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THE TARAN: RAMMING IN THE SOVIET AIR FORCE

J. T. Quinlivan

The intentional ramming of another aircraft or a ground target is a frequent occurrence in the American movie version of World War II; such incidents were less frequent in reality. The Soviets also have a fascination with such rams (taran in Russian) and the Russian history of the Second World War (their Great Patriotic War) includes many accounts of such incidents. An examination of these accounts throws an interesting light on the Russo-German air war and shows how strategic and technical factors can combine to produce tactical situations requiring the exceptional instance of a taran. But the taran is not just of historical interest. A close examination of current Soviet treatments of tarans shows how the Great Patriotic War continues to be a source of national pride and, more important, national unity and even gives some insight into the problems of modern strategic air defense.

From the first day of Soviet involvement in the Second World War, Soviet pilots carried out tarans, both aerial rams of enemy aircraft and rams of ground targets. The first aerial ram of a German aircraft occurred at 0425 hours on 22 June 1941 when Senior Lieutenant I. I. Ivanov of the 46th Fighter Air Regiment rammed a German bomber.[1] Lieutenant Ivanov's taran was the first of some 270 aerial tarans carried out during the war.[2] Although tarans constitute only a small

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[1]M.N. Kozhevnikov, *The Command and Staff of the Soviet Army Air Force in the Great Patriotic War 1941-1945,* Moscow, 1977 translated by the U.S. Air Force in the Soviet Military Thought Series, GPO, n.d., p. 34.

[2]Maj. Gen. Avn. A. Zaytsev, "A Weapon of the Stout-Hearted," *Kryl'ya Rodiny,* No. 6 (June) 1984 translated in USSR Report: Military Affairs, JPRS-UMA-84-060, 20 September 1984. The number 430 is given Kozhevnikov, *op.cit.,* p 214. However, his source is a Pravda article of

fraction of the 57,000 German aircraft (air and ground) claimed by the Soviet Air Force,[3] tarans figure prominently in histories of the Soviet Air Force (hereafter, VVS--*Voyenno-Vozdushnyye Sily*) and accounts continue to appear in both the military and the semi-popular literature. Despite the vast taran literature, two questions really remain unanswered: Why did pilots resort to this tactic as often as they did and why do the Soviets continue to talk so much about it?

Explanations of the taran are largely determined by point of view. In Soviet accounts, the taran is uniformly regarded as a pure and simple demonstration of profound love for both the homeland and the Communist Party. Some authorities on Soviet history view the taran as a reflection of the mood of heroic sacrifice appropriate to 1941-42[4] with an underlying exchange of an obsolete fighter for a modern bomber.[5] Once the disastrous effects of the initial German attacks were overcome and the fighter force modernized, the exchange was much less attractive and the practice gradually died out. On the other hand, western aviation authors and German aviators frequently treat the taran as a tactic dictated by the limited flying skills of Soviet pilots, an aerial analog to the "human wave" attack.[6]

1974; the Zaytsev article is certainly a more recent and authoritative source. An accurate count of tarans is even more difficult than combat claims by other means: In a careful tracing of 8 tarans claimed against Finnish aircraft during the 1941-45 war, two taran encounters were found in which the pilots of both sides landed and claimed victory. See Carl-Fredrik Geust, Kalevi Keskinen, Klaus Niska, and Kari Stenman, *Red Stars in the Sky: Soviet Air Force in World War Two, Volume 3,* Finland: Tietoteos, 1983, p. 43.

[3]Ray Wagner (editor), *The Soviet Air Force in World War II: The Official History Originally Published by the Ministry of Defense of the USSR,* translated by Leland Fetzer, Garden City, N.Y.: Doubleday and Company, 1973, p. 380.

[4]Von Hardesty, *Red Phoenix: The Rise of Soviet Air Power, 1941-1945,* Smithsonian Institution Press, 1982, pp. 28-29.

[5]A point made explicitly in *Sovetskaya Aviatsionnaya Technika,* Izd-vo "Mashinostroyeniye," Moscow, 1970, translated as *Soviet Aeronautical Engineering,* Foreign Technology Division, Air Force Systems Command, U.S. Air Force, FTD-HT-23-21-71, 1971.

[6]For example, see Mike Spick, *Fighter Pilot Tactics: The Techniques of Daylight Air Combat,* New York: Stein and Day, 1983, p. 83: "The Russian fighter units were forced to resort to desperate measures. Their aircraft were inferior to the German Messerschmitts, their pilots poorly trained and their tactical ideas almost non-existent." German Air Force commanders are also critical: "Soviet fighter pilots showed little adaptability, but were courageous to the verge of stupidity,

There is a richer explanation of the taran that recognizes that the tactical situation requiring a taran was produced by a number of strategic and technical factors. Without a doubt, tarans were heroic feats, but they were also heroic responses to desperate situations brought about by strategic failures and technical inadequacies.

PERFORMING THE TARAN

The aerial taran was an intentional collision with another aircraft, but it was not a simple, clumsy, or suicidal act. A pilot's method of closing and colliding with a target aircraft determined not only the damage he inflicted but also the pilot's chance of surviving the collision. Many sources list three methods of performing the taran:

(1) Bringing the propeller of the fighter into contact with the rudder and control surfaces of the bomber.
(2) Using the wing of the fighter to contact the rudder or to push into the wing of the bomber to force it out of control (a maneuver like that used by RAF Typhoon pilots against V-1s).
(3) Crashing the fighter into the main body of the bomber.[7]

Attacks using the first two methods frequently left the fighter either

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which at times even led them to carry out ramming attacks," Generalleutnant a.D. Walter Schwabedissen, *The Russian Air Force in the Eyes of German Commanders,* USAF Historical Division, Research Studies Institute, Air University, 1960, reprinted by Arno Press, New York, 1968, p. 105.

