battle. Concrete proposals were made for further improvement of the tactical training of aviators. For example, a desire was expressed that the timeliness of interception and the effectiveness of attacking an aerial target be evaluated not only by the photo-firing results of the fighter but also by the check data submitted by the gunner of the bomber aircraft. Emphasis was placed on the expediency of systematic training of pilots in the skill of descending at maximum speed singly or in groups.

The interesting appearances of the officers showed that the material taught by the instructor was constructive and helped them gain knowledge in many important tactical problems.

Lectures on the tactics of ground troops and the coordination of aviation with ground forces were also of great interest among the aviators. Devoted to this particular subject was a lecture by the commander, who spoke about the action of an aviation unit in covering ground troops by day and night under normal and adverse meteorological conditions.

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The pilot learned to master the tactics not only during group exercises but also in seminar (class) exercises. The material studied here is discussed in greater detail with a consideration of the concrete problems of forthcoming flights. The instructor presents certain specific commitments and tries to reproduce such an aerial situation which might actually come up as a result of battle. This teaches the aviators to think creatively (constructively) and to develop initiative and ingenuity. It stimulates the search for new tactical ways and means of conducting for the purpose of achieving victory.

The skills learned by the aviators during lectures and seminars are being perfected by their individual practice. All the conditions necessary for productive training and continuous improvement of the tactical scope of the officers of the K-unit have been created. The commander and the staff have made a timely preparation of the necessary equipment for a good training center and have provided the trainees with special literature and demonstrating media. In recent days, they have begun using training films more often than before and have introduced an exchange of ideas program for the solving of complex flight problems.

The problems of tactical employment of aviation are worked out during ground training and in actual flights. The flight and group commanders are trying continuously to imbue these problems with tactical elements, to teach the aviators initiative and skill in utilizing the tactical possibilities of their aircraft in various aerial situations and to strike successfully and defeat a technically trained and powerful enemy.

As a rule, the actions of fighters in the air are thoroughly and closely analyzed in post-flight reviews. Each flight mission is evaluated first of all from the standpoint of the tactical expediency of methods employed in the air, skill in conducting search, expertness in maneuvering in aerial battle and hitting the target during the first attack.

The search for new methods of conducting training exercises and the departure from established systems and standards in the pilot training organization are important factors in further improvement of the quality of the entire tactical training and in the training of pilots in tactically proper, decisive actions in aerial engagements.

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TOWARD THE 40TH ANNIVERSARY OF THE GREAT OCTOBER REVOLUTION

BY

CAPT. A. LUCHNIKOV AND FIRST LT. B. IVASHKIN

FROM

SOVETSKAYA AVIATSIYA NO. 120/2678, MAY 23, 1957

PAGE 1

Toward the 40th Anniversary of the Great October Revolution
by
Capt. A. Luchnikov and First Lt. B. Ivashkin

Marching Forward

The communist and young communists of the M-aviation unit appear to be reliable assistants to the commander in solving problems of tactical and political training. Take for example Maj. Svetlichnyy. His crew is justly considered one of the best in the unit. The communists of the unit have unanimously picked comrade Svetlichnyy for the position of secretary of the party organization.

The young communists (KOMSOMOLTS) take their cue from the older communists. An expert in his work is armorer, member of the young Communist League, Pvt. Tkachev. His work is always without criticism.

Gathering of Outstanding Ones

At the M-aviation group, a gathering of personnel considered outstanding in the field of tactical and political training recently took place. The members of the gathering were faced with an important problem. Many officers, members of the Party and the KOMSOMOL (Young Communist League) talked with the guests and requested that one of them give a speech during the gathering.

There were many who gave a speech and thus shared their experience, introducing many valuable suggestions.

"Anyone can become perfect" said Master Sgt. Trofimchuk. "This

Fig. 1. Left....The Crew of First Class Combat Pilot Maj. Svetlichnyy After Completion of Scheduled Flight.
Right.....Pvt. V. Kachev Keeps Aircraft Armament in Readiness.

requires a sincere attitude toward the service, thorough performance of duties and assignments, and a continuous improvement by experience. An outstanding soldier is above all a well disciplined soldier."

Master Sgt. Trofimchuk is himself an expert aerial gunner. On his chest he wears three "Aviation Expert" medals. The Party Organization recently accepted him as a candidate for membership of the Communist Part of the USSR.

Sgt. Shmulevich said that the experienced ones should aid their fellow soldiers, especially the young recruits, in learning their specialties and in the acquisition of tactical experience.

