

Chapter IV-2: The Soviet Personnel and Equipment Resource Database

In this section the methodology detailed in the Part II 'The Structure of the 1941 Soviet and Axis Resource Database' will be used to analyse the weapon systems available to the Red Army and Air Force (VVS) in 1941.

Obviously not every single weapon subsystem will be analysed, but all the primary weapons available in the key categories are included. Where several weapon models existed for a particular weapon category, the most common weapon in service over the campaign period is used. For example, in the category of 122mm howitzers, the Soviets had the 122mm M1910/30, 122mm M1909/37 and the new 122mm M1938 (M-30) howitzers in service as divisional artillery. Although the 122mm M1938 (M-30) howitzer became the regular divisional howitzer later in WWII, the vast majority available throughout 1941 were the older 122mm howitzers. Therefore the 122mm M1910/30 is used in the 122mm howitzer category for 1941.

There are many publications available on Soviet WWII weapons. In this section we will not attempt to replicate the history and description of these weapons as detailed in many of these works. A brief description is included for readers unfamiliar with some of these weapons. However, we will be taking all the relevant technical data from multiple sources and presenting this here for detailed analysis. All this information is presented in tables [Sov Res Database 1, 2 and 3](#). As such, tables [Sov Res Database 1, 2 and 3](#) can be seen as a summary of the huge amount of technical information available on these weapons. Tables [Sov Res Database 1, 2 and 3](#) present the information under three major subheadings, which are: Soviet Non-Mobile Weapon Systems and Squads (Stationary, Towed, or Carried Weapons and Squads), Soviet Land Based Motorised Mobile Fighting Machines (MFMs), and Soviet Aircraft. [Sov Res Database 1, 2 and 3](#) also include the calculations relating to the Overall Combat Power Coefficients (OCPC) and the specific combat attributes for each weapon system or database unit.¹

Soviet Light Infantry Weapons

Machine Guns

The Soviet standard Light Machine Gun (LMG) in WWII was the 7.62mm DP1928 and the standard Medium Machine Gun (MMG) was the old 7.62mm Maxim1910.²

The DP1928 was designed by Vasily A. Degtyarev from 1921 to 1926. It was air cooled, used a gas operated action, a 47 round cylindrical drum magazine and had a cyclic rate of fire of 550 rpm. The DP 1928 was simple to operate, extremely robust and had only six moving parts. In terms of overall firepower it was similar to most magazine fed LMGs of the day, but was an inferior weapon to the British Bren LMG and the German MG34.³ The DP 1928 became the standard Soviet infantry squad LMG from 1928 and remained so during WWII. [Sov Res Database 1](#) reveals an OCPC value for the DP1928 of 5.37, which is 63% of the MG34 value.⁴ In practical terms this was one of several reasons why Soviet infantry squads (and their Western Allied equivalents) had

¹ Refer to Part II-The Structure of the 1941 Soviet and Axis Resource Database, for details on how to calculate a weapon system or squad's OCPC and its specific combat attributes such as AT, Anti personnel or AA values etc.

² Note, for the purposes of our study, the 7.62mm Maxim1910 MG is called an MMG, and the 12.7mm DShk 1938 MG a HMG or AAMG. The 12.7mm DshK 1938 HMG is considered under the section on anti aircraft machine guns as this was its primary use in 1941.

³ The Bren guns was a Czechoslovakian design, designated ZB 30 and taken to England in the 1930s. The ZB 30 was redesigned to take British .303 rounds and designated ZB33. The Bren was a direct copy of this weapon. The German MG34 was their standard light squad weapon until the MG42 arrived. As such it is directly comparable to other squad LMGs. However the MG 34 created the term General Purpose MG (GPMG), and some publications classify it as a GPMG or even a HMG, avoiding a direct comparison with other LMGs.

⁴ Refer Part V, Chapter 2, 1. – 'The German Fully Integrated Land and Air Resource Model-The German Personnel and Equipment Resource Database- German Light Infantry Weapons'.

considerably less fire power than their German counterparts.⁵ A modified version of the DP1928, the DT or *Degtyarev Tankovii*, was mounted in tanks. The DT had a 60 round magazine, a telescopic butt, pistol grip and a heavier barrel which was not quickly changeable. Otherwise its ballistic characteristics were unchanged.

The Maxim1910 dated back to a demonstration of the basic design by Hiram Maxim at St Petersburg in 1887. The Tsar's army used British made Maxims, until production started in 1905 in Russia at the Tula Arsenal. The Model 1910 was basically unchanged except for a corrugated steel jacket replacing the original cast bronze water jacket, enlarging the filler cap and some minor changes to the feed mechanism. The Maxim 1910 was very reliable but was an extremely heavy and cumbersome gun. To assist mobility, the Russians developed a special mounting called the *Sokolov* mounting. This consisted of a tubular steel trailer with wheels, which enabled two men to pull the gun forward into firing position. Overall the Maxim 1910 was a WWI vintage weapon, inferior to most equivalent weapons by the start of WWII. However, for want of a better weapon and to ensure uninterrupted manufacture, production continued until 1945. The Maxim 1910 remained the most common Soviet MMG until wars end. The data in table **Sov Res Database 1** shows that in terms of combat power the Maxim 1910 was very similar to the bipod mounted MG34 LMG and considerably inferior to the tripod mounted MG 34 (72% of the HMG34's OCPC value). Like the LMG equipped rifle squads, this meant that Soviet MG companies had significantly less firepower than their German equivalents.⁶ It should be noted however that the Maxim 1910 was comparable to the British Vickers Mk1 and the US water cooled Browning M1917 in most respects, with the exception of the Maxim's inordinate weight.

