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SOVIET ASSAULT AVIATION 1938-1945

by

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## *Preface*

The topic chosen for research seems to me interesting by several reasons. First, in my opinion, the process of creating and developing the assault aviation applying theory is interesting. Until this time I could find only separate, disconnected evidence, that I wanted transform into a sequence. Also of interest is how assault aviation developed as part of USSR military aviation. For more clear understanding of the process in this research was made more deep view in combatant tactic, created especially for those type aviation units. The research was interesting not only from historical point of view. Assault aviation also now is part of Russian *Frontovaja* aviation (part of the AF). As close ground support aviation was used in several local conflicts, it was used in Chechnya. I think it still will have uses in a future.

*Abstract*

My work speaks about Soviet Union assault aviation development from the 1933 to 1945. It provides a short view on the creation phase of the *Red Army* military aviation. Next, it gives a purview of Red Army theoretical ideas according to functions and applications of military aviation. At the next stage, it focuses on the development of assault aviation theory and ideas for special aircraft created for accomplish these missions. This chapter examines in detail the *sturmovik IL-2* as racy deputy of that type of aviation at WWII period of time. The last part of the research analyzes the application of the assault aviation in the *Great Patriotic War (Stalingrad, Kuban, and Kurskaya Duga)*, using several particular period documents.



# INTRODUCTION

In my work I will examine in depth an interesting period in the development of Soviet assault aviation from 1938 to 1945. I will gather and systemize materials concerning the development of close ground support and assault aviation in Russia during this time. In addition, I will demonstrate that assault aviation was an important part of the Red Army success.

To start, I want to return to the time of the genesis of military aviation. From its beginning one of the most important missions, in that time using separate aircraft, was support of ground forces on the battlefield. Later, missions were changed creating several new theories of military aviation use, but support of ground forces on the battlefield still occurred in many armies. At the beginning of Second World War (WWII), the two main theories of applying AF consisted of the “ doctrine of strategic bombing” and “ tactical support doctrine”.

Looking at the USSR from 1920-1930, I can claim that military aviation started almost from zero. In the early part of creating it as fleet, the Soviet State had only small number of aircraft (from prior regime) with several pilots (who neither fought with the opposing force nor emigrated). This gave room for creating new ideas that were not restricted by old theories. During the Civil War (1918-1922), the Red Army AF functioned only as a supporting force for the ground forces and almost all units were attached to the ground army. A first precept on using military aviation was the

“Provisional field regulations” of the 1920, which emphasized support of the ground forces<sup>1</sup>. Later, in between the wars, history shows Germany largely influenced the development of Soviet aviation doctrine. The new state needed experience in building its armed forces. Germany, for its part lacked training places for pilots and needed place to apply new ideas of building aircraft. Germany took a part in creating the Soviet aviation industry. For example, the Hugo Junkers factory in *Fili* near Moscow<sup>2</sup> or the aluminum (*kolchugalumin* in that time) created at the *Kolchugins* factory in 1922<sup>3</sup>. Germany also established a flying school in *Lipeck* near the *Voronezh* to train German pilots (for example nearly 500 German officers studied in USSR in 1925)<sup>4</sup> and invited Russian officers to attend school and staff colleges in Germany (in the 1920s about 100 Soviet officers studied each year in Germany)<sup>5</sup>. Captain Martin Fiebig was the senior adviser and instructor in the Moscow Academy for air commanders (1925-1926)<sup>6</sup>. German doctrine stressed fundamental cooperation with ground forces at the operational level and did not pay attention to strategic bombing theory. Nearly four years of cooperation had a major influence on the developing doctrine and structure of Soviet military aviation.

#### Notes

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## CHAPTER 1

# NEW MILITARY AVIATION DOCTRINE DEVELOPMENT

### RED ARMY AIRPOWER THEORISTS

During the formation of *RKKA (Raboche-Krestjanskoj Krasnoj Armii)* or Red Army military aviation doctrine in the 1930's, several military authorities proposed various theories. For better understanding of that phase I will investigate some of them in more detail.

Soviets first tried creating a separate heavy bomber fleet under the direct orders of the highest command echelon, making the heavy bomber fleet independent from ground commanders<sup>1</sup>. One of the first theorists who supported the idea of bombardment aviation was Chief of Staff of *RKKA* aviation General A.N. Lapchinsky. He argued for the necessity of a separate “independent” bombardment force. Lapchinsky also wrote series of articles supporting the idea that strategic bombing would become the new decisive weapon in future wars<sup>2</sup>. But later he developed the idea of creating “air armies” for supporting ground force on the battlefield as primary<sup>3</sup>. Lapchinsky stressed in his writings of 1939 important tactical and operational aspects of aviation:

In order to conduct maneuver war, to win the air-land battles, which begins in the air and ends on the ground, one must concentrate all air forces in a given time on a given front<sup>4</sup>

Later, the Red Army in WWII used this idea. The next renowned supporter of bombardment aviation was the Commander of Soviet Air Force during the mid-1930's – General Khripin. In that period the percentage of bombers in the AF *RKKA* greatly increased (300-400 bombers were built) and in 1934 and 1935 a Special Heavy Bomber Air Corps for strategic bombing was formed<sup>5</sup>.

The importance of developing the AF also came from the Civil War-era military leader Frunze, who later became Commissar for National Defense. In his writings of 1923, he argued that war in the air would be decisive in future conflict<sup>6</sup>.

