

## Chapter I-9: A Divisional Sized or Division Equivalent Combat Unit in WWII

In most military history studies regarding the 20th century, the terms division, 'division equivalent' and 'division sized' are used freely to describe the size of a particular designated combat unit. This is standard military history terminology and makes sense because traditionally a division represented the smallest self-sufficient combined arms formation on the battlefield. Although supported by a multitude of smaller ancillary land and air units, it was the divisions which represented the primary offensive strength of any army. As a result one would assume that counting divisions or division equivalents is a reasonably accurate way to assess an army's strength.

Unfortunately, reality as usual is much more complicated than this. In fact simply counting the number of divisions in opposing forces almost always leads to very inaccurate, incorrect and just plain misleading assessments of an army's true strength.<sup>1</sup> The reason is that the terms division, division equivalent and division sized are totally ambiguous and subjective. There are several reasons for this.

Firstly division sizes and structures varied immensely depending on their primary mission. For example, cavalry divisions tended to be much smaller and lighter (fewer heavy weapons) than rifle or infantry divisions, but they had more transport to improve mobility. Armoured divisions tended to have considerably fewer personnel than rifle or infantry divisions, but a lot more heavy weapons and equipment. The various division types may have been all called divisions, but in terms of size and overall combat power they were almost never 'equivalent'.

Secondly divisions of a certain type varied tremendously from one country's army to another for many reasons, including:

- Each country's military objectives were different.
- The state of development of the 'art of war' varied by country depending on history and doctrine.
- Different country's armies had different resources available.
- Divisions were often structured to suit local terrain and conditions.

Thus various country's infantry divisions may have all been called 'infantry divisions', but in terms of size and overall combat power they were also rarely 'equivalent'.

In the FILARM and PILARM models relating to Operation Barbarossa we will be analysing the TOEs of all the land combat units involved. In addition we will be examining the actual equipment available in these units. When assessing the strength of divisions and brigades in a combatant's armed forces we will naturally be using the terms division, division equivalent and division sized. However to avoid the ambiguity and misleading conclusions resulting from uncontrolled use of these terms, we need a yardstick or reference to decide the criterion on which a combat unit can be classified as division sized. By comparing to a 'reference division' (see below)

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<sup>1</sup> For some authorities reporting on the history of a war or military campaign this might suit their agenda. This technique is often used to support statements about numbers of enemy troops. For example, until quite recently histories of WWII stated or implied that the Western Allied forces didn't have a significant numerical superiority over the German Army in France and Italy from 1943-45. This was (and occasionally still is) based around the statement that "the Germans fielded a similar number of divisions". In fact a detailed analysis of almost all US and Commonwealth campaigns from 1942 onwards (starting at El Alamein in 1942) reveals the Allies consistently enjoyed a superiority of 2-4 to 1 in overall manpower, and often much higher in terms of tanks, guns and aircraft. The only time this balance changed was for brief periods on local front sectors (such as the first week in the Ardennes during the German Ardennes counter-offensive in December 1944).

we can establish if a 'division' was a division in name only, and if so what proportion of a division sized unit it really was.

For the purposes of the FILARM and PILARM models this analysis will only be carried out on combat units designated by their respective country's armed forces as 'brigades' or 'divisions'. Where designated 'divisions' exceed the criterion set by the 'reference division', they will simply be designated as division sized. We are principally interested in the many smaller units involved in Operation Barbarossa which were designated as 'divisions' or 'brigades'.

### **What was a Divisional Sized Combat Unit in 1941?**

Given that 'divisions' and 'divisional sized' are terms so widely used in comparing force strengths, it is not unreasonable to ask: in the context of WWII, what is a divisional sized combat unit and how should this be assessed? As soon as one thinks about this, it becomes subjective. Should it include numbers of personnel and weapons only, or should divisional supply and support infrastructures be included? We have already seen the effect a weak Supply Distribution Efficiency (SDE) can have on a combat force's overall combat power.