[7]This list is given in a number of works on the Soviet Air Force. The list was apparently first transmitted to English-speaking audiences through a Soviet Embassy bulletin released by a Major N. Denisov sometime in 1942. The list was picked up by aeronautical publications and appeared in articles such as "The Ramming Russians," Lt. Robert B. Hotz, *Flying,* October 1942. Hotz's article points out the use of the taran as a method of dealing with crippled bombers. The academic tone of the list and its early appearance in the literature may reflect an origin in Soviet training material on the taran. During the war, there was formal instruction in performing the taran, in fact, there was a wartime VVS conference devoted exclusively to the taran as a technique of aerial combat. The conference was attended by many successful taran performers including M. Zhukov and P. Kharitonov, two of the Heroes of the Soviet Union in the first awards announced on 8 July 1941. The

capable of landing or sufficiently controllable to allow the pilot to parachute to safety. The first two attack tactics are those reported in accounts of tarans by famous Soviet aces; in such accounts the pilot is usually said to have considered the ramming tactic before being presented with the ramming situation. Accounts in which the third attack variant was chosen usually end with the posthumous award of Hero of the Soviet Union.

Of course, the pilot did not always have a choice in his method of performing the taran. The first two variants required a matching of fighter and bomber speeds and a more delicate approach than the third attack variant. Slight errors in approaching the target aircraft could inadvertently produce an attack by the third method. There were situations that demanded intentional attacks by the third method. The first two approaches required more exposure to fire from the bomber's gunners than the third and would be most easily performed in finishing off cripples with dead gunners and limited ability to maneuver. If a German bomber was largely undamaged and maneuvering at low altitude with gunners still firing, the first two attack variants would give little promise of success and even highly skilled pilots would be forced into the cruder and generally fatal third attack option.

SETTING THE STAGE FOR AN EXCEPTIONAL SITUATION

The mechanics of performing a taran are straightforward; what is obscure is why so many pilots came to be in situations that demanded this extreme measure. Answering this question shows how strategic and technical factors combine to produce tactical situations that demand exceptional responses. These factors include

(1) Luftwaffe initial air superiority and its effect on operational practice

(2) The control of Soviet fighter forces

(3) The firepower of Soviet fighters

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conference is mentioned in an article on Colonel Kharitonov who performed two tarans during the war. "An Alloy of Courage and Skill," *Air Defense Herald,* June 1984, translated as *Antiaircraft Defense Herald* by U.S. Army Foreign Science and Technology Center, FSTC-HT-0227-85, 1 March 1985.

Luftwaffe Initial Air Superiority and Its Effect on Operational Practice

The Luftwaffe opened the war on Russia with attacks on Soviet airfields that virtually annihilated the VVS in the west. In the space of a few hours, the VVS lost about 1200 aircraft, 800 on the ground.[8] Taking advantage of the near annhihilation of the VVS fighter arm, the Luftwaffe virtually abandoned fighter escorts for bomber and reconnaissance missions. The Luftwaffe also began to dispatch bombers in small groups rather than large formations. These two practices set up many situations leading to tarans.

Blitzkrieg required a maximum utilization of the Luftwaffe's many reconnaissance aircraft; with the rapid advance into Russia, the Russian rear areas rapidly became the German front lines, and tactical and long-range reconnaissance became critical activities. The importance of reconnaissance is reflected in the Luftwaffe's initial order of battle for the Russian campaign.[9] Fully 25 percent of the total aircraft strength committed in the opening phase of the Russian campaign was composed of tactical and deep reconnaissance aircraft. The reconnaissance aircraft usually flew alone, frequently along obvious avenues of approach such as highways or railroads, and provided many opportunities for encounters with Soviet fighters. By the time of the

[8]Kozhevnikov, *op.cit.*, p. 33.

[9]Air Ministry, *The Rise and Fall of the German Air Force,* HMSO, 1948 reprinted by St.Martin's Press, New York, 1983, p. 165.

Luftwaffe Strength for the Opening Phase of the Russian Campaign

Type	Number	Percent of Total
Long-range bombers	775	28
Dive Bombers	310	11
Single-engine fighters	830	30
Twin-engine fighters	90	3
Long-range reconnaissance	340	12
Tactical Reconnaissance	370	13
Coastal	55	2
Total	2770	99 (rounding)

Battle of Moscow, 5 percent of all VVS sorties were flown to intercept Luftwaffe reconnaissance aircraft.[10]

German bomber aircraft also frequently operated in small groups, or even alone, attempting to cover the large number of targets provided by a fluid battlefield.[11] In pinpoint attacks individual aircraft were used against particular targets. The great accuracy of the individual dive-bomber made pinpoint attacks particularly attractive and certainly placed many individual German aircraft in the Soviet rear areas.[12]

The Control of Soviet Fighter Forces

Once small groups of German aircraft were dispatched, there was little likelihood of encountering significant numbers of Soviet fighters. The initial attacks on the Soviet airfields had gravely reduced the number of Soviet fighters; the survivors were used in direct tactical support of the ground forces. Those aircraft that were intended to defend against bombers were hampered by the inadequacies of the Soviet detection and control system. During the early period of the war, Soviet defensive fighters were limited in their operational choices: They could patrol in zones, scramble from ground alert, or organize "ambushes."