Of course, speaking about military theory of that time, we cannot forget *RKKA* Chief of Staff Marshal Mikhail Tukhachevski. In his theory of the “deep battle,” which was basic for the Red Army until WWII, airpower played a main role in preparing for breakthrough by mechanized and tanks units, and later supporting them from the air by moving deep into the enemy territory<sup>7</sup>. Developing the theory, Tukhachevski thought: light bombers and ground-attack air units would first attack the battlefield to prepare it for ground forces, then waylay and destroy enemy reserves; and follow up with air units to neutralize enemy strategic reserves. The last wave would destroy the support base and command communication of an enemy. Tukhachevski saw aviation not as subordinate or independent branch of forces, but as part of a “joint force”.<sup>8</sup> From this theory was born “The Soviet Army field service regulations” (1936) discussed applying AF first for destroying enemy AF, the attacking his reserves, and finally destroying enemy artillery. Tukhachevski did not disagree with necessity of independent operation for military

aviation in the future, like strategic bombing and airborne operation. He envisioned that it could become decisive in future war.<sup>9</sup>

The Red Army AF theories by *REVVOENSOVIET USSR* special decision (23 March 1932) was transferred in *RKKA AF Doctrine*<sup>10</sup>. That doctrine fundamentally changed the main principles of combat applying the basic strategic, operational, and tactical use of AF. That document transformed military aviation from supporting level to the level of a substantive force. Doctrine assumed mass aviation for getting air superiority, disorganizing the enemy's rear area, frustrating the enemy's mobilization, centralizing attacks on enemy forces, and destroying the enemy's navy. V.K. Triandafilov and A.I. Egorov provided tremendous invert in accomplishing that document.<sup>11</sup>

The strategy spoke about the necessity of “synchronous cover of enemy defense in depth by using the full arsenal of combat resources, producing fast penetration of enemy defense and rapidly moving in motorized and tank units under cover of assault aviation for tactical success.”<sup>12</sup>

The first big exercise for checking that theory took place from 12 to 15 September 1935 in the *Kievskij* military districts, where the first use of airborne aviation occurred (1200 air-dropped soldiers)<sup>13</sup>. The theory of “deep echelon defense”, paralleled “deep offense operations” using the aviation in full force. This theory attempted to weaken the enemy in defensive battles and then shift forces to the counteroffensive (I think they successfully used that theory in WWII).

These facts point to that part of the strategy, which supported development of heavy bomber aviation, though it was not the main branch of military aviation. A

primary reason why it happened was the purges that eliminated many leaders of the Red Army. Discussions about aviation was repressed at all command components including regiment commander level (leaving no people to support strategic bombing theory).<sup>14</sup> The next important moment was competition between bombardment and airborne aviation (both required building big planes.) Also no less important was the impact of combat experience that Red Army AF got in the battles before WWII.

#### MILITARY AVIATION COMBAT EXPERIENCE 1937-1940

War in Spain had a big influence on the development of Soviet military aviation. One of the aviation's uses, which are related to the theme in that war, was the offensive at *Guadalajara* in March 1937. Between 9 and 21 of March the Republican air force attacked nearly 50,000 motorized Italian troops. About 125 Soviet pilots, using Loyalists' aircraft, attacked Italian columns in what we now call "close interdiction campaign". Italian losses were near 500 killed, 2,000 injured, and 500 prisoners in addition to 1000 vehicles and 25 artillery pieces destroyed.<sup>15</sup> That operation was an example of successfully applying aviation against ground targets. It was also one more reason to stress ground-attack tactics in later soviet *RKKA* doctrine development.

The next combat experience for *RKKA* military aviation was in the *Khalkhin-Gol* conflict. The hostilities officially were started 22 May 1939. There also the fighters (especially I-15BIS) was used, after July, for attack ground targets under strong cover of another fighters (I-16 and I-153 *Chaika*).<sup>16</sup>

The final combat experience before WWII for Soviet military aviation was the war against Finland. Fighter aviation units were used to support the battlefield and in operations deep behind enemy defenses. Most effective were actions against cargo trains using machineguns in combination with aerial bombs. The 54<sup>th</sup> Fighter Brigade in the period from 14 Feb to 11 Mar 1940 flew 786 sorties against enemy railways, destroying 82 locomotives, 12 railroad cisterns and hundreds of train cars.<sup>17</sup> The tactic was to attack a locomotive from 80-90 degree to moving direction. The first attack destroyed the locomotive, followed by attacks on fuel and munitions cars.<sup>18</sup> Applying fighters against ground target was possible because Soviet aviation had full air superiority.

The advantage of experience gained from combat cannot be overemphasized. It verified the need for air superiority before other force branches would work on their objectives. The idea of using AF against ground targets (enemy forces in the battlefield, communications, and reserves, etc.) also was developed. The war against Finland showed the effectiveness of the enemy ground antiaircraft units (creating heavy losses of bombers) and revealed a new problem – how to defeat it. Hostilities proved that fighter firepower was not enough to accomplish assigned missions. Those ideas emphasized the need of creating special assault aircraft with powerful weapons, armed to accomplish assigned missions.

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## CHAPTER 2

### ASSAULT AVIATION AIRPLANES

#### SPECIAL AIRCRAFT FOR CLOSE GROUND SUPPORT

The idea of creating *Sturmovik* (armored plane) was discussed following WWI in several countries (including Russia). However technical level in that time could not produce an aircraft that met the requirements. As we know, close ground support used conventional aircraft-observation and fighters that flew low altitude and had suffered heavy losses from ground unit fire. May 1917 was the advent of the armored plane idea. To the front came a German aircraft – the Junkers J-4<sup>1</sup>.

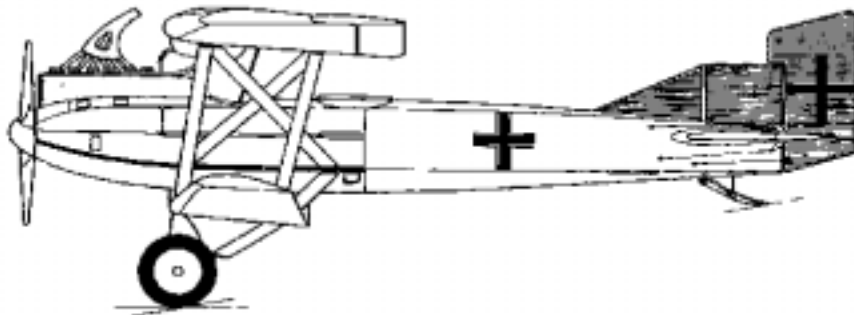


Figure1. Junkers J-

It had poor armament, but by virtue of armor it was practically invulnerable to fire from the ground and enemy fighters. J-4 earned a reputation for being invincible aircraft in