By far the most common division type in WWII was the Red Army's rifle or comparable western infantry division, so it is reasonable to examine the authorised structure (TOE) of various army's rifle-infantry divisions to gain an insight into the question above. It should be borne in mind in the following discussion that the TOE was usually different to the actual personnel and equipment in the division: very few countries had all the resources required to bring their divisions up to full strength. However full TOEs were what each country's army command strived for, and TOEs are a very strong indicator of the resources that were available to that country as well as the state of their military thinking and development.

The Soviet pre-war rifle division at full strength was a powerful force and was generally equivalent to the traditional western idea of a division. It included approximately 14 500 men, 392 LMGs, 166 MMGs, 1100 horse teams, 585 trucks, 22 light transports, 54 AT guns, 84 50mm mortars, 54 82mm mortars, 12 120mm mortars, 34 76mm artillery pieces and 44 122-152mm artillery pieces. The Soviet pre-war rifle division was particularly strong in terms of medium to heavy artillery and included a light and medium artillery regiment in its TOE. Fortunately for the invading Germans, not one rifle division in the Red Army was at full strength on 22nd June 1941.

In 1941 a first wave German line infantry division included almost 16 900 men excluding an additional *Feldersatz* (field replacement) battalion.<sup>2</sup> The German line infantry division's TOE varied slightly depending on the period it was created or 'wave'. However the first major organisational change from the 1939 structure occurred in the Type 44 and the *Volks Grenadier* divisions, both well outside the scope of Operation Barbarossa.<sup>3</sup> A first wave German infantry division was very heavily armed and included 435 LMG-GPMGs, 112 HMGs, 1 189 horse teams, 516 trucks (and 237 lighter transports), 72 AT guns, 84 50mm mortars, 54 81mm mortars, 20 75mm artillery pieces and 54 105-150mm artillery pieces. The German infantry division was particularly strong in infantry weapons. These included particularly well armed infantry squads (each with a MG34 GPMG), 75-150mm infantry guns and AT guns. In addition it was more mobile than Soviet rifle divisions or other Axis infantry divisions because it contained more motorised transport. The anti-tank battalion and the regimental anti-tank companies were fully motorised, while the reconnaissance and signal battalions were almost fully motorised. The division also included at least 530 motorcycles which were in addition to the 753 motor vehicles above.

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<sup>2</sup> A. Buckner, *The German Infantry Handbook, 1939-1945*, Schiffer Military History, Atglen, PA, 1991, pp. 14 and 15.

<sup>3</sup> The principal changes in the Type 44 division were that the number of battalions in the infantry regiments was reduced from three to two, and that the reconnaissance battalion was replaced by a fusilier battalion. G.F.Nafziger, *The German Order of Battle, Infantry in WWII*, Greenhill Books, London, 2000, p. 25.

A typical Finnish infantry division in 1941 contained approximately 15 000 men. Its equipment included 446 LMGs, 112 MMGs, 1 522 horse teams, only 132 trucks and 19 light transports, 24 AT guns, 27 81mm mortars, 6 120mm mortars, 24 75-84mm artillery pieces and 24 105-155mm artillery pieces. The Finnish infantry division was not very mobile and generally lacked all types of heavy infantry weapons (AT guns and infantry guns). In addition shortages meant that each division had only 12 105-155mm heavy cannon and heavy howitzers.<sup>4</sup> Nevertheless the numerous Finnish infantry were themselves well equipped and supplied. In addition and very importantly, the nature of the local terrain largely neutralised any disadvantages due to lack of mobility: in many instances horse transport proved superior to motor transport which had difficulty operating in the hostile Karelian terrain.

A typical Rumanian infantry division in 1941 contained approximately 17 500 men. Its equipment included 402 LMGs, 148 MMGs, 950 horse teams, only 126 trucks and 27 light transports, 30 AT guns, 60 60mm mortars, 21 81mm mortars, 54 47-75mm artillery pieces and 16 100mm artillery pieces.<sup>5</sup> The Rumanian infantry were themselves reasonably well equipped, but the division was not very mobile and lacked heavy infantry weapons. Most critical was the lack of any decent medium to heavy artillery: each Rumanian infantry division had only 16 100mm howitzers as their heaviest artillery weapons. The bulk of the remaining artillery pieces were light 75mm weapons. This lack of heavy artillery and their relative immobility severely curtailed the usefulness of the Rumanian infantry divisions in 1941, and made their attacks against entrenched or fortified Soviet positions very costly (as happened in the battle for Odessa). Although the Rumanian infantry divisions were large, their lack of heavy weapons and motorised transport meant they were probably the weakest pure infantry divisions possessed by the major Axis powers participating in Operation Barbarossa.