Very constructive was the speech by Pvt. Andreyev; he was first in adapting the tightening of the canvas covers of steering surfaces. He trained three recruits in this job. From the platform of the gathering, Andreyev spoke about his work.

Then Pfc. Simakov, expert radio operator, asked for permission to speak. Having attained outstanding results in radio communication, the soldier is continuously improving his knowledge and skill. In his speech, Simakov called upon the aviators not to be pleased and satisfied merely with past achievements but to greet the 40th Anniversary of the Great October Revolution with new successes in tactical and political training.

The outstanding young communists, Master Sgt. Trofimchuk, Sgt. Mochalov, Pfc. Simakov and Yasel'skiy, as well as Sgts. Krylov, Rudayev and Ol'shanskiy, were given honorary memberships signed by the Central Committee of the Young Communist League of the USSR.

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FLIGHTS IN THE CLOUD OF AN ATOMIC EXPLOSION, NUCLEAR WEAPONS AND AVIATION

BY

LT. COL. N. LITVINENKO, ENGINEER

FROM

SOVETSKAYA AVIATSIYA, NO. 126 (2684), 30 MAY 1957

page 2

FLIGHTS IN THE CLOUD OF AN ATOMIC EXPLOSION
NUCLEAR WEAPONS AND AVIATION
by
N. Litvinenko

The burst of an atomic bomb is followed by radioactive contamination of a considerable volume of air masses. During the explosion of a bomb with a TNT equivalent of 20 thousand tons (all further deliberations will pertain to such bombs), the volume of the forming radioactive cloud reaches a magnitude of 100 cubic km. within one hour after the explosion. With the increase in the caliber of the atomic bomb, the dimensions of the cloud will of course also increase.

Upon What Does the Radiation Dosage Depend?

The dosage of radiation for a crew during the flight of their aircraft in atmosphere contaminated with radioactive substances is determined by the gamma-radiation of the entire volume of contaminated air, by the gamma, beta and alpha-radiations of the contaminated air entering the cabin, and gamma radiation of radioactive substances deposited on the aircraft after flying through the cloud. The effect of gamma-radiation of the entire volume of contaminated air depends upon the level of radiation in the cloud, duration of flight in the cloud and the position of the aircraft with respect to the center of the cloud. The radiation level in the cloud formed by the explosion of the bomb depends basically upon the time which has elapsed from the moment of explosion (rise of the cloud). As time passes, the activity of the explosion products and consequently also the level of radiation in the cloud diminish noticeably.

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A diminishing in the radiation also takes place as a result of the fall-out (from the cloud) of a certain amount of radioactive substances containing particles of the soil which were carried upward by the cloud during the explosion.

Literature contains various data on the radiation level in the cloud in relation to its rise. This is partially explained by the non-uniform density in the distribution of radioactive matter over the volume of the cloud in each concrete case. However it can be assumed on the baser of these data that the average dosage of radiation picked up by the crew of the aircraft within one or two minutes' flight in a radioactive cloud is 5 to 10 times smaller than the permissible radiation dosage, provided the age of the cloud is about one hour. Even in the case when the flight through the cloud is within one half hour after the atomic explosion, the radiation dosage of the crew during the entire flight will be less than permissible.

A serious danger to the crew may be presented by the contaminated air seeping into the cabin of the aircraft during its flight in a radioactive cloud.

When flying through a radioactive cloud the aircraft becomes contaminated. This fact must be taken into consideration during further tactical employment of the aircraft. The fact is that the radiation from a contaminated aircraft in contrast to the radiation of the cloud is effective not only when the aircraft is in the cloud but also during the entire time of flight. In this way, the radiation picked up by the

crew in the cloud is augmented by the effect of radioactive substances deposited on the surface of the aircraft, which leads to an increase in the total radiation dosage.

How Does the Aircraft Become Contaminated in the Cloud?

It may appear that the improvement of the aerodynamic form of the aircraft and thorough treatment of its surfaces eliminate the possibility of radioactive contamination or practically reduce it to zero. Actually this is not the case. The amount of radioactive matter which may accumulate on the surface of the aircraft and its components will prove to be sufficient to produce a noticeable level of radiation.

This is further aided by the great specific activity (activity per gram of radioactive matter) of the fission products of the bomb charge particularly during the first hours after the explosion. For example, one milligram of one hour old fission products has the activity of more than 5000 curie units. The radiation level produced by such a source of radiation at a distance of 1 m. is more than 1000 roentgen units per hour and at a distance of 2 m. - 250 roentgen units per hour. This example makes it clear that the deposition of 1 milligram of fission products near the cabin is sufficient to increase the radiation level in the cabin to a dangerous point. One must also take into consideration the time of flight of the aircraft after passing through the cloud and consequently the time the crew was exposed to radioactive dust which settled on the aircraft.