WWI (total built were 189 planes).<sup>2</sup> One year later a similar airplane appeared in Great Britain's Royal Air Force - *sturmovik* Conbur "Salamander".<sup>3</sup>

On 10 March 1928, *NTK* (science – technical complex) *VVS RKKA* approved requirements for building two types of armored *sturmovik*<sup>4</sup> aircraft: one light, agile single engine and a more heavy two-engine design. But ten years later that project was not accomplished because of the lack of a powerful engine, necessary quality of armor (strong but light), and worse cooling of engines under armor. Fielded planes also were hampered by poor visibility from the cockpit. In that time only one tactic was used to attack ground targets -the "hedgehop". Using this tactic the observation angle from the cockpit, for example in the *TSH-2* (*sturmovik* construction bureau *Tupolev*) was one degree, which allowed the pilot, flying at 15 m; see targets no further than 1000m<sup>5</sup>.

In that particular period in the military environment appeared the idea of attacking ground targets at high speed from low altitude or from a dive. This showed the possibility of creating "combined type" aircraft (or in the USSR – army aircraft) with more thin armor (the opinion was that high speed would make *FLAK* fire ineffective)<sup>6</sup>. The idea was attractive because observer or light bomber craft could be used. Meanwhile *AF RKKA* acquired the rapid light *sturmovik* – *SSS*, construction bureau (*KB*) N.N. Polikarpov (modernization of *R-5*). Its maximum speed close to the ground was-249 km/h. Armament included two 7.62-mm *SHKAS* machineguns and four more under each wing. It was used also as an observer and bomber, but even after modernization did not meet the requirements<sup>7</sup>. As the result of supporting those ideas, in 28 June 1935 Chief of Administration *VVS RKKA* J.I. Alksnis assigned requirements for " army aircraft with common functions" in two variants: observer-spotter and *sturmovik*<sup>8</sup> *Sturmovik*,

according to that document, should attack ground targets. The plan was to reinforce it by a “ machine gun battery” which would allow aircraft to attack targets ahead of the plane from an altitude of 50-100m at maximum speed. Five basic variants of bomb loading were flown with a total weight around 400kg (including flame-thrower)<sup>9</sup>. Requirements for both aircraft were minimal landing speed (70-80km/h) and short takeoff distance (90-100m). *Sturmovik* was planned with two crewmembers, range not less than 1200km, dive angle of 60 degrees, and fuel tanks protected from incendiary bullets<sup>10</sup>.

At that time, creating its own aircraft in parallel, *GUAP* (Main Department of Aviation Industry) after visiting the United States bought the license to produce the *Vultee V-11GB* with *Wright GR-1820G2 Cyclone* engine (contract was signed 7 Sep 1936)<sup>11</sup>. Later after adapting to the Soviet production it was named *BSHI* (combat *sturmovik* 1). Full combat tests of *BSHI* in 1937 showed it had poor combat effectiveness because of weak defensive weapons and lack of armor for crew and vital parts of aircraft<sup>12</sup>.

The next several years’ events saw the production of multifunctional aircraft and the debugging of *BSHI* production. These activities overloaded the scientific and experimental – industrial complex. Because of that all work on specialized “battlefield” aircraft was practically stopped, which had serious after effects for the country’s defense, and extended the time before special ground force support aircraft entered the AF *RKKA*. Development of the multifunctional aircraft delayed production of this plane a minimum of two years. The result was that the country did not have enough time for proving the value of battlefield aviation and in the initial phase of the *Great Patriotic War the RKKA* fought without fire support from the air.

The next step in developing the idea of the *sturmovik* was a special commission for developing aviation *RKKA* convened on 19 December 1936. It involved Stalin, Voroshilov, Molotov, Ordzonikidze, Kaganovich, Tupolev, Alksnis and others. The main result was a development program for aviation industry in 1937, and on 25 December a session of the government commission discussed the issue “about new types of observation and *sturmovik* with greater speed and range”<sup>13</sup>. Stalin’s offer in that session was about the necessity of creating *sturmovik* – observation first, which of course was accepted with one voice. Based on that offer, a bylaw was issued on 27 December (*STO # OK-225*) “about building rapid, long-distance *sturmovik*-observation”<sup>14</sup>. The Council of Work and Defense decided to:

1. Confirm effort of GUAP about building long-range *sturmovik*-observation aircraft using the best experts in manufacturing and science institutes.
2. Design protection of fuel-oil-water tanks from bullets
3. Manufacture of experimental designs shown in August 1937.
4. Create aircraft in three variants: from aluminum (KB Suhoj), wood (KB Neman), and mixed construction (KB Polikarpov).

Also special requirements were made for the qualities and composition of weapons.<sup>15</sup> The result of the effort was that only *KB Suhoj* accomplished its work in the period between 1937-1940. Two very good bombers-*sturmoviks* were created: *SU-2* and *SU-4* with *M-82* engine. These aircraft entered service in *VVS RKKA* beginning in 1942.<sup>16</sup>

## SOVIET STURMOVIKS BEFORE THE WAR.

S.V. Iljushin officially did not participate in *sturmovik*-design program, but paralleled the work on his first combat aircraft in trying to develop an armored aircraft.