A 1940-41 Italian infantry division was authorised approximately 14 300 men. Its equipment included 270 LMGs, 80 MMGs, 1000+ horse teams, only 86 trucks, 24 AT guns, 126 45mm mortars, 30 81mm mortars, 32 65-75mm artillery pieces and 12 100mm artillery pieces.<sup>6</sup> The Italian infantry division was not at all mobile, generally lacked all types of heavy infantry support weapons (AT guns and infantry guns), and suffered from a severe lack of medium to heavy artillery. In addition for some reason known only to the Italians, their division structure was binary as opposed to triangular. This meant there were only two infantry regiments per division as opposed to three and experience had shown well before WWII that the triangular divisional structure was much more flexible, resilient and self supporting in prolonged combat.<sup>7</sup> All in all the Italian infantry division was probably the weakest Axis infantry division in 1941: even weaker than the average Rumanian infantry division (above). This is probably why none were committed to support Operation Barbarossa, or at least not in the form above. The Italians did dispatch three divisions to the East front in 1941. These were two semi-motorised (also called truck-borne) divisions and one of the more elite *celere* (cavalry or mobile) divisions. Both these division types were considerably smaller than the pure infantry division and struggle to meet any criteria to be classified as divisional sized combat units.

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<sup>4</sup> Refer Part VI – ‘The Axis Allied Land and Air Resource Models: the Finnish, Slovakian, Hungarian, Rumanian and Italian Forces Involved on the Eastern Front in 1941’, the Finnish FILARM model for details.

<sup>5</sup> Ibid, refer to the Rumanian FILARM model for details.

<sup>6</sup> Ellis, World War II, A Statistical Survey, Facts on File Inc, New York, 1993, p. 209. The so called ‘North Africa infantry divisions’ had a slightly reduced TOE.

<sup>7</sup> Italian infantry divisions did have a Blackshirt Legion attached with two battalions. Maybe this was viewed as the third regiment of infantry by the Italian army planners? However the Blackshirt units were essentially fascist militia which appear to have been attached to the division to enable greater political influence and control, rather than to enhance the combat power of the division. As such the Blackshirt Legions were poorly supported, poorly integrated and relatively poorly trained. The overall affect of the Blackshirts on the division appears to have been detrimental at worst, and insignificant at best.

The 1941 type B 'standard' Japanese infantry divisions were very large formations. They contained approximately 20 000 men, 382 LMGs, 76-112 MMGs, 2290 horse teams (approximately 8000 horses), 22 AT guns, 340 'grenade dischargers' (50mm Type 89 mortars), and 66 70-75mm artillery pieces.<sup>8</sup> The type A 'strongest' Japanese infantry divisions contained approximately 24 600 men, 410 LMGs, 114 MMGs, 18 AT guns, 450 'grenade dischargers', 72 70-75mm artillery pieces and 12 105mm artillery pieces.<sup>9</sup> Generally the Japanese army opted for large divisions with relatively light weapons and little motorisation. In the west this (Japanese) decision has traditionally been attributed to the more hostile jungle terrain that the Japanese army planned (and trained) to operate in during WWII. However this assumption ignores where the bulk of the Japanese army was actually deployed before and during WWII: specifically occupied China and Manchukuo (Manchuria). In these theatres all types of heavy mortars and artillery, AT weapons (against the Soviets) and all types of motorised vehicles would have been greatly appreciated. Ultimately the sparsity of heavy artillery, any decent AT weapons, motorisation, and heavy infantry weapons in general, were factors in the rapid Japanese defeat at the hands of the Red Army in Manchukuo in 1945. It is difficult to avoid the conclusion that the lack of heavy weapons and motorised vehicles in Japanese infantry divisions was principally due to the lack of equipment in the Japanese arsenal throughout WWII.<sup>10</sup>