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However, the fission products in the cloud are not pure but are mixed with non-radioactive substances. The chemical composition and amount forming thereat depend upon the height of bomb-bursts, nature of the locality, and meteorological conditions, that is, upon all the factors which determine the content of dust and moisture in the cloud.

An atomic explosion cloud, in addition to containing radioactive fission products, dust and moisture, also contains a great amount of nitric oxide. According to calculations, during the explosion of an atomic bomb with a TNT equivalent of 20 thousand tons, about 100 tons of nitrogen peroxide may form. The presence of moisture and nitrogen peroxide lead to the formation of nitric acid in the cloud.

Thus the cloud represents a mixture of radioactive particles in the form of oxides and salts, drops and water vapors and fine soil dust. The radioactive particles when colliding with the dust particles or with the water drops, which as a rule are much larger in size, form a strong conglomeration with the latter. As a result of this, the water droplets and the dust in the cloud become radioactive. The specific activity of such a mixture will be much lower than that of the fission products of the substance contained in the original charge. However, even under such conditions where the specific activity of the mixture will be hundreds of time less than the activity of the fission products, the level of radiation produced by a small amount of the mixture (about 1 g) will be sufficiently high. Consequently, if a small amount of such radioactive dust (fall-out) will settle on the surface of the aircraft

during its flight in the cloud, its degree of contamination may then exceed the permissible limits.

Of course not all dust particles which came in contact with the surface of a streamlined body will remain on that surface. Whether the dust particles will remain on the surface or be separated from it by the air flow depends upon the ratio of the adhesion and separation forces affecting the particle after the collision.

In spite of the great speed of the aircraft, the speed of the air in the boundary layer (directly near the surface) is low, much lower than the speed of the aircraft. In this connection, the forces of separation affecting the dust particles which stuck to the surface of the aircraft will be small. The smaller the dimensions of the particles, the smaller will be the separation forces. At particle dimensions not exceeding 40 - 50 microns, the forces needed for their separation from the surface, as a rule, will be smaller than the adhesion forces, which is the reason for the strong adherence of the dust particles to the surface. Such phenomenon is also observed during the falling of radioactive dust on the surface of an aircraft having flown through a radioactive cloud. It should be added here that the microscopic surface roughness which is unavoidable even at high degree of surface purity contributes to the retention of the dust.

Contamination of the Engines.

Considering the aircraft as an object of radioactive contamination we must first of all mention the engine. The features of the air-passages

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through the engine are such that they aid in the separation of the dust from the air flow thus creating the possibility for a strong radioactive contamination of the engine during the flight of the aircraft in an atomic explosion cloud. The high rate of motion of the air in a jet engine and the curvature of the ducts over which the air flows promote the collision of the dust particles with the walls of the ducts. A particularly contributing factor to the contamination of the engine is the effect of considerable centrifugal forces on the dust particles passing through the compressors.

Radioactive contamination of piston engines during flight in an atomic explosion cloud will, as a rule, be less than the contamination of jet engines in spite of the fact that the conditions for the separation of dust in piston engines are more favorable than in jet engines. This is explained by the comparatively small air consumption of the piston engine and consequently by the small amount of radioactive dust entering the engine at a uniform degree of air contamination.

The picture of relative distribution of radioactive dust over the engine, apparently, should remain approximately constant for different conditions of contamination. There is a possibility of strong contamination of the frontal section of the engine, intake nozzles of the centrifugal compressor and particularly the internal surface of the compressor body. The dust on the body of the compressor will be distributed unevenly; most contaminated will be the center section of the compressor disk.

The intake nozzles of the combustion chambers will become contaminated along the peripheral side approximately 2 to 3 times more than in the interior. Of the total amount of radioactive dust retained in a jet engine, about one half of it will fall to the lot of the structural parts indicated.

Radioactive dust will also appear in the combustion chambers, gas collectors, nozzle mechanism, on the turbine blades and in the jet nozzle of the engine. The dust will show a tendency of departing from the axis toward the periphery of the engine. For example, the contamination of the internal surface of a jet nozzle may be stronger than the surface of the cone in one case out of ten. Shown in the drawing is a jet engine and the small crosses mark the points of maximum radioactive contamination.

Drawing - 1 - intake section; 2 - axial compressor; 3 - combustion chamber; 4 - gas turbine; 5 - jet nozzle.