Figure2. S.V.Iljushin

In January 1938 he approached the government with the offer of creating two-seat armored *sturmovik* by his project.<sup>17</sup> On 5 May 1938 that program was included in the plan of “experimental building”.<sup>18</sup> The draft was shown on 3 January 1939 and on 2 February the prototype Chief of VVS RKKA vice commander A.D. Loktionov approved the model.<sup>19</sup> *Sturmovik* on the first phase got abbreviation – *CKB-55* (military abbreviation *BSH-2*).<sup>20</sup> It was a single-engine, two-seat monoplane with half-retracting landing gear, which had the wheels protruding from fairing under the wings. Half-retracting wheels were part of design for the purpose of minimal damage in landing without retracted landing gear. The aircraft had liquid-cooling engine *AM-35* with power

993kvt (1350 hp).<sup>21</sup> The cooling of engine occurred through a special air channel. The main feature of construction was a streamlined, armored core made from high- durable steel with double curve armor *AB-1* including the armor in the plane common power scheme (all armor weight was ~ 700kg).<sup>22</sup> The *sturmovik* armored core protected the engine, cockpit, and the fuel-oil system. It also had special transparent armor *K-4* for cockpit windshields; which was used in the USSR the first time. Nevertheless the tail part was made from wood. First flying tests showed a lack of engine cooling in certain flight regimes (take off, climb, and at high angles of attack).<sup>23</sup>

The first flight of the experimental plane at the hands of test pilot *V.K. Kokinaki* occurred on 2 October 1939.<sup>24</sup> The government continued testing until 1940 and found the aircraft had poor visibility from the cockpit and needed a more powerful engine *AM-38 (KB A.A. Mikulin)*.<sup>25</sup> When testing was almost finished the government “offered” to *S.V. Ilyushin* to build a single-seat variant of the *sturmovik* with better armor and improved armaments to include two *PTB-23* guns, two *SHKAS* machineguns, and eight rocket launchers for *RS-82* and *RS-132* rockets.<sup>26</sup> The new model had far better visibility due to a lower-mounted engine, which gave the aircraft the characteristic “humpbacked” appearance.

Just before WWII, the head of VVS sent a letter to *I.V. Stalin* about the need for serial production of the new aircraft. Mass production started before the single-seat *sturmovik* completed its testing. The prototype *IL-2* rolled out of the factory in March 1941 followed three months later by the first production aircraft. By the time the *Great Patriotic War* began, 249 planes had been produced.<sup>27</sup>

Noteworthy among aircraft developed in that period was the rapid dive-bomber *Pe-2*. It was designed as a high altitude long-range fighter (project “100”), but after a visit to Germany by a group of Soviet aircraft builders, requirements were changed to dive bomber.<sup>28</sup> *Pe-2* was an all-metal monoplane with two *M-105R* engines, a mid-fuselage wing, and a twin tail. It also was the first mostly electric airplane in the country at that time. *Pe-2* frequently had overlapping missions with the *sturmoviks* and later was produced in a *sturmovik* variant – *Pe-2SH*.<sup>29</sup>

With the beginning of hostilities, Soviet aircraft construction had many experimental designs in developing new types of aircraft for assault aviation. These air machines included the ultra-heavy *sturmovik SU-8*, *sturmovik SH (LBSH)*, and the fire ground force support aircraft *VIT-1* and *VIT-2*; but none of them because of various reasons achieved serial production. One of the interesting projects was *sturmovik PEGAS*. That aircraft in its construction mirrored Soviet VVS requirements as an affordable, simple close ground support airplane. It was wood construction with armored cockpit and could carry fuel drop tanks. The technology of production was very simple because it was made to be built in the prisoner camps where there was little technical skill.<sup>30</sup> Actually the materials used in construction were not aviation-grade consisting of plywood, pine, roof iron, and soft steel.<sup>31</sup> One camp territory in Siberia produced several aircraft, but testing showed they did not meet the requirements as either a *sturmovik* or as bomber (in some Western journals it was called “*Russian kamikaze*”).<sup>32</sup>

## GERMANY ASSAULT AVIATION

Speaking about assault aviation development in the USSR, for comparison, it is useful to compare to other countries, especially Germany (as a future enemy of the USSR). In my opinion two aircraft were more comparable: *JU.87C (H) STUKA* and *sturmovik* – tank destroyer *Hs129*. In the spring of 1937, learning from their war experience in Spain, Germany's technical department started developing requirements for a close ground support aircraft: small, well-armored aircraft for close ground support in the battlefield.<sup>33</sup> It was not a high priority program and the debut of assault aviation took more than five years. Basic requirements, which were sent to several constructors, included small size (to reduce vulnerability from *FLAK*), using 75mm armored glass, armor protection for pilot and engines, and a minimum of two guns.<sup>34</sup> In the competition with the “*FOCKE-WULF*”, the *Hs129* won, not because of better characteristics but because of better technology for mass production. One of the biggest problems of that aircraft was low reliability of its engine “*GNOM-ROM*”.<sup>35</sup> Nevertheless the airplane was used on the Eastern Front and North Africa (*Tripoli*).<sup>36</sup> In September 1942 in *Deblin*, as part of *JG.51*, a separate squadron of “tank hunters” was formed around the *Hs.129b-1/R2* aircraft with the *MK-101* gun.<sup>37</sup> That unit first saw action on the Eastern Front in January 1943.<sup>38</sup> The problems also were in the weapons system: *MK-101* could not penetrate 45mm armor (*T-34*, *KV-1/75mm*) and had to employ 4kg *SD-4* bombs.<sup>39</sup>



Through that period were tested many kind of antitank weapons: 70mm rocket “*Panzerbleec*”-1, 55mm rocket “*Pazcerbleec*”-2, and the flame-thrower “*GERA*”.<sup>40</sup> The most interesting tested weapon was “*Festerzonde*”*SG-11A* (tested in *Tarnevalde*, in *Ekdo.26*). It was a vertical container with six launcher tubes. Each barrel was loaded with a 45mm shell and in the aircraft nose was a special magnetic sensor, which gave the aircraft the capability to shoot automatically in passing a tank magnetic field. The system was unreliable.<sup>41</sup> The most successful weapon modernization was the 75mm *RAK-40* gun (rate of fire ~40 rounds per minute, which allowed the pilot from 500m to put 4 shells in a tank), but only two dozen aircraft were produced with that weapon.<sup>42</sup> The best employment of *Hs.129b* was participation in offensive operation near Kursk – operation “*CITADEL*”. In the beginning of June 1943 four squadrons (each 16 aircraft), under command of Captain *Bruno Meiers* were employed from Mikojanovka village and attacked a Red Army tank brigade near Belgorod. The tactic was: first squadron attacked the brigade, a second returned to the airfield, a third refueled and loaded weapons, and a fourth was on way to target. The tank brigade was almost completely destroyed.<sup>43</sup>