Small Arms

Rifles

The standard Soviet bolt action rifle in WWII was the 7.62mm Model 1930G. It is sometimes called the 1891/30 and was based on the Mosin-Nagant Model 1891. The rifle was originally designed by the Belgian Nagant brothers, and modified by Colonel S.I. Mosin. The original 1891 model was a long weapon and was partnered by the slightly shorter 'Dragoon Rifle'. In 1931 the Soviets introduced the 1930G, which was essentially the Dragoon Rifle with improved sights and design modifications to increase production efficiency. In most respects the Model 1930G rifle was comparable to other countries' contemporary bolt action rifles.

Sub-Machine Guns

The predominant Sub-Machine Guns (SMGs) in service with the Red Army in WWII were the 7.62mm PPD 1940G, PPS-42 and the ubiquitous PPSH-1941G. The PPD (*Pistolet-Pulyemet Degtyarev*) or Machine Pistol designed by Degtyarev, was based on the German Bergmann design of 1928. However production was small by Soviet standards and only lasted from the autumn of 1940 to late 1941. The PPS was designed by A.I. Sudarev, and was also adopted during WWII. It arose out of the besieged city of Leningrad in 1942, and was cheaper and simpler than contemporary Soviet SMGs. However, due to mainly political reasons the weapon never went into mass production and relatively few were made.

⁵ The superior firepower of the MG34 and MG 42 is very carefully simulated in most sophisticated tactical or tactical/operational level military simulations such as Talonsofts "East Front", SSIs "Steel Panthers" or HPS Simulations "Tigers on the Prowl". However, for some mysterious reason this same superiority is ignored in many operational level simulations, and all infantry squads are often treated as equal and generic units.

⁶ As for LMGs, this difference is carefully simulated in sophisticated tactical or tactical/operational level military simulations and completely underestimated or ignored in many operational level simulations. In this case MMGs and HMGs are treated as generic weapons and any differences are often ignored when the combat values for whole MG Companies or Battalions are 'calculated'.

During WWII the Soviets put into service approximately 5 530 000 SMGs, of which approximately 5 000 000 were the famous PPSH-1941G.⁷ The PPSH (*Pistolet-Pulyemet Shpagin*) was developed in 1940/41 as a replacement for the PPD, as the PPSH was easier to mass produce. The PPSH was one of the few Soviet small arms which had a higher overall combat power compared to the equivalent German weapon, namely the MP (*Maschinenpistole*) 38/40. This is reflected in the higher WCPC values for the PPSH-1941G shown in **Sov Res Database 1** compared to the MP 38/40 (116% of the MP 38/40 WCPC value).

The principal reason that the Soviets produced such huge numbers of SMGs was not specifically to increase the short range firepower of their average rifle squad, although this was the overall result. It was more to ensure that the average rifle man actually had a firearm at all. Generally WWII SMGs, and particularly the Soviet PPSH and PPS SMGs, were cheaper and much easier to produce than rifles. This was due to the fact that it is much easier to produce a short and imprecise SMG barrel than a reasonable quality rifle barrel. To produce a high quality rifle barrel requires longer precision lathes and is relatively labour intensive. For example, old and reserve Mosin-Nagant rifle barrels were usually cut in half to make two 'new' PPSH SMG barrels.⁸ The Soviet SMGs had non-existent finishing, and rough welds and grinding marks were common. They were nonetheless excellent weapons, and later in WWII large combat units were often entirely equipped with them. Another example of cheap SMGs during WWII was the British Sten gun: a weapon that was produced in the millions and at a cost of less than 2.87 pounds per gun. However, infantry squads purely equipped with SMGs are sometimes at a serious tactical disadvantage, mainly due to the very short effective range of these weapons (refer SMG Squads below).

Side Arms

The 7.62mm Nagant Model 1895 revolver was the standard Red Army sidearm in WWII. It dated back to the imperial Russian government, which adopted the weapon in 1895 and purchased the patent rights in about 1901. Consequently, manufacture was carried out at the Tula arsenal and the Model 1895 revolver went on to equip soldiers in the Tsarist as well as the Red Army. A more powerful and modern pistol, the 7.62mm Tokarev Model TT33, was also issued in WWII. The Model TT33 was never produced in large numbers, with the Soviets preferring to issue those soldiers normally eligible for a sidearm with cheaper and easier to make SMGs.