In 1942 US Army infantry divisions were authorised approximately 15 500 men. By 1943 US Army infantry divisions were reduced to approximately 14 300 authorised personnel. They also contained 157 MMGs, 236 HMGs, 2 012 motor vehicles (fully motorised), 57 AT guns, 90 60mm mortars, 54 81mm mortars and 66 105-155mm artillery pieces.<sup>11</sup> US divisions were unique in one respect: the TOE of American units often corresponded to their actual strength (except for units in prolonged combat), and they also exceeded their TOE far more often than any other WWII combatant. However these figures are illusionary because they do not include three additional 'separate' battalions which were normally attached to US infantry divisions when they went into action. These included a full tank battalion (authorised 25 M5 or M24 light tanks, 60 M4 medium tanks and 6 M7 self propelled howitzers), a self propelled tank destroyer battalion (with 36 M10, M18 or M 36 tank destroyers), and a light AA battalion.<sup>12</sup> This meant that from 1943 the average US infantry division had around 127 fully tracked AFVs in direct support. To get this in proportion the reader should note that this was more than the number of fully tracked AFVs authorised in a 1944 German panzer grenadier division, and more than many late 1944-45 panzer divisions actually had.<sup>13</sup> A US infantry division with its tank support was well and truly a divisional sized combat unit.

<sup>8</sup> The Japanese also fielded heavier mortars such as the 81mm Model 99 and the 90mm Type 94 mortars. However both these weapons were built in very limited numbers and don't appear to have been included as standard in the TOE's of Japanese infantry divisions.

<sup>9</sup> The Japanese categorised their forces under three headings: 'A' strongest, 'B' standard and 'C' special. TOE info from J.Ellis, *World War II, A Statistical Survey, Facts on File Inc, New York 1993*, p. 212.

<sup>10</sup> Another very strong indicator of the lack of motorisation and support for heavy weapons in the Japanese army is the fact that the average divisional slice (see note below) for divisions in the Pacific was only around 25 000 in 1941. This means there was very little non-divisional support infrastructure in the Japanese army in 1941. J.F. Dunnigan, A.A. Nofi, *The Pacific War Encyclopedia, Checkmark Books, New York, 1998*, p. 397.

<sup>11</sup> J.Ellis, *World War II, A Statistical Survey, Facts on File Inc, New York, 1993*, p. 220.

<sup>12</sup> The US formed 65 so called 'separate' or 'independent' tank battalions in WWII and of these 39 fought in Europe from 1944, mostly attached to US infantry divisions. In May 1944 there were 30 'separate' tank destroyer battalions in England available for the Normandy campaign, of which 19 were self propelled (with M18s and M10s).

S. Zaloga, P. Sarson, *Sherman Medium Tank 1942-1945*, Osprey Military, Osprey Publishing Ltd, London, 1993, pp. 23 and 24. Also S. Zaloga, J. Laurier, *M18 Hellcat Tank Destroyer 1943-97*, Osprey Publishing Ltd, Oxford, UK, 2004, p. 15.

<sup>13</sup> In April 1944 a panzer division's panzer regiment was authorised 79 Panthers and 101 Pz IVs (including all staff company HQ tanks). However very few panzer regiments ever reached full strength and most operated well below full strength. This was especially true after June 1944. In late 1944-45 the panzer regiment's two tank battalions had reduced TOEs of only 48 tanks each (with 8 more in the panzer regiment staff company). E. Lefevre, *Panzers in Normandy Then and Now, Battle of Britain Prints International Ltd, London, 1990*, p. 9. Also T.L. Jentz, *Panzer Truppen: Volume 2 1943-1945*, Schiffer Military History, Schiffer Publishing Ltd, Atglen, PA, 1996, pp. 153-169.