The next German aircraft with a similar mission (ground attack) was the *JU.87 STUKA* dive-bomber. In the last part of 1942 mass production of *JU.87d-3* began. The plane had reinforced armor protection on engines, radiator, and cockpit as well as a new armaments (under wing were containers with six machineguns or two *MGFF* guns).<sup>44</sup> Also the night *sturmovik JU.87d-7* was developed which had special equipment. A special antitank type – *JU.87g-1* with *Flak-18* guns (*BK-3, 7*) was created later. One noteworthy pilot flying that model was Second Lieutenant *Ulrich Rudel* from *1/ST.G.2* squadron “tank hunters” (credited with killing 519 tanks).<sup>45</sup> *JU.87* was used to attack

airfields, bridges, roads, and railroads. It also was effectively used to engage German ground forces on the battlefield, attacking enemy force concentrations, and in the Navy against vessel convoys or separate ships. One of the interesting examples of applying *JU.87* was *1<sup>st</sup>* and *3<sup>rd</sup>* *ST.G.2* sea battle on Baltic Fleet vessels in *Kronshtadt* and *Leningrad*. On 23 September 1941 aircraft from these groups attacked in *Kronshtadt linkors* (heavy armored ships): “*OKTJABRSKAJA REVOLUCIJA*” and “*MARAT*”. The last one after a direct hit broke in the middle and sank. The sinking was credited to *Rudel*.<sup>46</sup>

Other countries also built aircraft with similar missions: A-25 STRIKE (USA), A-33 (USA/Britain), A-36 APACHE (Britain), and KI-36 (Japan), but doctrinal differences did not put the priority on these aircraft.

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## CHAPTER 3

# GREAT PATRIOTIC WAR 1941-1945

### FIRSTS MONTHS OF THE WAR

How we can see from the previous chapters, German and USSR approached the war with similar assault aviation doctrines. Fresh designed close ground support machines needed testing in a combatant condition, and they did not have to wait a long time to prove their utility in combat. The war began. In what condition did the Soviet VVS find itself at the start of hostilities? I will limit the information to a few key examples because many papers were written about that period of time. *Marshal Georgij Zukov* recollected:

From archive data in the period 1 January 1939 to 22 June 1941 the Red Army acquired 17,745 combat aircraft, 3,719 new type planes. Before the war, old aircraft were in the majority. Approximately 50-80% of these aircraft performed inferior to the same types of German aircraft. At the start of the war the breakdown of the types of aircraft was: bombardment air regiment - 45%; fighter air regiments - 42%; assault, intelligence and other air regiments – 13% Only a few regiments received intense training and no more than 15% of pilots practiced night flying. Throughout the war the VVS went through a period of wide reorganization and equipment upgrades<sup>1</sup>.

The VVS RKKKA condition at the start of the war is also shown in Table 1:

**Table 1 Number of new types of aircraft Produced on eye of Great Patriotic war**

Type	1940	1941(June 22)	Total
YAK-1	<b>64</b>	<b>335</b>	<b>339</b>
MIG-3	<b>20</b>	<b>1,289</b>	<b>1,309</b>
LaGG-3	—	<b>322</b>	<b>322</b>
Pe-2	<b>2</b>	<b>458</b>	<b>460</b>
IL-2	—	<b>249</b>	<b>249</b>
Total	<b>86</b>	<b>2,653</b>	<b>2,739</b>

Source: *TsGASA* (Central State Archives of the Soviet Army), quoted in *M.N. Kozhevnikov, Komandovaniye I shtab VVS Sovetskoy Armii v Velikoy Otechestvennoy voyne, 1941-1945g.g.* (Moscow: Nauka, 1977), p.16

The structure of Soviet AF at that time consisted of several components: the Long Range Bomber Aviation (under direct supervision of high command); the Front Air Forces (attached to the military districts); the Army Air Force (subordinate to commanders at various levels), and the Anti Air Defense aviation (*PVO*). Navy aviation also existed and each of the four fleets had their own aircraft<sup>2</sup>.

That was the Red Army *VVS* makeup at the start of war. The assault aviation first saw combat near *Berezin* and *Bobruisk*<sup>3</sup>. The combination of armament and armor made *IL-2* a potent means of fighting enemy ground forces, especially against tanks and motorized units. First days showed German tanks and motorized units' ability for rapid maneuver and mass strike. Russia's ground forces could not withstand the Germans and assault aviation rose in value. Because of the lack of special aircraft, *IL-2* attacked only moving tank and motorized columns and tank concentrations. Later *IL-2* also was used to attack targets on the battlefield<sup>4</sup>.

Early combat showed that the pilot could attack targets from 300-400m using rocket shells and could destroy 1-2 tanks in one passe. Rockets demoralized the enemy, and in several cases tank crews fled their tanks under air attack<sup>5</sup>. Bombs and machinegun fire were also effective.

Analyzing period documents we can see combat experience summarized: how the enemy acted and what was good and bad in applying Soviet assault aviation. In “Conclusion about combat applying *West Front VVS*” we find: “in the *Bobruisk* airfield 28-29 June 1941, 30-35 enemy fighters *Me-109* were destroyed by *sturmoviks* from 4<sup>th</sup> Aviation Regiment on the ground ”<sup>6</sup>. In another part German tactics were documented: “There were cases when enemy pilots used deception: 2-3 aircraft *JU-88*, pursuing escorts, dropped their landing gear above the airfield, descended, went along airfield border and, from an altitude of 400-500m, suddenly attacked (attack on airfield *Bihov* 28 June 1941)<sup>7</sup>. Another document (report “ To the *Reserve Front VVS* navigator”) spoke about problems that appeared in the first month of war. There were differences between theoretical and practical combat range of the new aircraft (*IL-2*, *MIG-3*, and *Pe-2*), which caused forced landings in first days of war, lack of radio navigation (only by compass or visually), and poor bombing accuracy due to lack of precise target pointing.<sup>8</sup> At the same time the document also spoke about new methods of applying experience. Very good results drove dive attack tactics and emphasized the need for fighter cover during assault operations. An interesting fact concerned the new method of using rockets which were fired backward from the aircraft (rocket launchers were turned around), allowing attacks on enemy columns or position without turning (also used later in *Afghanistan* and *Chechnya*)<sup>9</sup>. Another instruction (about narrow target attack tactics) pointed to the utility