Patrolling in zones placed standing patrols of aircraft over likely targets. The patrols could detect other aircraft visually or by radio warnings from ground observers if the patrol included aircraft equipped with radios. Because the patrols had to be maintained for extended periods of time without knowledge of when penetrators would arrive, fighters would have to be replaced in shifts, one shift landing to refuel as another took its place. Given the difficulty of keeping aircraft fueled and maintained under field conditions and the physical exhaustion of pilots, only a small fraction of the available aircraft could be kept aloft in such standing patrols, exacting a high "virtual attrition" of the available force. Consequently, penetrating aircraft

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[10]Mar. Avn. G. V. Zimin, *Taktika v Boyevykh Primerakh: Istrebitel'naya Aviatsionaya Diviziya,* Moscow: Voyenizdat, 1982.

[11]Schwabedissen, *op. cit.,* p. 92.

[12]Suchenwirth, *op. cit.,* p. 29.

would encounter only small numbers of aircraft in the standing patrols.

In the early period of the war, the interceptor scramble from ground alert was an exceedingly difficult operation for the VVS. The Air Observation, Warning and Communication (VNOS, *Vozdushnoye nablyudeniye opoveshcheniye i svyaz'*) system relied on sound detectors and visual observers and gave inadequate warning of incoming raids. With inadequate warning time, the slow-climbing Soviet fighters only rarely met incoming bombers before their bomb release lines. With their formations intact until the bomb release line, the standard German bomb delivery tactic of a dive from intermediate altitudes with return to base at low altitude frequently led to the bombers returning individually. The scrambled fighters then found themselves engaged in a tail-chase with fast bombers.

The intercept from ambush was a somewhat specialized tactic relying on the use of austere "ambush airfields" located close to the front lines. Early in the war, the tactic would place a few fighters on likely approach routes with the fighters scrambling when they observed German aircraft. The tactic was particularly useful against reconnaissance aircraft whose entry routes along highways and rail networks could be predicted with some confidence.

The scarcity of fighters equipped with radios limited the success of all of the above tactics, both by denying airborne fighters whatever information was available on the ground and by limiting the tactical cooperation of groups of fighters to what could be communicated in visual signals. Once an individual fighter without a radio was separated from his formation, he was equipped only for a silent and solitary duel with any German aircraft he encountered.

The Firepower of Soviet Fighters

Most tarans involved a Soviet fighter and a German bomber. Zaytsev points out "there are dozens of examples of the crews of ground attack aircraft, long- and medium-range and dive bombers ramming the enemy."[13] Nevertheless, dozens of cases in hundreds of occurrences means that the vast majority were carried out by fighters.[14] That the target of the

[13]Zaytsev, op. cit., p 37.

[14]The Kozhevnikov history specifies 404 of 430 rammings as carried out by fighters. Kozhevnikov, *op. cit.*, p. 214.

aerial ram was most frequently a German bomber is clear in most accounts, but no concrete numbers are available.

Why didn't the fighter destroy the bomber with gunfire? The most frequent scenario played out in accounts of tarans is the chase of a German bomber by a Soviet fighter; the fighter exhausts its ammunition in repeated attacks, and the destruction of the bomber is completed with a taran. Usually the fighter exhausts his entire stock of ammunition in attacks on the aircraft he eventually rams and not in attacks on other aircraft. Why should a fighter expend his entire ammunition stock without destroying the bomber? The answer lies in the design choices that were made in developing modern Soviet fighters.

At the beginning of the war, a Soviet pilot would have been flying one of three aircraft: the I-153, the I-16, or the then new MiG-3. The I-153 was the last operationally deployed Soviet biplane fighter. The I-16 was the first metal monoplane fighter in VVS service. The MiG-3 was the first truly modern fighter aircraft to be introduced into VVS service. Many of the regiments equipped with this aircraft were in the process of conversion at the time of the June invasion and were not yet comfortable with the fast but unmaneuverable and unforgiving MiG. Within the first year of the war, two additional fighters began to appear in substantial numbers, the Yak-1 and the LaGG-3.

The armament of Soviet aircraft was chosen from four standard weapons.[15] The weapons were well designed and reliable and compared favorably with foreign weapons of the same caliber. Obtaining a quantitative measure of their firepower is a complicated problem that has generated a number of possible answers depending in sensitive ways

[15]Soviet aircraft weapons at the beginning of the war:

Designator	Caliber (mm)	Cyclic Rate (rounds/min)	Weight of gun	Weight (gm) Complete	Projectile
Machine Guns					
ShKAS	7.62	1800	10.0	22	9.6
UB	12.7	1000	21.5	131	48
Cannon					
ShVAK	20	800	45.	181	96
VYa, MP-23	23	600	66	476	200

Bill Gunston, *Aircraft of the Soviet Union: The Encyclopedia of Soviet Aircraft Since 1917,* London: Osprey, 1983.

on the vulnerability of the target. During the early period of the war, one reasonable measure is the weight of projectiles fired per second. Such a measure ignores the contribution of muzzle velocity and the greater destructiveness of explosive cannon shells; nevertheless, it captures much of what is meant by firepower in the context of air combat.