When discussing the real strength of any western allied divisions in WWII, one really needs to use the term 'division slice'. Division slice is military jargon to indicate a force's true strength. It is essentially calculated as the total force strength in the field divided by the number of divisions. It includes non-divisional units such as separate tank battalions and corps artillery regiments, which were normally attached to or supported the division in action. US forces had by far the largest average divisional slice of any of the combatants in WWII. The 60 odd US divisions in Europe in 1944 had a divisional slice of around 40 000 men each in the battle area: around 15 000 with the division itself (armoured and airborne divisions had considerably fewer), 15 000 in combat support and service units, and 10 000 in communication zone forces.<sup>14</sup> In comparison, by 1944 German line infantry divisions had shrunk to an authorised strength of approximately 12 400 men. In addition German divisions had a divisional slice in Western Europe of only 14 900 men on 1st June 1944.<sup>15</sup>

Finally, in 1941 a UK infantry division comprised approximately 17 300 men, 819 LMGs, 48 MMGs, 2 158 motor vehicles (fully motorised and excluding APCs), 48 AT guns, 162 2in mortars, 56 3in mortars and 72 87.6mm artillery pieces (25pdrs).<sup>16</sup> This meant the large British army infantry division had well armed infantry, was a very mobile formation and had strong artillery support with three field artillery regiments. However direct artillery support for attacking infantry in the form of infantry guns was not present and the division needed medium to heavy artillery support from corps artillery units to destroy the heaviest enemy entrenched or fortified positions. By 1944 the British army infantry division was even more powerful: it was authorised approximately 18 300 men and its divisional slice was similar to US divisions above (i.e. slightly greater than 40 000 and often included additional armoured units).

So bearing all the above in mind, what conclusions can we draw regarding the common perception and expectation of a divisional sized combat unit? If we display the information above and take the average personnel and equipment in the various combatants' divisions, we get the following.

<b>Divisional Comparisons, 1941</b>										
Rifle-Infantry Division	Personnel	LMG-GPMG	MMG-HMG**	Motor Vehicles	Horse Teams	AT Guns	Mor < 61mm	Mor > 61mm	Art < 90mm	Art > 90mm
Soviet (pre June 41)	14500	392	166	607	1100	54	84	66	34	44
German*	16900	435	112	753	1189	72	84	54	20	54
Finnish	15000	446	112	151	1522	24		33	24	24
Rumanian	17500	402	148	153	950	30	60	21	54	16
Italian	14300	270	80	86	1000	24	126	30	32	12
Japanese (type B)	20000	382	112	150-200	2290	22	340		66	
US (1943)^	14300	157	236	2012		57	90	54		66
UK	17300	819	48	2158		48	162	56	72	
<b>Average</b>	<b>16225</b>	<b>413</b>	<b>127</b>	<b>762</b>	<b>1006</b>	<b>41</b>	<b>118</b>	<b>39</b>	<b>38</b>	<b>27</b>
* LMGs were MG-34 GPMGs with considerably more firepower than contemporary LMGs: the only modern day squad GPMG equivalent in service.										
^ Does not include 243 Browning Automatic Rifles (BARs). LMGs shown are Browning .30in MGs										
** Excludes MGs used primarily as AAMGs										

<sup>14</sup> N. Zetterling, Normandy 1944, J.J. Fedorowicz Publishing Inc, Winnipeg, Canada, 2000, p. 32. The 40 000 figure does not include approximately 20 000 men in the USA (in training, hospitals, HQ personnel etc), also part of the division. J.F. Dunnigan, A.A. Nofi, The Pacific War Encyclopedia, Checkmark Books, New York, 1998, p. 396.

<sup>15</sup> N. Zetterling, Normandy 1944, J.J. Fedorowicz Publishing Inc, Winnipeg, Canada, 2000, p. 32. Also J.Ellis, World War II, A Statistical Survey, Facts on File Inc, New York, 1993, p. 204.

<sup>16</sup> J.Ellis, World War II, A Statistical Survey, Facts on File Inc, New York, 1993, p. 217.