In a piston engine the components most exposed to contamination are the compressor and combustion chambers. The radioactive dust deposited on the internal surface of the cylinders is picked up by the piston rings and from there goes into the lubrication system. In this way the lubrication system of an aircraft powered with a reciprocating engine accumulates radioactive dust and becomes a source of radiation.

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Operations on a Contaminated Aircraft.

The level of radiation in a cockpit of a contaminated aircraft even during unfavorable conditions, as a rule, is inconsiderable. The dosages to which the aircraft crew may be exposed during the flight on a contaminated aircraft is usually small.

In this way, an aircraft contaminated with radioactive matter does not present a danger from the viewpoint of exposing the crew to radiation. However, the operation on this aircraft and particularly any work on the engine requires the adoption of precautionary measures. It is therefore advisable to employ dosimetric instruments in order to determine the degree of contamination of the aircraft in time.

If the tactical situation allows it, the aircraft contaminated with radioactive matter should be decontaminated. The engine is decontaminated only from the outside.

Radioactive substances remaining on the internal surface of the engine will gradually decompose and their activity will decrease. A gradual self-decontamination takes place during the operation of the engine, i. e., the radioactive dust particles break away from the surface and are carried out by the air flow from the engine. However, the process of self-decontamination is not sufficiently effective to have this accomplished by an idling engine.

When working on a contaminated aircraft, one must exercise constant control of the radiation level by using collective and individual dosimetric devices.

ANTI-ATOMIC PROTECTION OF AIRFIELDS, NUCLEAR WEAPON AND AVIATION

(PROTIVOATOMNAYA ZASHCHITA AERODROMOV, YADERNOYE ORUZHIYE I AVIATSIYA)

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ANTI-ATOMIC PROTECTION OF AIRFIELDS, NUCLEAR WEAPON AND AVIATION

by

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At present, foreign military literature thoroughly discusses the problem of employing atomic weapons against airfields. The increased interest in this problem appears to be a reflection of the views existing abroad regarding the nature and problems of the initial period of the future war. As is known, certain representatives of military circles of the USA, England and other capitalistic states assume that during the initial period of a war the most important problem will be to gain strategic superiority in the air by mass application of nuclear weapons, aimed primarily against enemy airbases - the carriers of atomic and hydrogen bombs.

The authors of certain articles point out that, at present, no military target is more vulnerable than a modern airfield with aircraft and equipment situated over a small area. As is stated in literature, it cannot be taken for granted that an atomic explosion will destroy for certain the entire airfield because its effectiveness is always limited to a certain extent. It also calls attention to the possibility of employing certain measures considerably reducing the destructive effect of atomic bombing or making the employment of atomic weapons against airfields unsuitable. The idea of anti-atomic protection of airfields includes a combination of such measures.

What then are these measures? They include first of all the dispersion of aircraft and services, construction of shelters, camouflage and increase in the number of reserve airfields etc.

Great attention is being given to the dispersion of aircraft and equipment on the airfield. Military specialists figure that the dispersion of aircraft and equipment over the airfield will reduce the bombing effect and that one atomic bomb will destroy only some of the buildings and a small number of aircraft. At the same time an atomic attack may turn out to be a failure. Literature quotes an example of anti-atomic protection of a permanent airfield by the dispersion measure.

The solution suggested provides for the reconstruction of the airfield and the establishment of aircraft dispersion zones oriented at distances of more than 3600 meters from the epicenter of the probable explosion (supposedly in the center of the take-off and landing area). With such a disposition of aviation equipment, the explosion of one bomb with a force equivalent to 20,000 tons of TNT will not be able to destroy a considerable number of aircraft.

According to another suggestion (see drawing) it is advisable to place aircraft in groups of 4 to 8 along three sides of the air base on parking areas removed from the take-off landing area by not less than 3 km. At the same time the shortcomings of such protection variants are pointed out. First, by dispersing we reduce almost by half the number of aircraft based on the airfield. Secondly, it is difficult to send all aircraft into the air rapidly because prior to the actual take-off they have to taxi (roll) for 3 km. to the take-off landing strip. Finally and thirdly, the dispersion is accompanied by the weakening of the airfield ground defense and is connected with a large expenditure of forces, means and time.

Two of the last disadvantages can be largely eliminated by having protected the aircraft at the parking areas which offers the possibility of having the dispersion zones closer to the take-off landing strips. Protective buildings (shelters), as figured by some military specialists, will considerably reduce the effect of the shock wave and flash radiation of an aerial atomic explosion and will protect a greater number of aircraft and equipment not situated in direct proximity to the epicenter of explosion. However, in order to avoid destruction of the shelters by an underground atomic explosion, it is not recommended that these shelters be situated closer than 1000 meters from the center of the take-off and landing area.