Table 1 shows the firepower of Soviet fighter aircraft in the Soviet inventory during the first years of the war. The table shows that the modern fighters were less capable than the most heavily armed variants of the I-153 and the I-16, both in the firepower (as measured by the weight of burst) and the number of bursts that an aircraft could fire.

The Soviets were aware of the need for heavier armament to destroy bombers; indeed, the heavier armament of the I-16 type 24 was a consequence of the difficulty in destroying bombers in the Spanish Civil War. The reduction in firepower sprang from the necessity of limiting the weight of the modern fighters in order to obtain the demanded speed and maneuverability. The limited power of the available engines meant that the new generation of fighters could be fast or they could be heavily armed but they could not be both.

As other nations in the 1930s, the Soviet Union believed that massive bomber raids would be a feature of any new war. The impression that these raids would be made by high-altitude, high-speed bombers was reflected in fighter requirements. The modern fighter present in the largest numbers at the beginning of the war was the MiG-3, an aircraft designed to a specification for a high-speed, high-altitude interceptor. The solution to the requirement for high speed and a high climb rate was to marry an extremely light airframe to the AM-35A engine. Because of both weight and center of gravity problems, the MiG-3 could accept only a light armament. The cause of light armament was fairly clear: In order to meet the speed and climb requirements with the available engines, strict limits were imposed on weight; to attain the desired weight, designers limited the armament to a few guns of small caliber. Other aircraft would encounter the same problem.

Table 1

FIREPOWER OF SOVIET FIGHTER AIRCRAFT

Aircraft	Weapons	Rounds per gun	Cyclic rate of fire (rpm)	Total time to exhaust ammo (sec)	Weight of burst[16] (kg/sec)
I-153	4 ShKAS	650	1800	21.7	1.15
I-153 BS	4 UB	--	1000	--	3.2
I-16 type 10	4 ShKAS	650	1800	21.7	1.15
I-16 type 24					
	2 ShKAS	650	1800	21.7	.58
	2 ShVAK	180	800	13.5	2.56
					3.14
MiG-3					
	1 UB	300	1000	18.0	.8
	2 ShKAS	375	1800	12.5	.58
					1.38
Yak-1					
	1 ShVAK	120	800	9.0	1.28
	2 ShKAS	500	1800	16.7	.58
					1.86
LaGG-3					
	1 ShVAK	120	800	9.0	1.28
	2 ShKAS	325	1800	10.8	.58
					1.86

Source: William Green and Gordon Swanborough, *Soviet Air Force Fighters, Parts One and Two*, New York: Arco, 1977, 1978. and Gunston, *op. cit.*

[16]The weight of burst is computed assuming the weapons achieved their full cyclic rate. The usual configuration for Soviet aircraft was to mount the cannon to fire through the propeller hub allowing the cannon to achieve its full cyclic rate. Machine guns were usually fuselage mounted and fired through the propeller with an interrupter mechanism which would cause the actual firing rate to be less than the weapon's cyclic rate of fire.

Within the first year of the war, the Soviets began to introduce two additional aircraft, the Yak-1 and the LaGG-3. These aircraft were designed to the "frontal fighter" requirements of 1938 for aircraft to fly both air combat and ground-support missions at medium heights. Both of these aircraft were chosen for the 1939 crash program for modern fighters. Both were designed for the M-105P engine; the disappointing performance of this engine combined with the rush to introduce the aircraft into service, led to major constraints on the ability to introduce improved armament. The LaGG in particular shows the limits on armament imposed by the desire to introduce a significantly faster aircraft built around the M-105P engine.

The LaGG was first introduced in a LaGG-1 model that was armed with one VYa 23 mm cannon and two UB machine guns, a truly formidable armament providing 3.6 kg/sec in a burst. However, with the M-105P engine the LaGG-1 was seriously underpowered, and the design bureau was ordered to lighten the aircraft. During the redesign, the boosted M-105PF became available and was incorporated in the design at a slight increase in weight. The reduction in weight produced by installing the lighter armament of one ShVAK and two ShKAS in the LaGG-3 accounted for 25 percent of all weight reductions and fully 40 percent of the net weight reduction.[17]

Improving the firepower without significant increases in weight was a constant problem for Soviet designers. Table 2 shows that the usual solution chosen by the designers was to increase the firepower (the instantaneous burst rate in kg/sec) by adding heavier weapons; the weight was then kept nearly the same by reducing the ammunition supply.

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[17]The comparable system weights:

System	Weights (kg) LaGG-1	LaGG-3	Weight reduction (kg)
Armament	205	101	104
Fuel/oil	250	332	-82 (weight increase)
Engine	575 (M-105P)	614 (M-105PF)	-39
Airframe	2188	1905	283
Total	3218	2952	266

Armament weight includes only weapons and cartridges; belts, ammunition containers, or fixtures are not included.

The reduced ammunition loads of the modern fighters were probably a nuisance in many tactical situations, but they were particularly noticeable in the single fighter versus single bomber duels that preceded many tarans. Thus, the inability of a Soviet fighter pilot to achieve lethal damage within the few seconds of fire available from his heavy weapons was not necessarily a reflection on the pilot's skills. It was frequently just a consequence of his fighter's limitations.