Hand Grenades

We now come to the last light infantry weapon considered here, which is the hand grenade. There are two main types of hand grenade, normally classified as 'offensive' or 'defensive'.⁹ An offensive grenade is used in the attack, by a man who is running forward. He needs to throw the grenade ahead and not have to seek heavy cover. Therefore the grenade should have a localised effect and not blast chunks of metal back at the man that threw it. Such a grenade needs a lightweight casing which breaks into tiny fragments that don't carry long distances. The offensive grenade derives most of its effect from the blast of the explosives. The defensive grenade on the other hand is for use by a man holding a position. In this case the defender has available cover after throwing the grenade. A good defensive grenade needs to generate maximum possible lethal fragmentation over a large area. In this case a heavy casing is used which breaks into large lethal fragments, and less explosive is required.

The standard Soviet offensive hand grenade in 1941 was the Model 1914/30 stick hand grenade. This grenade was originally a product of WWI but was improved in 1930. It weighed

⁷ G.F. Krivosheev, et al, *Soviet Casualties and Combat Losses in the Twentieth Century*, Edited by Colonel General G.F. Krivosheev, (*Kandidat* of military Science), Greenhill Books, London, 1997. p. 247. Also I.V. Hogg, *Infantry Weapons of WWII*, Saturn Books Ltd, London, 1997, p. 59.

⁸ I.V. Hogg, *Infantry Weapons of WWII*, Saturn Books Ltd, London, 1997, p. 58.

⁹ This classification was adopted by the French in 1916, and has remained the standard.

0.595 kg and used a 'fly off handle' igniter. A segmented fragmentation sleeve was sometimes available to convert it into a more lethal defensive type. Although common in 1941, stocks rapidly dwindled and the Model 1914/30 grenade was soon replaced by grenades that were easier to mass produce.

The standard Soviet defensive hand grenade in 1941 was the F-1 fragmentation egg hand grenade. In appearance this grenade resembled the well known Mills pattern, with a serrated body and an external handle and safety pin, although the action was quite different. The F-1 weighed 0.566 kg, but had only 0.045kg of TNT filler. Later in WWII, the similar RTD 1942 grenade replaced the F-1 to become the standard grenade for the Red Army.

Soviet Squads Equipped with Light Infantry Weapons

During WWII the infantry (or Soviet rifle) squad was normally the smallest tactical manoeuvre unit on the battlefield. The squad usually had 6-14 men (normally around 10 in an infantry squad), with a leader, independent equipment and ammunition, and (in some armies) individual communication. The term 'section' is sometimes used to describe the same unit, or sometimes a half squad. For our purposes a section will be used to describe a half squad. The crew of individual heavy weapons larger than a HMG were also similar in size to a squad, and were able to function similarly.

In Part 2 'The Structure of the 1941 Soviet and Axis Resource Database', the principal types of rifle or infantry squads are simulated separately. The following table shows the different rifle squad types best able to represent the various TOEs of different Soviet land combat units in 1941.

Soviet Light Infantry Weapon Equipped Squads	
Squad Type	Unit Content, (Definition)
	'x man' means +or - 4 men in a Squad, but most commonly x
Rifle Squad	11-12 man squad with DP 1928 LMG.
Rifle Squad (SMG)	11 man squad, all with sub machine guns (PPD 1940G or PPSH-1941G).
Light Rifle Squad	11-12 man squad with no LMG, or 10 man chemical defence squad with no LMG.
Motor Cycle Squad	8 man motorcycle squad and DP 1928 LMG (includes motorcycles).
Cavalry Squad	12 man mounted squad and DP 1928 LMG (includes riding horses).
Irregular Squad	10 man militia squad with no LMG, or 10 man construction squad with no LMG.
Light Eng Squad	2x9 man engineering squads with no LMG, or 10 man flame thrower squad.
Ferry Bridging Squad	5 man bridging eng squad with no LMG and 18m of (3 Ton) pontoon bridge section.
Military Police Squad	5 man NKVD squad with no LMG.
Rail Repair Squad	5 man rail construction and repair squad with no LMG.

Following a review of the Soviet ground combat unit TOEs in 1941, the following small arms are considered to be in each type of Soviet squad shown above. These numbers of small arms are used in calculating the squad's Overall Combat Power Coefficient (OCPC) values shown in table

Sov Res Database 1.

Soviet Light Infantry Weapon Equipped Squads						
Squad Type	Small Arms Distribution in Soviet Rifle Squads					
	Pistol	Rifle	SMG	LMG	Off Grenade	Def Grenade
Rifle Squad	2	11		1	10	10
Light Rifle Squad	2	12			10	10
Rifle Squad (SMG)	2		11		10	10
Cavalry Squad	2	6	4	1	10	10
Motor Cycle Squad	2	4	2	1	10	10
Light Eng Squad	1	16	2		20	20
Ferry Bridging Squad	1	5			5	5
Military Police Squad	2	3	2		5	5
Irregular Squad	1	10				5
Rail Repair Squad	1	5				

The above table does not represent an absolute or fixed numbers of small arms issued to each type of Soviet squad in 1941. It represents the most common number and type of small arms present, given the varying TOEs for different types of combat unit and the overall availability of equipment during 1941. In addition, the squad types above include a small number of pistols, SMGs, and rifles issued to platoon and company HQs controlling the individual squads. For example, let us consider the Soviet 1941 rifle squad.