of using *Pe-2*, *SU-2*, and *IL-2* in small groups (*zveno/shesterka*) with echelon attack (in 10-15 minute intervals), using sun or clouds to gain surprise. The instruction also spoke about ground target attack effectiveness for *IL-2* from low altitude and as a dive bomber in diving maneuvers. Support for ground forces was proposed, in attacking vital points such as small targets; artillery positions and grenade positions. In addition it recommended sending a liaison from AF to ground units for better coordination. Wide use of camouflage on airfields was stressed.<sup>10</sup> Another document concerning assault aviation addressed the need to attack enemy airfields using combined groups (bombers, *sturmoviks* and fighters). First strike was recommended for fighters (to suppress airfield *FLAK*), and in common operations, the ratio of fighters and *sturmoviks* was recommended two to one.<sup>11</sup>

The first big application of Soviet assault aviation was in *Mozhaisk* defense, as component of *Special Air Group* under the command of *N.A. Sbytova*. The group consisted of *46th Bomber Air Regiment* (equipped with *Pe-2*), *65<sup>th</sup>* and *243d Ground attack Regiments* (with *IL-2*). In that operation, the *Group* interacted with *5<sup>th</sup> Army*<sup>12</sup>. Later in counteroffensive near Moscow, *VVS* flew 16,000 combat sorties in three days, half of them supporting ground forces<sup>13</sup>. *Front Aviation* according to the Soviet sources “played significant role in the offensive against *Army Group Center*”<sup>14</sup>.

Nevertheless, speaking about basic assault aviation aircraft – *IL-2* (despite some successes) suffered big losses. The absence of a gunner made *sturmovik* defenseless to rear-quarter fighter attack. German Air Command formed special fighter group of pilots trained in attacking *IL-2* from above and behind. In the combat units (for example in *806 SHAP sturmovik air regiment*) engineers and technicians improvised a gunner position

using a hatch behind the pilot (made for transporting a maintenance technician)<sup>15</sup>. From veterans' stories, rear gun was sometimes simulated by installing sticks (creating illusion of a machinegun for fighters). The weak point was also a wood tail section (later it was reinforced by a steel longeron)<sup>16</sup>. Combat operations also indicate a small speed range for the *IL-2* which complicated *sturmovik* group actions (and led to new engine development)<sup>17</sup>.

A special tactic was developed for defense from enemy fighters. Single-seat *IL-2* attacked ground targets from a “*free circle*” with 150-200m between aircraft. When enemy fighters appeared they formed a “*closed circle*”(forward aircraft was covered by firepower of the one behind)<sup>18</sup>.

Nevertheless it was impossible to quickly fix these problems. In October 1941 *KB S.V. Ilyushina* was evacuated from Moscow<sup>19</sup>. Several aviation factories were also evacuated (including factories that produced *IL-2*) and because of this mass production of *IL-2* was reduced and stopped altogether for 35 days.<sup>20</sup> In very hard conditions people started production in new places, sometimes working under the open sky. At that time two aircraft factory directors *Shekman* and *Tretyakov* got this telegram:

“You betray our country and our *Red Army*. You have not to this date produced the *IL-2*. *Red Army* needs *IL-2* aircraft as air, as bread. *Shekman* gives one *IL-2* per day, *Tretyakov* one-two *MIG-3*. There is a rout on the *Red Army*. I ask you to not frustrate the government. I require you to produce more *IL-2*. This is your last warning.” (*National Defense Commissar I.V. Stalin P553*).<sup>21</sup>

After that *IL-2* production increased, partly by reducing *MIG-3* production. Finally the two-seat *IL-2* started going through its factory tests.<sup>22</sup>

Hostilities also shaped the combat tactics of *sturmoviks*. Emphasis was made that the basic targets for *sturmoviks* should be enemy tanks and that it was ineffective to use all ammunition in one attack.<sup>23</sup> The orders spoke about the requirement to assign the units a clear mission before the flight to include time of target attack, numbers of attacks, time on target, enemy strength, return orders, group actions in air battle, anti *FLAK* maneuvers, and protection for take off and landing.<sup>24</sup> On 18 June 1942 came *Stalin's* order about applying fighters and *sturmoviks IL-2* on the battlefield as day bombers with approved weapons variants<sup>25</sup>. *Commander of Western Front VVS Colonel Naumenko* issued directions that emphasized the need for better interaction between the Army and aviation and aviation units assigned to airfields close to the front line (for faster reaction). He also made special directions about *sturmovik* actions (prohibition of flying the same route to the targets and the need to have detailed combat plans)<sup>26</sup>.

Tremendous changes in *USSR* military aviation happened after General A.A. *Novikov* was assigned as *VVS Commander* (11 Apr 1942) (17). His reformations created Air Armies, which took airpower application to a higher level. The Air Armies enabled force concentration, flexibility, and quick reaction to changes in the situation. *Novikov's* next step was to develop communications, which was a weakness in military aviation.

Using of assault aviation also showed new problems - inability for *sturmoviks* fight against enemy fighters from “*hedgehop*” altitudes and necessity of creating new methods of attack.

Especially effective against our *sturmoviks*, enemy fighter groups, attacking our *sturmovik* employing “*hedgehop*” tactics, engaged them and shot from close distance. On several occasions *ME-109s* approached closely to *IL-2*, dropped



their landing gear, stood on their tail, and with carefully aimed fire from machineguns attacked the vulnerable spots of the *sturmoviks*—between the cockpit dome and fuselage and in the side cockpit dome windows—while they were attempting to land.<sup>27</sup>

New *sturmovik* tactics emerged: diving attack with new array and target attack order, assault blow from “*hedgehop*”, bombing from level flight, and defense air battle against enemy fighters<sup>28</sup>.