Throughout the early period of the war, Soviet aircraft would be noticeable for their limited firepower. Other factors, such as aerial gunnery skills and gunsights,[18] contributed to the limited ability of

Table 2

FIREPOWER AND ARMAMENT WEIGHTS OF SOVIET FIGHTER AIRCRAFT

Aircraft	Burst Rate (kg/sec)	Armament Weight (kg)	Time to Expend Ammunition (sec)
I-153 and I-16 type 10	1.15	97.2	21.7
I-16 type 24	3.14	203.8	13.5 (ShVAK) 21.7 (ShKAS)
MiG-3	1.38	72.4	18.0 (UB) 12.5 (ShKAS)
Yak-1	1.86	109.1	9.0 (ShVAK) 16.7 (ShKAS)
LaGG-3	1.86	101.4	9.0 (ShVAK) 10.8 (ShKAS)

Armament weight includes only weapons and cartridges; belts, ammunition containers, or fixtures are not included.

[18]Most of the aircraft available at the beginning of the war were equipped with the PBP-1 gunsight, a simple lens-type reflector that had only two deflection rings and gave only a limited ability for deflection shooting. In the production surge to replace the initial losses, even this limited capability was frequently lost. Erich Hartmann, the 352-

VVS fighters to destroy modern bombers, but the dominant factor was the limited firepower of the aircraft themselves. It was frequently the final step in a chain of events culminating in a taran.

THE DECLINE OF THE TARAN IN THE GREAT PATRIOTIC WAR

There was a marked decline in the number of tarans as the war progressed. By 1944 the taran was officially discouraged. As Marshal of Aviation Pokryshkin recently recalled, a special order was issued in the autumn of 1944 which pointed out that the taran "should be employed only in exceptional instances and as an extreme measure."[19]

Explanations for the decline of the taran usually revolve around the special spirit of 1941-1942 or the increase in value of Soviet fighters as new models were introduced, making the exchange of a modern fighter for a bomber a much less attractive transaction. While these explanations certainly capture some of the truth, they fail to adequately recognize the Soviet achievement in the air war.

The number of tarans decreased because the number of situations that required a taran was decreased. Taran situations became less frequent both because German operational practices presented fewer situations that might have led to a taran and because the Soviets dealt more successfully with those situations that were offered.

As the VVS gradually denied the Luftwaffe air superiority, the Luftwaffe responded by changing operational practices. Although both sides could achieve operational/tactical supremacy by massing aircraft in the period of 1942-1943, the Luftwaffe never again achieved the freedom of action of the eastern campaign's first summer. Even in those

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victory Luftwaffe ace, observed: "The gunsight on Russian fighters at this time was often only a circle on the windshield. I mean a hand-painted circle on the windshield." Raymond F. Toliver and Trevor J. Constable, *Horrido!*, New York: Bantam, 1967, p. 232.

[19]Interview with Mar. Avn. A. I. Pokryshkin by Col. O. Frantsev, "A Meeting with a Glorious Pilot, Thrice Hero of the Soviet Union, Mar. Avn. A. I. Pokryshkin," *Voyenno-Istoricheskiy Zhurnal*, No. 3 March 1983, pp. 61-67; translated in USSR Report: Military Affairs, No. 1771, JPRS 83593, 2 June 1983. Marshal Pokryshkin downed 59 aircraft in World War II, none by ramming. During the war he was important in the development and dissemination of fighter tactics.

situations in which the Luftwaffe achieved operational or tactical supremacy, their operations were contested by increasingly effective Soviet fighters. Luftwaffe operational practices were forced to change once the VVS could effectively contest the passage of German aircraft. Once individual penetrators began to face a high probability of encountering numbers of Soviet fighters, the Luftwaffe was forced to send bombers out in larger and larger groups with fighter escorts. Combat between Soviet fighters and escorted bomber formations produced fewer situations permitting or requiring tarans. Carrying out a taran against a group of bombers with a fighter escort was not a practical operation. The odds that the fighter would be destroyed by the escort fighters or by the massed fire of the bombers before closing to taran range were simply too great.

As the war began to go against the Germans, other factors further reduced the likelihood of taran situations: The depth of German bomber penetrations also decreased as the requirement for tactical support moved closer to the immediate region of the battlefield rather than farther to the rear. In turn, the battle against German aircraft began to move across to the German side of the front, and the taran had always been officially barred when aircraft were not over Soviet territory.

Before the struggle for air superiority was won, the VVS was forced to fight its own internal struggle so that it could contest command of the air. The struggle was to control the effective application of fighter forces so that they could arrive at the right place in sufficient numbers to contest the passage of German aircraft. Only when the Luftwaffe began to meet significant fighter opposition did unescorted bomber formations or single bomber pinpoint attacks become impossible. Putting up a significant fighter defense was not just a matter of bringing more airplanes to the front; it required improving the control of the available forces. Introducing the new system of control while fighting the war was one of the great military-technical achievements of the Second World War, an achievement uniquely associated with Chief Marshal of Aviation A. A. Novikov, commander of the VVS from 11 April 1942 until the end of the war.

The introduction of radio control of air formations began in 1941 when Novikov, then commander of the Northwestern Front VVS, began experiments with radio control in battles around Leningrad. Once Novikov became commander of the VVS, he ordered larger experiments with radio control in the air battles over Stalingrad. By the time of the air battles over the Kuban in 1943, the system was widely understood. The system relied on ground command posts supported by observation posts near the front lines linked to the aircraft by radio. Once information on enemy movements could be combined with rapid communication to the fighter forces, massing of formations and reinforcement during air battles became possible.