The *Shtat* (or TOE) 04/401 for a rifle regiment in an April 1941 rifle division, indicates a rifle squad had two NCOs and ten enlisted men, armed with one LMG, one sniper rifle, nine rifles and one rifle grenade launcher.¹⁰ An alternative source states the same rifle squad consisted of one NCO and ten enlisted men, armed with one LMG, one pistol, two SMGs and eight rifles.¹¹ Both sources indicate the rifle platoon HQ (controlling four rifle squads) also had 2-3 men armed with pistols and rifles. Given that the Soviet only had approximately 100 000 SMGs in service in June 1941 and only received a similar number in the remainder of 1941, it means the Soviets didn't have sufficient SMGs in 1941 to fill their SMG requirements in SMG squads, security units etc (refer Soviet FILARM model, Parts IV 6. 21 and IV 7. 17).¹² Almost all available SMGs went to alternative squad types in 1941, leaving only pistols and rifles in the rifle squads.

In July 1941 a new reduced rifle division *Shtat* 04/600-616 was issued. The rifle regiment *Shtat* 04/601 now called for two types of rifle squad, each with two NCOs and nine enlisted men, (11 men). The 'new' rifle battalion now had half its rifle squads equipped with LMGs and rifles, while the remainder had only rifles.¹³ The rifle squads with no LMG are termed 'light rifle squads' in the squad types listed above.

In October 1941 the Soviet issued new *Shtat* 04/730-744 to form separate rifle brigades. *Shtat* 04/740 also called for the brigade's rifle battalions to have rifle and light rifle squads, but each now had two NCOs and ten enlisted men (12 men). In addition, the rifle brigade's rifle platoons each had ten SMGs in their TOE (which equates to an average of 2.5 authorised SMGs per squad).¹⁴

¹⁰ C.C. Sharp, "Red Legions", Soviet Rifle Divisions Formed Before June 1941, Soviet Order of Battle WWII, Volume VIII, George F. Nafziger, West Chester OH, 1996, p. 104.

¹¹ S.J. Zaloga, L.S. Ness, Red Army Handbook 1939-1945, Sutton Publishing, Stroud, UK, 1998, p. 8, table 1.2.

¹² G.F. Krivosheev, et al, Soviet Casualties and Combat Losses in the Twentieth Century, Edited by Colonel General G.F. Krivosheev, Greenhill Books, London, 1997. p. 246, Table 95.

¹³ C.C. Sharp, "Red Tide", Soviet Rifle Divisions Formed From June to December 1941, Soviet Order of Battle WWII, Volume IX, George F. Nafziger, West Chester OH, 1996, p. 118.

¹⁴ C.C. Sharp, "Red Volunteers", Soviet Militia Units, Rifle and Ski Brigades 1941-1945, Soviet Order of Battle WWII, Volume XI, George F. Nafziger, West Chester OH, 1996, p. 96. Also, S.J. Zaloga, L.S. Ness, Red Army Handbook 1939-1945, Sutton Publishing, Stroud, UK, 1998, p. 37, table 1.13. Two SMGs were authorised for the Platoon's officer and NCO in the Platoon HQ, controlling two rifle and two light rifle squads.

However, given that rifle brigades were near the bottom of the ladder in terms of issued equipment, and given the chronic shortage of SMGs throughout 1941, it is very unlikely that many rifle brigades were issued with SMGs in 1941.

From the above we can see that the number and equipment in a typical rifle squad varied in 1941. However, the variation was relatively small and the typical rifle squad was most likely as shown in the tables listed above.

It is worth considering briefly the differences between a typical rifle squad and a rifle squad equipped purely with SMGs. In 1941 the rifle squad (SMG) was relatively rare in the Red Army, but this would change progressively from year to year as huge numbers of cheap SMGs became available.

Some authorities, and a few tactical level simulations, attribute WWII squads equipped entirely with SMGs with considerably higher firepower than was historically the case. The idea simply being that they could collectively lay down a much more intense rate of fire. The reality was unsurprisingly different: the SMG armed squad only had a tactical advantage in specific tactical situations. The WWII SMG was a very short range automatic weapon, i.e. it was not an assault rifle! It typically had a muzzle velocity marginally greater than military pistols of the day, and an accuracy to match. At ranges over 100m there was wide dispersion, and firing at ranges over 200m was usually a waste of ammunition. The German term '*Maschinenpistole*' was in fact a much more accurate description of functionality than 'sub-machine gun'. An SMG armed squad had a tactical advantage in the final phase of a close assault where SMGs could be fired while on the move, during close combat in dense urban or forest terrain, or in the hands of troops with limited marksmanship skills. Infantry equipped with SMGs received very limited benefit from being great marksmen and hence were easier to train and get to the front. In many other tactical situations having only SMGs was a very severe handicap. In any open or mixed terrain, an enemy equipped with accurate rifles or a LMG had a huge advantage. They could inflict fatal damage on any SMG squad without danger of effective return fire until the range was considered virtually point blank for a rifle and any half decent marksman. A SMG squad could be pinned down and picked off by a single sniper because they had to get very close to even supply covering fire. A predominantly rifle equipped squad with a LMG and 1-3 SMGs, was definitely a more balanced unit capable of a much wider range of tactical missions.