In order to protect aircraft at the parking areas, it is also considered possible to utilize semi-underground shelters and caves as natural and artificial shields. Such a type of structures, as is stated in literature, have stood up well, giving protection to aircraft against ordinary means of destruction during the period of World War II as well as during the Korean War. In addition, there is a statement that, during the atomic attacks on Hiroshima and Nagasaki, certain equipment, e, g., transformers remained intact only because of the protective walls and sand bags.

With a favorable topography, places for aircraft can also be built in special subterranean shelters of tunnel type. According to literature (Sweden), in order to protect such shelters against the effects of an atomic bomb, they are built in mine pits situated close to certain airfields.

It is recommended that airfield personnel shelters should be of the semi- or fully underground type and located at distances of not more than 100 meters from the places of occupation, and the living quarters of flight personnel should be at a safe distance.

Certain opinions are expressed with regard to the decentralization (dispersion) of certain services at distances securing the possibility for their immediate action after an atomic attack. One of these services is the medical (first aid) service. It must adapt itself to the new situations and reorganize into a center of first aid. The fire fighting service may be confronted with the need of fighting several fires at the same time with limited water supplies which are transported in tank-trucks. It is necessary to secure the possibility of immediate action of the transportation (evacuation) service.

There are conflicting opinions regarding the importance of camouflaging in the system of measures on anti-atomic protection of permanent airfields. Many authors consider that, for many reasons (the information of the enemy about the location of the airfield, development of the technique of reconnoitering and detection from the air, the effect of an atomic weapon over a large area) the expenditures for the camouflaging of permanent airfields are not justified. Others, on the contrary, referring to the fortunate examples of World War II, insist upon further improvement of camouflaging skill and methods. However, regardless of the opinions with respect to camouflage in connection with the appearance of the atomic weapon, a majority of countries spend large

sums on camouflage countermeasures. As is pointed out in many journals, camouflage materials and structures must first of all be fire-resistant.

The object of special importance to the military circles of capitalistic nations is to secure effective bases for tactical aviation aircraft, fighters and fighter-bombers, for which airfields are being readied during the process of combat operations. However, it is considered that the preparation of such airfields, in connection with the increase in speed and load of modern aircraft, has become complicated and involves the expenditure of much time, manpower and money.

In order to facilitate the solution of this problem, a number of authors suggest the development of special aircraft which, in addition to high flying qualities, would not require large and permanent runways. It is the opinion of those authors that aircraft adapted for atomic warfare should be capable of taking-off and landing from natural ground areas, sections of roads, from the icefields of the Arctic as well as from the surface of rivers, lakes, and reservoirs.

The creation of a jet fighter hydro-aviation has been suggested in many countries. For the purpose of solving the problem of anti-atomic protection of tactical aviation airfields for example, they are constructing vertical take-off and landing aircraft and jet hydroplanes-fighters and are also working on the improvement of caterpillar type landing gear for aircraft.

It is mentioned in press releases that the problem of getting an aircraft into the air is presently no longer considered as most important

because there are numerous means and system (catapults, assisted take-off devices etc.) which make it possible for aircraft to take off from a small area which can be built almost anywhere. A greater and more difficult problem is presented by the landing of the aircraft. It is recommended here that conventional airfields use brake systems which are effective on aircraft carriers, reverse engines and many other means. The idea is that by employing new take-off and landing methods, one can solve the problem of adapting aircraft to atomic warfare.

In addition to the above discussed methods of protecting aircraft at the airfields under conditions of mass employment of atomic weapons, literature also suggests the timely removal (evacuation) of aircraft from the possible attack area by sending them aloft. This method of preserving aviation has developed on the basis of numerous studies carried out abroad (not in the USSR). But in order for aircraft to make a rapid take-off (get-away) foreign specialists consider it necessary to change the AF organization. It is stated that, in this atomic age, air bases can not be set up in the same form as they are at present, i. e., consisting of one or several runways surrounded by aircraft and an imposing collection of installations and equipment concentrated within the confines of relatively limited space.

In order to make it possible for aviation units to carry on their tactical operations regardless of the atomic threat, it is considered advisable to subdivide them into smaller units, to apply maximum dispersion but at the same time secure them operational effectiveness. All auxiliary services should become mechanized (mobile). Each aviation unit numbering

s aircraft should be perfectly independent in technical and operational respects. It is assumed that such breaking down of aviation units into smaller components will reduce the atomic threat to a known degree.

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