Thus when a 'divisional sized' combat unit is being described or mentioned it is reasonable for the reader to expect a combat unit with a minimum of 12-14 000 personnel, 250-350 LMGs, 80-100 MMG-HMGs, 400-500 motor vehicles, 700-800 horse teams, 25-35 AT guns, 70-90 small infantry mortars, 25-35 large mortars (greater than 61mm), 25-35 artillery pieces less than 90mm in calibre, and 15-25 artillery pieces greater than 90mm in calibre (a total of at least 40-60 artillery pieces excluding AT guns). A division just meeting this criterion would be relatively small and weak compared to most of the divisions listed above, but could still reasonably be described as a WWII divisional sized combat unit.

The statement above regarding the minimum resources in a divisional sized combat unit applies even more critically if we are talking about the actual personnel and equipment present in a 'division' on the battlefield at any point in time. Far too often divisional sized combat units are said to have been present when in fact they were divisions in name only: their actual and even authorised levels were far below what one would expect from a divisional sized combat unit. This was especially the case for German units from 1942 onwards and Soviet units from the very beginning of the war. Both German and Soviet divisions progressively shrank as the war went on and their manpower shortages became more and more critical. By 1944-45 the average Red Army rifle division was down to an actual strength of only 3-4 000 men.<sup>17</sup> By western standards this was akin to a regimental sized combat unit and yet the Red Army is commonly credited with having close to 600 'divisions' at war's end. When the US or Commonwealth forces refer to a complete division landing or moving somewhere during WWII, it was almost always a truly divisional sized combat unit.<sup>18</sup>

The above analysis applies primarily to rifle and infantry divisions. Obviously divisions are structured for their primary mission, so armoured, cavalry, mountain and airborne divisions varied tremendously in their TOE and actual levels. Nevertheless the above analysis relating to 'what is a divisional sized combat unit?' applies to the large majority of divisions mobilised during WWII.

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<sup>17</sup> In Operation Bagration in June 1944, the average participating Red Army rifle division had approximately 6 000 men. This was after they had been brought up to strength for the major Bagration offensive (from an average strength of 2500-4000 men). However no fewer than 118 rifle divisions were available for the operation. S. Zaloga, Bagration 1944, Osprey Military, Campaign Series, London, 1996, p. 27.

<sup>18</sup> Sophisticated military simulations exist of the probable outcome of a military campaign between the Red Army vs. US and Commonwealth forces in Germany-Czechoslovakia-Austria-Hungary in May-June 1945. This scenario (sometimes called the 'General Patton' scenario because there is evidence Patton saw it as an opportunity) envisages hostilities breaking out between the former allies over territorial rights in Europe or-and Stalin not being satisfied with only occupying East Germany. Despite the common perception that the Red Army was an "unstoppable juggernaut" in 1945, the outcome of these simulations almost always ends in a Red Army defeat. The principal reasons for the Soviet defeat (in the simulations) are the fact that the far more numerous rifle divisions were barely at regimental strength with little prospect of replacements, the massive Western Allied air superiority that quickly develops, and the relatively poor Supply Distribution Efficiency (SDE) in the Red Army compared to the Western Allied armies (exacerbated by the Soviet's inability to replace motorised vehicle losses). It is probable that the Soviet High Command was aware of these factors, especially the shortages of manpower, which contributed to their willingness to settle for less than they had fought so hard (and hoped) for.

## Measuring Whether a Combat Unit can Reasonably be Called a Divisional Sized Combat Unit

Any division includes personnel and equipment. The equipment can be further divided into transport and support equipment, and weapons. When considering the size of a combat unit it is very important to not only include numbers of personnel but also the amount and type of equipment present. An analysis based purely on authorised or actual personnel is misleading because it fails to take into account the 'size' of the biggest weapon systems in the division or the division's internal support infrastructures. For example, a US 1943 infantry division was authorised 14 253 men while a US 1943 armoured division was authorised only 10 937 men. However the latter had 2 653 motor vehicles (including 501 armoured half tracks), 263 tanks and 54 self-propelled howitzers: altogether a much heavier and often more powerful division than its compatriot infantry division.<sup>19</sup>

Upon analysing the weapon types in most divisions it quickly becomes apparent that certain weapon types predominate in determining its effective size. These are weapon types that are either available in very large numbers (such as MGs and mortars) or that require a large amount of support and transport (such as artillery and tanks). All types of artillery (especially medium to heavy artillery) and tanks require large amounts of support compared to most other weapons. They consume prodigious amounts of ammunition, fuel, spare parts, and transport, and require disproportionate amounts of support personnel. Naturally they made the division far more lethal and able to inflict more damage with minimal losses, compared to divisions with fewer of these 'heavy weapons'.