Finally, it is worth mentioning the relative shortage of hand grenades and other demolition devices available to most Soviet squads during 1941. It is known that every Front in the Red Army in 1941 suffered a relative shortage of grenades and a chronic shortage of mines, although no detailed figures on available hand grenades has been found.¹⁵ For the purposes of this analysis it is assumed that the average Soviet squad (that is in supply and likely to be used in direct combat) was equipped with at least 20 hand grenades, while the average engineer-sapper squad had around 40 hand grenades. By the supply standards of the British and US armies in WWII, this would be considered minimal supply. However, for the Soviet rifle squads in 1941 this estimate is on the generous side and it is highly probable that many Soviet squads, including engineer-sapper squads, had no grenades or mines available in 1941.

In early 1941 the Red Army had around 1 000 000 anti tank mines at its disposal, but lacked any delayed action or other types of mine. The Red Army estimated at this time that it would need at least 2 800 000 anti tank, 4 000 000 anti personnel, 120 000 delayed action and 350 000 trip mines, for a six monthly period of operations.¹⁶ The production of the outstanding mines simply never occurred in 1941, and given the changing Soviet priorities before and then after June 1941, it is hardly surprising. It does explain why Soviet minefields do not commonly figure in German

¹⁵ J. Erickson, *The Road To Stalingrad*, Phoenix Orion Books Ltd, London 1975, p. 232.

¹⁶ J. Erickson, *The Road To Stalingrad*, Phoenix Orion Books Ltd, London 1975, p 72.

combat reports from 1941 and why they were not the problem for the Wehrmacht that they would become in later years. Part of the difference in the overall combat power between German pioneer (sapper) squads and Soviet engineer squads shown in table [Sov Res Database 1](#), is due to the availability of mines and similar equipment. The shortage of mines in the Soviet forces during 1941 is either not well known or ignored in almost all current military simulations relating to Operation Barbarossa. In many simulations the Soviet forces are generally able to lay mines as effectively in 1941 as in 1944-45. It is interesting to note that the positions fortified after June 1941, such as Moscow itself, would have had relatively few minefields in 1941. This would have been the case even after several months of preparation.

Heavy Infantry Weapons

Anti-Tank Rifles

The two types of Soviet anti-tank (AT) rifle available in WWII were the 14.5mm PTRD 1941 and PTRS 1941. The PTRD 1941 was designed by Degtyarev and was capable of penetrating 25mm of vertical non-face hardened homogeneous armour at 500 metres. The PTRS, developed at the same time as the PTRD, was designed by Simonov. It was a more advanced design than the PTRD, but was less robust as well as being heavier and larger. Relatively few PTRS were manufactured and when it became apparent the PTRD could reliably do the job, manufacture of the PTRS ceased.

The PTRD 1941 became available in July-August 1941 and so was included in the *Shtat* for the new rifle division structure, issued on 29th July 1941. This called for the three rifle regiments in the division to each have an AT rifle platoon, each with six AT rifles. However, although some 17 700 AT rifles were produced before this date, no ammunition had been produced for them. Thus AT rifles did not become 'general issue' in the Red Army until November 1941.¹⁷

By mid 1941, most of the world's armies had already decided the AT rifle was essentially an obsolete concept. The average tank's armour had progressed to the point where AT rifles were becoming relatively ineffective, even at close range. In addition, the nature of infantry vs. tank combat was such that infantry often didn't survive the contact unless they quickly delivered a seriously damaging or fatal blow to the tank. If the tank was well designed and the crew knew what they were about, the infantry didn't get time to repeat their effort. AT rifle ammunition rarely destroyed a tank even if the armour was penetrated, which meant the tank's crew were often left with an operational vehicle with which to neutralise the AT weapon. In short, using relatively ineffective AT weapons was very expensive in terms of personnel casualties. By late 1941 the Germans had started withdrawing their *Panzerbuchse* 38 and 39 AT rifles permanently from service, even though their penetrative performance at close range (less than 350 metres) was similar to the Soviet weapons.

Despite all this, the 14.5mm PTRD 1941 continued to be produced in large numbers until war's end and remained the Soviet rifleman's standard AT weapon until 1945. In all, some 471 500 were received during WWII, including 37 700 manufactured as late as 1944.¹⁸ When other army's infantry were using all sorts of lethal AT rockets with hollow charge warheads, the Red Army soldier had to make do with trying to get a lucky shot at any exposed tank crew or through one of the vision devices. The failure of the Soviet authorities to even research and develop serious infantry AT weapons during WWII (especially after 1943), is a disturbing indictment of the apparent willingness of the Soviets to sacrifice personnel. German panzer crews always considered the PTRD 1941 to be a 'dangerous nuisance' because the AT rifle usually inflicted non-fatal

¹⁷ C.C. Sharp, "Red Tide", Soviet Rifle Divisions Formed From June to December 1941, Soviet Order of Battle WWII, Volume IX, George F. Nafziger, West Chester OH, 1996, p. 119.