Radio was essential to control from the ground, but it also greatly improved the tactical flexibility of airborne formations and provided a new basis for the minor tactics of pairs. The increase in radio usage was dependent on supplying radio-equipped aircraft. Radio transceivers began to be installed in about half of all fighters starting in October 1942. But only in 1943 would every new airplane be equipped with radio.[20] While the formations of 1941 could signal only with hand and aircraft motions that were essentially impossible once combat was joined, radio permitted useful exchange of information. A pilot who had expended all of his ammunition in attacks on a bomber could call for help from other aircraft. Radio not only permitted improved cooperation and reduced the number of situations in which Soviet pilots were left alone with cripples, but it also must have removed much of the psychological pressure on a pilot to feel solely responsible for downing the fleeing cripple.

The factor that showed the least improvement during the course of the war was the firepower of Soviet aircraft. Not until the final year of the war would the Soviets introduce significant improvements in aircraft armament. The aerial warfare on the Eastern Front never forced the Soviets to develop the heavily armed interceptor fighters that both the British and Germans introduced to defend against bomber offensives. The late-war armament was up to the requirement of a frontal fighter.

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[20]Kozhevnikov, *op. cit.*, p. 129.

At the time of Novikov's order, the principal Soviet fighter types were the Yak 7 and the La 5. These aircraft represented immense improvements in aerodynamic qualities relative to the aircraft available in June 1941; however, as shown in Table 3, their armament had only improved to the level of the most heavily armed of the pre-war aircraft.

THE TARAN AND MODERN TIMES

The taran is not just an item of historical interest: It is written about with some frequency in both military and semi-popular literature. Its treatment tells something both about Soviet society and about the problems of a modern strategic air defense. Articles on the taran have appeared in a number of different Soviet journals: *Soviet Patriot, Military History Journal,* and *Air Defense Herald* among others. There are clear distinctions between the articles found in the popular literature and the military literature, and even in the military literature two different tones can be discerned depending on whether or not the article deals with strategic air defense in a nuclear war.

Table 3

FIREPOWER OF SOVIET AIRCRAFT IN 1944

Aircraft	Weapons	Rounds per gun	Cyclic rate of fire (rpm)	Total time to exhaust ammo (sec)	Weight of burst (kg/sec)
Yak 7	1 ShVAK	140	800	10.5	1.28
	2 UB	220	1000	13.2	1.6
					2.88
La 5FN	2 ShVAK	200	800	15.0	2.56

Source: Green and Swanborough, op. cit.

The Taran in Current Soviet Literature

The first Hero of the Soviet Union awards of the Great Patriotic War announced on 8 July 1941 included awards for tarans. Both in domestic newspaper articles and publications produced for foreign consumption[21] tarans were praised as acts of courage and skill virtually unique to the Soviet Air Force and Stalin's Falcons. Accounts of tarans in popular publications have since varied little from the descriptions found in these early awards.[22]

The article by Maj. Gen. Avn. Zaytsev cited above inaugurated a series of articles in *Kryl'ya Rodiny* describing briefly many rammings and providing biographical information on the pilots.[23] The concluding passage of Gen Zaytsev's 1984 article may suggest why such a series might be attractive in the current climate:

> The pilots who employed mid-air ramming include aviators representing the most diverse nationalities of the great family of Soviet peoples: Russians and Ukrainians, Belorussians and Georgians, Armenians and Tatars, Kazakhs and Kirghiz...[Zaytsev's ellipses]. Their feat demonstrated with new and convincing force the friendship and fraternity of all the peoples of our multinational nation and their infinite love for the homeland and for the Communist Party.[24]

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[21]See, for example, *Ram Them! Tales About Daring Soviet Airmen,* n.d., an English language collection of sketches by Alexei Tolstoy and others published in the USSR and distributed in the United States. The Library of Congress copy of this work was received in November 1943.

[22]The Soviet popular literature on the taran is vast but inaccessible to the western reader. It includes both articles and books. Famous taran performers such as Victor Talalikhin, the first pilot to perform a taran at night and a great favorite of the Komsomol, have rated full-scale biographies: S. Utekhin, *Viktor Talalikhin,* Moscow: Moskovskiy Rabochiy, 1961. Collective biographies have been more common, for example, F. A. Vazhin, *Vozdushnyi Taran,* Moscow: Voyenizdat, 1962.

[23] *Kryl'ya Rodiny, Wings of the Homeland,* is published by the Voluntary Society for Cooperation with the Army, Aviation and Fleet (DOSAAF), a "defense-patriotic" organization with no exact western parallels. It combines the functions of pre-military training in schools together with special interest sections such as flying, ham radio or sport parachuting in a paramilitary organisation somewhat resembling Explorer Scouts. *Kryl'ya Rodiny* is a nation-wide publication addressed to the aviation enthusiasts within this community.

[24]Zaytsev, *op. cit.*, p. 38.