## THE MAIN BATTLES

The next serious phase of applying assault aviation was the battle in *Stalingrad*. At that time *8<sup>th</sup> Air Army* reinforced by ten regiments (General *Novikov's* special order) took part in the hostilities. Seventy-five percent of the Army equipment was new types of aircraft: *YAK-1*, *YAK-7b*, *IL-2*, and *Pe-2*.<sup>29</sup>

General *Falaleev* was assigned in June as *Chief of Staff VVS*. In August the units got his order which emphasized assigning combat missions to the units, fighter coordination, the role of *sturmovik* units in escort and maneuvers above the target, and supporting problems.<sup>30</sup>

During *Stalingrad* battle, assault aviation was used very frequently and effectively. For example, from 18 to 22 August *8<sup>th</sup> Air Army* flew more than 1,000 sorties to prevent enemy forces from crossing the *Don* River.<sup>31</sup> Attacks were made by groups of ten to thirty *Pe-2* and *IL-2*, covered by fighters, that greatly increased their effectiveness.<sup>32</sup> On 22 October came General *Novikov's* special *Directive* for ground-attack and fighter regiments, "It is necessary to train a minimum of five crews for flying in complex and night conditions".<sup>33</sup> In the defensive operation phase 406 night sorties were made by *sturmoviks IL-2*.<sup>34</sup> On 12 November *Stalin* made clear that his basic objective for *VVS* in *Stalingrad* was to concentrate efforts in the breakthrough zone, clear the airspace from enemy aircraft, and create the necessary support and air cover for the ground forces.<sup>35</sup> When the offensive operation started in *Stalingrad* the battlefield picture was: *17<sup>th</sup> Air Army* supported *5<sup>th</sup> Tank Army* and *21<sup>st</sup> Army*, *16<sup>th</sup> Air Army* supported *65<sup>th</sup> Army* and *8<sup>th</sup> Air Army* assisted *50<sup>th</sup> Army*.<sup>36</sup> In the *16<sup>th</sup> Air Army* in that period almost all

assault aviation was replaced by new *IL-2s* reinforced by two bomber divisions of *Pe-2*.<sup>37</sup> November's combat statistics of this Army showed that of 2,848 sorties flown in that period, 2/3 were against Germany's airfields.<sup>38</sup> A bright spot in the offensive operations were *VVS* tactics. In December 1942 (16-31) of the 4,177 sorties flown by 2<sup>nd</sup> and 17<sup>th</sup> *Air Armies* 80% supported ground troops.<sup>39</sup> The tactic of assault aviation was constantly developed. A method of attacking targets from low-level with small number of heavily armed *IL-2s* was created. The example of successfully using that method occurred with 7 *IL-2s*, under the command of Captain *I.P. Baktin* and covered by of *squadron YAK-1*, on 2 January at *Sal'sk* airfield. Soviet *sturmoviks* made six passes and destroyed 72 Germany aircraft, losing only four of their own aircraft.<sup>40</sup> On 28 November a Soviet air raid destroyed 219 enemy aircraft on the *Gumral* and *Bol'shaya Rossoshka* airfields.<sup>41</sup>

General lessons learned in Soviet military aviation development from the battle of Stalingrad include the clear need to create Air Armies, develop communication systems (to allow coordination of those armies), close coordination with ground forces, and developing new methods of applying assault aviation.

In 1942, many orders and instructions about assault aviation application were issued. Among others, instructions for conditional signals for *sturmovik* (bombers) and fighters interaction were issued. Special instruction: "Sturmovik action against airfields and small targets" were developed. It spoke about choosing and apportioning targets among flying crews, selecting routes to a target, approaching a target, attacking a target, leaving the target, rejoining, active defense against enemy fighters, returning to base, and using bombs with special fuses.<sup>42</sup>

Viewing the “air battle” above Kuban we can divide it in two parts. The first part was fighting to achieve air superiority. The second part for supporting Soviet force offensive operations broadly was applied assault aviation. For example; in the battle near village Krymskaya, *sturmoviks* from 2<sup>nd</sup> *Mixed Air Corp* under command of General-Major *I.T. Yeremenko* supported tanks attack.<sup>43</sup> The 4<sup>th</sup> *Air Army* in interacting with naval air units in the period from 29 Apr to 10 May made 12000 sorties and more than half of them against Germany ground positions.<sup>44</sup> In operation of “*Blue Line*” attack mass strike tactic were again applied: 4<sup>th</sup> *Air Army* attacked German positions with 338 combat aircraft. There in the first time *IL-2* used special bombs for smoke screen making, under cover of which Soviet ground forces were able to secretively approach enemy position and attack by surprise.<sup>45</sup> Senior Lieutenant *N.P. Dedov* applied the new tactic in attacking Germany artillery position with 36 *IL-2* under fighter cover. They attacked by columns, six aircraft in each, to predefined targets, with changing columns above targets in a circle (later it called “*circle of death*”), which gave for each pilot more freedom in maneuvre.<sup>46</sup>

And of course speaking about Soviet assault aviation application in WWII, we can't overlook the “*Battle of Kursk*”. The “*Battle of Kursk*” became the smithy of new assault tactics against Germany armor. The initial phase of operation, like in Stalingrad, had a defensive character; 16<sup>th</sup> and 2<sup>nd</sup> *Air Armies* participated in it.<sup>47</sup> The *VVS* was already fully reorganized and rearmed. *Sturmoviks IL-2* were changed to *IL-2M3* with more powerful engine and a shooter in the back cabin, armed with a 12.7mm machinegun. Also the aircraft had *NS-37* guns (constructor *A.E. Nudel'man*), special pocket shells *RBS-82* and *RBS-132*, cumulative bombs *PTAB-2.5-1.5* (constructor *I.A.*

*Larionov*).<sup>48</sup> The first time that kind of bomb was used occurred on 6 June 1943 in “*Kursk Arc*” battle.<sup>49</sup> Using those weapons pilots from *291 Assault Air Division* (Commander Colonel A. *Vitruk*) in first five days of “*Kursk Battle*” destroyed and damaged 422 enemy tanks.<sup>50</sup> In the defensive phase of operations *VVS* started applying “*Okhotniki*” (hunters) tactic, including *sturmoviks* in the teams. Their patrolled pointed areas, attacking all possible targets and exerted constant military pressure on the German Army rear area.<sup>51</sup>



Figure3. IL-2M3.