¹⁸ G.F. Krivosheev, et al, Soviet Casualties and Combat Losses in the Twentieth Century, Edited by Colonel General G.F. Krivosheev, Greenhill Books, London, 1997. p. 247, table 95. The authors have the gall to call these 'AT rocket launchers' in this table.

damage and due to the sheer number they encountered. However, considering that 214 000 Soviet AT rifles were lost in combat during WWII, mostly with their two man crews, the Soviet soldier paid a horrendous price to be a dangerous nuisance instead of a lethal anti-tank force.¹⁹ There was one thing that Soviet and Western Allied tank crews never thought, and that was that a German infantryman armed with a *Panzerfaust* or a *Panzerschreck* was a mere nuisance.

Anti-Tank Guns (AT Guns)

The Soviet standard issue AT Gun in 1941 was the 45mm M1937 gun. It was a derivative of the German Rheinmetall 37mm PaK 36, which were initially purchased and were then manufactured in the Soviet Union under license as the 37mm M1930 AT gun. The Red Army desired a larger caliber so the 37mm gun was modified to take the barrel of the standard Soviet 45mm M1934 L/46 tank gun (46 calibre barrel length), which was then designated the 45mm M1937.

The 45mm M1937 had a weight in action of 560kg and could penetrate 35mm of 30deg sloped homogeneous armour at 500m, and 28mm at 1000m, using its standard AP shot.²⁰ This meant it could penetrate 6mm more armour at 500 and 1000 metres than the German standard issue 37mm Pak 36 L/45 gun.²¹ However, the Soviet gun was 128kg heavier in action, had a slower rate of fire and had inferior optics. Fire control effects meant the maximum effective anti-armour range of both weapons was around 750 meters. In addition, at ranges beyond 500 meters the 37mm Pak 36 was more likely to acquire and hit a small moving target, despite having a shell with less mass and hence less repeatable accuracy over longer ranges.²² Nevertheless, table **Sov Res Database 1** shows that the 45mm M1937 AT gun had a considerably higher overall combat power compared to the standard German AT gun in 1941 (the OCPC for the 45mm M1937 AT is 113% of that for the 37mm PaK 36). This was largely due to the ability of the Soviet gun to fire a more useful high explosive round, and the OCPC calculation is based primarily on lethality to personnel.

In 1941 the Soviets were developing the potentially excellent 57mm M1941 AT gun with performance approaching that of late war medium AT guns. The 57mm M1941 had a very long barrel length of 73 calibres and could have been the best light/medium AT gun in the world in 1941. In test firing it could penetrate 86mm of 30deg sloped homogeneous armour at 500m and 78mm at 1000m, using solid AP shot. The weight of the gun in action was 1 125 kg, which was only 139 kg heavier than the German 50mm Pak 38 while possessing a considerable superiority in anti-tank capability.

The 57mm M1941 was rushed into production from May 1941 but, fortunately for Axis armour, production ceased after only 320 had been produced.²³ There were several reasons for this. The gun proved to have major technical problems relating to accuracy and shot stability. The story goes that the original barrel rifling was calculated with mathematical errors! In parallel to this a disagreement broke out among the Red Army's leaders over the purported thickness of German tank armour, which was grossly overestimated. The Soviets preferred to concentrate on the 85mm and 107mm guns which never materialized as AT guns. Finally, production was severely disrupted by the German invasion and a 'corrected' model wasn't produced until 1943, designated the 57mm M1943 (ZiS-2). Interestingly enough the weight in action of the 57mm M1943 (ZiS-2) had

¹⁹ Ibid.

²⁰ Throughout this book, 'degree of slope' refers to slope from a vertical position. The same angle is then the angle of incidence of an incoming round for a gun shooting in a horizontal plane, and ignoring any downward component of the resultant trajectory.

²¹ The 37mm Pak 35/36 could penetrate 29mm of 30deg sloped homogeneous armour at 500m, and 22mm at 1000m, using its standard solid AP shot. Note some sources give the 37mm Pak 36 a penetration of 36mm at 500m in the above conditions, so caution should be used.

²² This is particularly irksome in tactical/operational simulations where the 45mm M1937 is given effective AT combat ranges over 1000metres and the 37mm PaK 36 is not, i.e. the effects of optics and fire control are ignored.

²³ S. J. Zaloga, L. S. Ness, Red Army Handbook 1939-1945, Sutton Publishing Ltd, Stroud, UK, 1998, p. 199.

increased to 1 250 kg, which suggests there were also problems with the strength of the gun carriage on the 1941 model.

At this point it is necessary to digress and discuss a key difference between the Soviet and German philosophy relating to AT weapons. This was in the area of combining the roles of AT guns and artillery.

The German Army believed the AT gun should be dedicated primarily to the task of destroying enemy tanks and was not artillery in the traditional sense. They believed artillery was unsuitable and generally too valuable, in terms of carefully trained personnel and specialist equipment, to use tactically as AT weapons, and should only be used in this role if nothing else was available. Thus although AT ammunition was produced for most light and medium artillery pieces, the German tactical doctrine meant that they normally only committed their artillery (including Flak guns) to engage enemy armour if no other suitable or effective AT weapons were available.