In deciding what resources to include in determining the size of the division, the following are included: total personnel, all types of MGs, all types of mortars, all major transport types (excluding motor cycles) and all types of artillery (excluding AA artillery). Motor cycles, AA artillery, AT rifles and armoured reconnaissance vehicles are excluded because they generally had little effect in increasing or decreasing the overall size of the division. They were either very light equipment requiring little support or were heavy weapons available in limited numbers. For example, AA guns larger than HMGs were comparably few and far between in WWII divisions, and are hence excluded even though they required substantial support to function effectively. On researching the material for this book, it was found that AA weapons in the divisions listed in the previous section contributed on average less than 1% to the overall division's size.<sup>20</sup> This was because of the rarity of AA artillery within the divisions themselves: apparently the vast majority of AA defence was provided by AA units attached to divisions from corps and army level.

In determining the 'size' of a WWII division, the following equation is used.

$$Div_{Size} = Per + (6 * LMG) + (10 * MMG) + (8 * MV) + (4 * HT) + (30 * ATG) + (8 * LMrt) + (30 * HMrt) + (60 * LArt) + (100 * MArt) + (60 * Tanks)$$

Where:

*Per* is the number of personnel in the division.

*LMG* is the number of LMGs and GPMGs (General Purpose Machine Guns) in the division.

*MMG* is the number of MMGs and HMGs (Heavy Machine Guns) in the division.

<sup>19</sup> J.Ellis, World War II, A Statistical Survey, Facts on File Inc, New York 1993, p. 220.

<sup>20</sup> The UK Infantry division listed above was the only exception: it contained a light AA regiment with 48 40mm AA guns in 1941. From the divisions listed, only the Soviet pre-war rifle division was authorised AA weapons greater than 45mm calibre: it was authorised four 76mm AA guns.

*MV* is the number of motor vehicles excluding motor cycles, armoured cars, APCs and tractors (prime movers) in the division.

*HT* is the number of horse teams in the division (using 3.5 horses per team if only total horses information available).

*ATG* is the number of artillery type anti-tank guns in the division.

*LMrt* is the number of mortars with calibre less than 61mm in the division.

*HMrt* is the number of mortars with calibre greater than 61mm in the division.

*LArt* is the number of artillery pieces with calibre less than 90mm in the division.

*MArt* is the number of artillery pieces with calibre greater than 90mm in the division.

*Tanks* is the number of light to heavy tanks included in the division, but only if the division contains a tank or armoured battalion. Note the proviso on tanks: tanks are included only if tanks formed a significant component of the division. Many divisions contained a few light tanks or tankettes for reconnaissance work, but these were usually few in number.

The above equation enables a practical, realistic and quantitative assessment to be made on whether a 'division' was truly divisional sized, was simply a 'very small division', or was really masquerading as a division. The equation importantly includes the support infrastructures (total personnel and transport) as well as the significant weapon types. The above equation still attributes 40-50% of the division's size purely to numbers of personnel. However it now also takes into account all types of transport infrastructure (typically 20-30% of the division's size), artillery (typically 10-20% of the division's size) and other significant weapons.