On 12 of July near Prokhorovka, the biggest tank battle of WWII happened, involving some 1200 tanks. Assault aviation from both sides actively participated in the battle, attacking enemy tanks and each other. By the end of battle Germany lost 300 tanks, the Soviet side had commensurable losses, but was better able to absorb these losses.<sup>52</sup> The failure of the German offensive operation “*Citadel*” enabled the Soviets to launch counteroffensive operation. The *VVS* in that operation had the followings objectives: establish control of the air space above the battle zone, make a blow against enemy ground forces to create a corridors for own forces, support ground force offensives on the battlefield and continue attacking enemy reserves attacking.<sup>53</sup>

*IL-2* contributed to the victory of “*Kursk Battle*” in a major fashion. Attacking, for example, the *9<sup>th</sup> Panzer Division* in July 7 1943, *sturmoviks* in 20 minutes destroyed

70 tanks or in four attacks against the 17<sup>th</sup> *Panzer Division* destroyed near 200 (from 300).<sup>54</sup> In favor of its powerful weapons and invulnerability *IL-2* was named as “*flying tank*”. An article in the *Pravda* (August 8 1943) stated that:

“It was clear to us that air forces would primarily be used in joint operations with land armies and the navy. Therefore, our design ideas were directed toward aircraft that would render the most effective assistance to the ground forces of *Red Army*”.

Summarizing the experience of assault aviation application in the “*Kursk Battle*”, we can conclude that it entailed the first mass application against enemy armor and was used in offensive operation for creating “*offense corridors*”, with later close ground support on a battlefield.

Also assault aviation was broadly applied in the Navy for enemy ships attacks and amphibious support. The effective attack method for *sturmovik IL-2* against enemy ships was the “*topmachtoviy method*”. The results were five-time higher compare with bombing from horizontal flight. An aircraft went on 30m altitude with 400km/h speed, dropped bombs, rebounding on water, smash in the ship’s board.<sup>55</sup> Trying to attach torpedoes to *IL-2* wasn’t successful (it was too heavy for *IL-2*). The great example of applying *sturmoviks* in the Navy can be operation of Crimea deliverance. In it took a part 23<sup>rd</sup> *Assault Aviation Division*, 8<sup>th</sup> and 47<sup>th</sup> *Assault aviation Regiments* (from 11<sup>th</sup> *Assault Aviation Division*).<sup>56</sup> In that operation *sturmoviks* flew ground support sorties, attacking enemy ship convoys with very good results.

Не так уж много советских самолетов в годы Второй Мировой войны было сфотографировано под разными ракурсами, но этому ИЛ-2 из состава 8-го ГШАП в этом смысле повезло: его фотография также опубликована в предыдущей части (см. ИА №5/2000, с.21). На правом борте фюзеляжа самолет нес белую стрелу и надпись «За Родину!». Фото из архива Г.Петрова.



Figure4. IL-2 from 8<sup>th</sup> Assault aviation regiment.

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## CONCLUSION

Researching the assault aviation development in the period from 1938 to 1945, we were going from the idea to doctrine, from doctrine to application. Assault aviation in that short period of time was transformed from the idea into a powerful part of *Red Army* Air force. Accepting “*tactical support doctrine*” as fundamental, the Soviet government, with little deviations, transformed the concept into reality. The doctrine found support and development in the *Red Army* military theoretical works. They created the concept of joint operations. Later, the hostilities in *Spain*, *Khalkhin-Gol*, and *Finland* further endorsed aviation effectiveness in applications against ground targets and showed the necessity of creating special aircraft for those mission accomplishments. Next, as if conforming to the laws of nature, amalgamation of close ground support concept and hostilities experience found their physical manifestation – the *IL-2*. It was an aircraft specially designed to accomplish “close ground support mission” as basic. Those aircraft gradually became basic striking power of Soviet *VVS*, multipurpose planes that accomplished various combat missions. They were widely used in all big *Great Patriotic War* operations. At Stalingrad battle the assault aviation made big input in both phases of operation, supporting ground units and attacking enemy airfields. In the period of battle of Kuban it, using special weapons and mass strike, it provided ground forces offensive. Application an assault units in “Kursk Battle” against enemy armor, created odds of force on Soviet part, witch gave possibility for the big counteroffensive operation. Success of the assault aviation units was verified by creating, for the first time, not only assault regiments, divisions, but also assault aviation corps. Later in 1944, as the *IL-2* idea development, units started receive the new *sturmovik* model – *IL-10*.

Developed in wartime, *Frontovaya* aviation was created specially to solve the problems of direct ground support in offensive and defensive operations. Assault aviation performed a broad spectrum of missions and played a major role in accomplishing victory in *Great Patriotic War*. Also after WWII *Frontovaya* aviation was maintained as part of the VVS. In the current Russian VVS structure, *Frontovaya* aviation exists as important part and is attached to military districts. Today Russian assault aviation is equipped with *sturmoviks* SU-25, SU-39.



Figure5. SU-39

Assault aviation in modern times is being applied in limited wars (*Afghanistan* and now in *Chechnya*). Therein it was interacted mostly with small ground units, directly striking enemy position, providing fire support and attacking enemy supply lines. Those air units were used because of short reaction time and high accuracy of the fire. With confidence we can say that assault aviation occupied an important place in the Russian VVS and in the near future will continue to play an important part in military aviation operations.

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