The Red Army adopted the idea that although dedicated AT forces should be available, light, medium and even heavy artillery (field guns), should normally be issued with AT ammunition and be tactically available to stop enemy armour as required. The Soviets viewed artillery (especially light artillery) as having a dual AT and artillery role. This philosophy may have been the main reason the Red Army neglected the dedicated AT arm, relative to the tank and artillery arms, in terms of AT weapon development during WWII.

The result was that throughout WWII Soviet light divisional artillery, in particular the 76mm divisional guns, were often used in the artillery and AT role. Throughout 1941 the Soviets used their 76mm divisional guns in the AT role in all types of rifle divisions. This includes divisions deployed in June 1941 and newly mobilised divisions. However, the divisions deployed in June 1941 had 54 dedicated AT guns in their TOE, while those mobilised after July 1941 only had 18 dedicated AT guns. All types of rifle division retained 16 76mm guns in their artillery regiments. Obviously the newly mobilised rifle divisions were expected to use their 76mm guns to bolster the weak divisional AT forces, which was part of their tactical doctrine. This meant newly mobilized rifle divisions only had 8 122mm howitzers as 'dedicated' artillery and 16 76 mm guns trying to be artillery and AT guns at the same time. The Soviets were trying to "have their cake and eat it".

In addition to the large formations above, the 76mm gun also went into dedicated AT brigades and regiments in 1941. Between June and December 1941, 73 new small AT regiments were mobilised in 1941, using up 288 45mm AT guns and 918 85mm Anti Aircraft (AA) guns as AT guns. These were small regiments with 16-20 AT guns each. They initially used 45mm AT guns and 85mm AA guns. In October 1941, the AT regiment TOE called for 20 76mm field guns. One new AT Regiment had this TOE when formed and nine others used replacement 76mm guns to convert to this TOE.²⁴

Apart from using heavy artillery in the direct fire AT role, which is very expensive and not a good idea, the main problem was that the Soviet 76mm divisional guns were all designed as a light artillery pieces, and were always better field guns than AT guns. For example, consider the following. In 1941 the main Soviet 76mm divisional guns in service were the old 76mm M1902/30 L/30 (1320kg weight in action), the modern 76mm M1936 (F-22) (1620kg) and the modern 76mm M1939 (USV) (1480kg). Against homogeneous armour plate sloped at 30 degrees and using standard AP shot, these guns could penetrate 47mm, 58mm and 56mm at 500 metres, and 41mm, 54mm and 49mm at 1000metres, respectively. For the German 50mm PaK 38 L/60 (986kg weight in action) the same test firing figures are 59mm and 48mm, using standard Pzgr 39 AP shot. On top of this the 50mm PaK 38 had superior optics and fire control against small moving targets, a much

²⁴ Zaloga, S.J. Ness, L.S. Red Army Handbook 1939-1945, Sutton Publishing, Stroud, UK, 1998, p. 119-121, table 4.1.

lower silhouette for concealment, and a considerably higher rate of fire. On the other had the PaK 38 wasn't much use as artillery for which it was never designed.²⁵

From June to December 1941 and the whole of 1942, the Soviets lost a staggering 12 300 and 10 100 76mm guns respectively. This total reached 44 000 76mm guns by war's end. In the same period the figures for 45mm and 57mm AT gun losses were 12 100, 11 500 and 42 400.²⁶ In other words more light divisional artillery pieces were lost than AT guns, and in all probability most were lost fighting German armour. The total German fully tracked AFV losses on the East Front in WWII amounted to approximately 33 000, and around half of these were lost to Soviet AT guns and artillery (including AA guns). If we assume around 85% of the dedicated Soviet AT guns and 65% of the 76mm guns were lost fighting German armour in WWII, it means the Soviets lost an average of four guns (and most likely a large portion of their crews) for every fully tracked AFV they destroyed. This is before we consider the other 17 500 medium and heavy artillery pieces, and 8 000 AA guns, lost on the East Front in WWII, of which a significant proportion were also lost fighting German AFVs.²⁷

On balance, the evidence suggests that the German Army's philosophy of separating the AT and artillery functions, and simultaneously developing highly effective dedicated AT guns, led to a much more favorable result. In terms of the Soviet Personnel and Equipment Resource Database, all Soviet 76mm guns mentioned here are classified as Light Divisional Artillery and are considered under this weapon category.

Mortars

By strict definition, mortars are any piece of ordnance restricted to firing at angles of elevation between 45 and 90 degrees to the horizontal plane, and many countries have correctly named some of their heavy howitzers as mortars in conformity to this rule. Today the word mortar is used to refer to a light weight, smoothbore, muzzle-loading weapon firing a fin stabilised bomb; and it is this weapon to which we will confine our attention here. For the purposes of this discussion there are three categories of mortar: light, (45-60mm), medium (80-82mm) and heavy (107-120mm).