In a country with severe ethnic problems and a need to show the Party in a favorable light at all times, taran accounts have many attractive features. Taran accounts particularly lend themselves to a series with the theme of diverse ethnic groups united in support of state and party since tarans were performed by virtually every ethnic group. The list even includes a woman aviator. Moreover, the wartime self-sacrifice of the Party is amply demonstrated in the statistic that 95 percent of those who performed tarans are described as communists and Komsomol.[25] One feature that particularly recommends taran accounts for commemorating the wartime spirit of unity is the remarkable uniformity of the act: Each taran is complete in itself. An account of a taran permits no comparisons on the basis of tanks destroyed, fascists killed, or prisoners taken; moreover, it leaves no ground for recriminations over troops left in exposed positions or troops forced to pay in blood for the mistakes of a higher command.[26]

Even in outside literature with a "military-patriotic" theme, the simplicity of the taran leads to its use in the statistics of heroic deeds achieved by military organizations or regions. For example, in an article describing how students can apply for entry to VVS training schools, a description of the Kacha Aviation School records that "Former students include 291 Heroes of the Soviet Union, 14 graduates were twice named Hero of the Soviet Union, while Mar. Avn. A. Pokryshkin was thrice awarded this title. During the war Kacha graduates downed approximately 3,000 enemy aircraft and performed 49 aerial rammings."[27]

While the official military literature of the Great Patriotic War differs little from the popular press in its attitude toward the taran, the tone used in memoir literature is usually more somber with fewer

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[25]Kozhevnikov, *op. cit.*, p. 215.

[26]During the Viet Nam War there was a somewhat similar American focus on the heroism of men who died throwing themselves on hand grenades to shield their comrades, an act which clearly shares many of the features of the taran.

[27]"To Those Desiring a Career in Aviation," A. Mel'nikov, *Aviatsiya i Kosmonavtika,* March 1985, translated in USSR Report: Military Affairs, Foreign Broadcast Information Service, JPRS-UMA-85-042, 17 July 1985.

invocations of love of the Party and more mention of deaths. For example, in an account of fighter tactics during the Great Patriotic War,[28] Hero of the Soviet Union and Honored Military Pilot of the USSR, Col. Gen. Avn. G. Dol'nikov states:

> A great deal has been written about ramming in military literature. Intrepid pilots employed this device when there was no other option. A typical situation was running out of ammunition. In such a situation a combat pilot would deliberately attempt to collide with his adversary. He would attack the enemy aircraft's control surfaces and cables with his spinning propeller, and the enemy would go down. Frequently this was the last action our combat pilots took. But brave individuals would deliberately seek to ram and inflict irreparable loss on the enemy at the cost of their own life.

The Taran and Modern Strategic Air Defense

In 1980 *Air Defense Herald,* the official journal of PVO Strany,[29] began a feature under the rubric "Eternally in Combat Formation." The rubric refers to the Soviet practice of entering the names of heroes on the rolls of combat units.[30] The features consist of biographies of these heroes with expanded details of their

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[28]"Soviet Fighters in Battles for the Homeland," G. Dol'nikov, *Aviatsiya i Kosmonavtika,* April 1985, translated in USSR Report: Military Affairs, Foreign Broadcast Information Service, JPRS-UMA-85-046, 5 August 1985.

[29]PVO Strany (*Protivozdushnoy Oborony Strany,* usually translated as National Air Defense) was an independent service charged with the strategic air defense of the Soviet Union. PVO Strany controlled the interceptors, strategic SAMs, and radars dedicated to the strategic defense role. Although recent reorganizations have resubordinated PVO Strany assets in border military districts to the air forces of the military district, a PVO Strany organization continues to have an independent existence in the interior.

[30]In accord with Soviet security practices, the articles do not give the current unit designator of the air defense regiment that includes the individual on its rolls. The honor is extremely rare; only 34 such names exist on the rolls of PVO. Col. Gen. S. F. Romanov, "On Guard of the Air Borders," *Sel'skaya Gazeta,* 8 April 1984, translated in USSR Report: Military Affairs, Foreign Broadcast Information Service, JPRS-UMA-84-049, 29 July 1984.

heroic actions. A number of taran accounts are included in this series. These articles are interesting because the situations presented are not unlike situations that could occur in a modern strategic air defense.

One of the most interesting accounts in the *Air Defense Herald* series is that of Sr. Lt. I. M. Polyakov.[31] Polyakov's taran was carried out in June 1944, a period when tarans had become infrequent. The taran started with an extended chase of a Ju 88 reconnaissance aircraft that was returning to German lines from a deep penetration in the vicinity of Kiev. Polyakov and a wingman were scrambled from ground alert. Polyakov's wingman was disabled by fire from the Ju 88. The Ju 88 was damaged by Polyakov's fire but still flyable and attempted to escape in a steep dive. Polyakov received an order from the command post that he was to continue the pursuit and destroy the enemy at any cost. Within a few kilometers of the front, Polyakov expended the last of his La 7's ammunition (most variants carried the same armament as the La 5: two 20mm ShVAK cannon with 200 rounds per gun). At this point the chase was at low altitude. The article continues:

> The Soviet pilot had literally seconds in which to evaluate the situation and make a decision. The task remained unchanged--to execute the commander's order, to down the Hitlerite vulture. But how? Polyakov still had at his disposal a fearful weapon--the ram.... And so Polyakov, with complete awareness of his duty to the Motherland, decides to take the extreme measure. With the shout "For the Motherland, for the party! Goodbye, dear comrades!", he hurls his aircraft forward....

At low altitude, high speed and in the face of an apparently still active rear gunner, Polyakov could only carry out the taran by crashing the main body of his aircraft into the Ju 88; he was posthumously awarded the gold star of Hero of the Soviet Union.