It is very important for the reader not to make the mistake of using the equation above to assess the overall combat power of any given division in WWII. In order to assess the overall combat power of a division, the OCPCs (Overall Combat Power Coefficients) of all the weapons in the division are required, as well as the ROCP (Relative Overall Combat Proficiency) of the force at that time.<sup>21</sup> Inclusion of these factors shows that relatively small divisions sometimes had a disproportionately large amount of combat power. Naturally they also show that many poorly equipped and trained 'small divisions' were even weaker than one would expect. A sophisticated computer based military simulation should calculate the actual overall combat power of each combat unit continuously. It fulfils the millions of calculations required to take into account weapon OCPCs, force ROCP, combat unit size changes (resource losses and gains), readiness losses and gains, and supply state for each time increment being simulated. For a simulation the size of Operation Barbarossa this calculation should be resolved each (simulated) day or less to enable maximum realism.

Applying the size equation to the minimum sized combat unit that can be reasonably called 'divisional sized' (from the previous section), we get a value of 28 540. This assumes a combat unit should have a minimum of 13 000 personnel, 300 LMGs, 90 MMG-HMGs, 450 motor vehicles, 750 horse teams, 30 AT guns, 80 mortars less than 61 mm calibre, 30 mortars greater than 61mm calibre, 30 artillery pieces less than 90mm calibre, and 20 artillery pieces greater than 90mm calibre (a total of 50 artillery pieces excluding AT guns) to be reasonably called 'divisional sized'.

In the FILARM model this will be referred to as the Minimum Divisional Size (MDS) value and will be set at 28 540. In addition, division and brigade designated combat units in the various FILARM-PILARM models will be expressed as a percentage of the Minimum Divisional Size

<sup>21</sup> Refer Part II 2 – 'The Barbarossa Simulation's Resource Database - Methodology for Calculating a Weapon System's or Database Unit's Overall Combat Power Coefficient (OCPC)' for details on weapon OCPCs. Also refer Part III – 'Relative Overall Combat Proficiency (ROCP): the ROCP of Soviet and Axis Forces from 1941-1945', for details on a ROCPs in WWII.

(MDS) value, in order to assess their true size. Applying the size equation and MDS value to the typical rifle-infantry divisions discussed in the previous section, we get the following results.

<b>Divisional Comparisons, 1941</b>		
<b>Rifle-Infantry Division</b>	<b>Size</b>	<b>% of MDS</b>
Soviet (pre-June 41)	38480	135%
German	42462	149%
Finnish	31642	111%
Rumanian	33266	117%
Italian	27156	95%
Japanese (type B)	41312	145%
US (1943)	44348	155%
US (1944, w typical tank support)	51968	182%
UK	48694	171%

As we can see the Minimum Divisional Size (MDS) value represents a relatively small division by comparison to most WWII divisions. Significantly only the Italian 1940-41 infantry division falls below the MDS value; all other units are well above.<sup>22</sup> This underlines the fact that combat units well below the MDS value should not be called ‘divisions’ simply because of their historical designations. They were usually designated divisions historically because it suited the political, propaganda and morale agendas of the relevant powers at the time. Then as now, it led to incorrect and misguided perceptions of military strengths. If historically designated divisions are used to describe military campaigns and impartial objectivity is desired, then great care should be taken to stress the actual size of the divisions which took part.

Another use of the MDS value is to test the term ‘division equivalent’ which is also common in WWII literature. In most current accounts of WWII battles and campaigns, two separate brigades or three separate regiments are usually considered to be a division equivalent. If this was the case we would expect the separate brigades and regiments in question to have had a minimum size value of approximately 14 300 and 9 500 respectively: around a half or a third of the MDS value. In fact the vast majority of brigades and regiments operating in WWII were no where near these minimum size values: two or three of them were generally not a realistic division equivalent.<sup>23</sup> This was primarily because separate brigades and regiments did not contain the heavy weapons (especially artillery) or the support infrastructures that existed to support the brigades and regiments within a division. As we shall see in the Soviet FILARM model, this was particularly true for all types of Soviet rifle and tank brigades mobilised in the second half of 1941.

<sup>22</sup> This goes some way to explain the poor performance of Italian infantry divisions during the invasion of Albania in April 1939, and during the Italian invasion of Greece from Albania in October-November 1940.

<sup>23</sup> The only consistent exception to this was the WWII British armoured brigade which was usually the armoured portion of an armoured division.