The first Soviet light mortar was the 50mm mortar M1938, which was rapidly replaced by the M1939, which in turn was rapidly replaced by the M1940. The 50mm mortar M1940 appeared conventional in appearance but had two unusual features. It had a small recoil buffer between the barrel and bipod yoke, and the sights were fixed at 45 and 75 degree firing angle. The range was controlled by venting a proportion of the propellant gas to the atmosphere, thus reducing the propellant available to the bomb. The 50mm mortar M1941 dispensed with the bipod and buffer and hinged the barrel to the baseplate. The M1941 became the standard Soviet light mortar during WWII and was comparable to the British 2in and German 50mm models. After 1941, they were gradually phased out of service and by 1944 they had been largely replaced by the 82 mm mortar.

As with the 50mm mortar, the Soviet pre-war infantry were presented with a bewildering array of medium 82mm mortars. These were the 82mm mortar M1936, M1937 and M1941. The

²⁵ Ironically the Germans used many captured 76mm guns as AT Guns later in the war. They were re-bored, modified with new optics, issued with new German designed ammunition, often given new lower splinter shields and muzzle brakes and designated 7.62mm Pak 36(r) or 39(r). The penetrative performance of these weapons with new ammunition was considerably improved. The more well publicized German figures using their ammunition etc has lead some military simulation designers and authors to rate the Soviet 76mm divisional AT guns with an AT capability comparable to the German 75mm PaK 40 AT gun. In no sense were any of the Soviet WWII 76mm divisional guns in the same class as the PaK 40 in terms of penetration or fire control against enemy tanks.

²⁶ G.F. Krivosheev, et al, *Soviet Casualties and Combat Losses in the Twentieth Century*, Edited by Colonel General G.F. Krivosheev, Greenhill Books, London, 1997. pp. 248-251, table 95.

²⁷ Ibid. Note, all gun and AFV operational and strategic losses are ignored here, but it is reasonable to assume they were in similar proportions for Soviet guns and German tanks when considered over the period 1941 to 1945.

M1941, which became the standard medium mortar up to 1943, consisted of a circular steel stamped baseplate and an unusual bipod assembly. Conventionally, heavier mortars were carried into action in three parts: barrel, bipod and baseplate. The 82mm M1941 designers decided to modify the bipod assembly with small stub axles at the lower ends of the bipod legs, and fit small steel wheels. Thus the mortar could be moved with the barrel and baseplate clamped to the bipod. Once in action the wheels could be removed. The M1943 design modified the bipod so the wheels could remain permanently attached but clear of the ground in action. The 82mm M1941 was a generally good design, comparable with western counterparts and with a greater range than the average medium mortar.

In 1941 the Soviets possessed an advantage in the heavy mortar category. They had developed the 120mm mortar M1938, probably the best weapon in its class in the world at that time with the possible exception of the Finnish 120mm Tampella M1940 mortar.²⁸ The 120mm mortar was considered an artillery weapon in Soviet use and four mortars were issued to one mortar battery per rifle regiment in June 1941. Newly mobilised rifle divisions reduced this to two mortars per rifle regiment. As it is included in the TOE of the rifle regiment, and for the sake of completeness, it is included here as a heavy infantry weapon.

The 120mm mortar M1938 was basically a conventional design. It included a smooth bore barrel locked into a circular baseplate and supported by a bipod, with a two spring shock absorber unit connecting the barrel and bipod together. For movement a specially designed transporter was provided which enabled the mortar to be rapidly moved into and out of action, and which could be towed by any convenient vehicle. The Soviet 120mm mortar was one of the few weapons in WWII that the Germans copied directly from their enemy. The Germans were so impressed by this weapon they added some modifications and manufactured a copy, the 12cm *Granatwerfer* 42 (GrW 42), which was first issued in late 1942.

Infantry Guns

Infantry guns are artillery allocated to an artillery platoon in a rifle regiment or an infantry gun company in an infantry regiment, and usually used in the direct fire infantry support role. As such, they are classified as a heavy infantry weapons.

As in most contemporary armies, the Red Army used a short barrelled howitzer for infantry support at the regimental level. The standard weapon was the 76mm M1927 regimental gun. This was a modification of the old Tsarist 3in Model 1913, which was modernised in 1936 and 1939 to permit motorised towing, designated the 76mm M1927/39. The 76mm M1927 was archaic and heavy compared to most equivalent German and American weapons. Along with many other Soviet weapons, rather than attenuate production for a better weapon it remained in production until 1944. The only modification during WWII was to mount the gun on a carriage from the 45mm M1942 AT gun and designate it the 76mm M1943 regimental gun. Soviet figures attribute a maximum effective range of 8 550 metres for the 76mm M1927 gun which seems high. Nevertheless, in the absence of further information this range has been used in determining the OCPC for this weapon in table [Sov Res Database 1](#), although a range over 3500m is pointless in a direct fire support weapon. If a more realistic maximum effective range of 3500 meters is used, the OCPC for the 76mm M1927 drops from 41 to 34, which is more in line with its historical performance. It is worth noting that the maximum effective range of the 'improved' 76mm M1943 regimental gun dropped to 4 200 metres.

²⁸ The Soviets also had a similar but lighter 107mm heavy mountain mortar.