The article on Polyakov has the notable feature that the order to carry out the destruction of the reconnaissance aircraft "at any cost" makes it unclear to what extent the taran was freely motivated. Since

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[31]Lt. Col. A. Mironenko, "As Compelled by Duty...", *Air Defense Herald,* No. 1, January 1980, translated as *Antiaircraft Defense Herald,* No. 1, January 1980, Foreign Science and Technology Center, U.S. Army, FSTC-HT-1089-80, pp. 142-147.

the article appeared in *Air Defense Herald,* the PVO Strany audience might be particularly sensitive to the implication that the taran was ordered from the ground. There is reportedly a general presumption in PVO Strany that a taran would be ordered by a ground controller if it was the only way to destroy a penetrating aircraft. We know something of the attitudes within PVO Strany pilot ranks from the testimony of Victor Belenko,[32] the FOXBAT pilot who defected with his aircraft:

> ....were the Soviet Union attacked, most Soviet pilots would fight ardently and to the best of their ability to defend not communism necessarily but their Mother Country, to which they are spiritually bound, however ill it may have served them. In his opinion, the large majority of Soviet pilots, if ordered, actually would ram hostile aircraft. With luck they might eject and survive as heroes; without it they would die as heroes, and their families would not suffer. Should they disobey an order to ram, they would be imprisoned and their families would suffer grievously.

At the time of Belenko's training and service in PVO Strany, low altitude penetration tactics had neutralized much of the missile armament of the then current generation of Soviet interceptors. Moreover, many of the FISHPOTS and FLAGONS then in the inventory did not carry gun armament (a lack later corrected by retrofitting gun pods). It is not surprising that the ramming tactic might have been mentioned frequently.

In fact, there is an emigre story that a taran was carried out in peacetime against a border violator. One version of the story has a Turkish F-4 entering Soviet airspace. A FLOGGER was sent to intercept. The FLOGGER was unarmed and was ordered to ram by a ground controller. The ram was carried out, and the Soviet pilot was killed. The incident allegedly occurred in 1973, but there is no record of it in either the western or Soviet press.

In addition to articles exclusively devoted to tarans, tarans are described in publications that address the entire range of air combat techniques.[33] It is a reasonable inference that the taran is still

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[32] John Barron, *MiG Pilot: The Final Escape of Lieutenant Belenko,* New York: McGraw Hill, 1980, p. 189.

[33] For example, *Taktika v Boyevikh Primerakh: Eskadrilya-Ekipazh (Tactics in Combat Examples: Squadron-Crew),* Y. I. Maslennikov, Voyennoye

thought of as an infrequently employed but still possible technique of air combat.

There are practical reasons why PVO Strany should continue to recall the taran. Despite major changes in the technology of interceptors and bombers, the strategic air defense against an American bomber attack would share many features of the bomber/fighter duel of the Great Patriotic War. The attacking bombers would penetrate individually, the large number of targets would force the air defense to dispatch only one or two interceptors to deal with each penetrator, and the ability of the interceptors to destroy bombers may be limited.

The end-game encounter of a modern interceptor with a bomber may be as difficult as the end-game of the Great Patriotic War. The weapons of a modern Soviet interceptor include radar-guided air-to-air missiles (AAMs), infrared AAMs, and cannon; each of these weapons is less than perfect. The radar-guided AAMs would generally only be useful against a low-altitude penetrator in a head-on engagement in which high closing speeds, together with electronic counter measures, might prevent launch of the AAM within required engagement parameters. The infrared AAMs are susceptible to decoys. The gun attack has a number of difficulties: despite the huge size of a strategic bomber, it is no mean feat of marksmanship to hit a maneuvering bomber at low altitude. Moreover, even hits from the gun or AAM detonations near the bomber may not produce a prompt lethal effect. It is not totally improbable that an interceptor pilot with all armament expended could find himself in the vicinity of a penetrating bomber with no time to wait for help, leaving only a single attack method, the "exceptional instance" of a taran. As Marshal Pokryshkin has pointed out:

> Such exceptional cases are possible also in the future, particularly as an enemy bomber could be carrying nuclear weapons and threaten to destroy a strategic industrial installation or administrative center with many millions of people.[34]

Izdatelstvo, 1985. The foreword to this book is by HSU Mar. Avn. G. Zimin, an authority on Soviet air tactics and the author or editor of a number of official handbooks. His association with the book attests to its orthodoxy. In the section of the book on the tactics of the lone fighter and the pair, a taran is described which involved a single fighter against a single bomber.

[34]Pokryshkin interview, op. cit., p. 49.

The taran was always a desperate and "exceptional measure." In the Great Patriotic War, the taran permitted brave men to exact a cost despite near-disarming tactical, organizational, and technological shortcomings of the Soviet Air Force. As these shortcomings were remedied, the taran gradually disappeared into the literature of the war. The literature of the war is understandably fascinated with the sacrifice of the taran, both for its demonstration of raw heroism and its ability to reinforce messages of national unity and party leadership. Even more interesting and operationally significant, is the mention of the taran in the setting of a modern strategic war. The modern strategic air defense shares many of the conditions that gave rise to tarans in the Great Patriotic War. With all of the improvements of the modern air defense, a strategic air war could produce situations in which single interceptors with all armament expended could encounter strategic bombers carrying nuclear weapons. There is no doubt that the Soviet authorities expect the interceptor pilot to understand that such an exceptional instance would, yet again, demand an exceptional measure, the taran.