Producing Weapon Statistics for Micro Armour®:The Game

The various values for weapons stands in the Micro Armour®: The Game (MATG) and supplements are based on the best data we could find. Whenever two or more sources disagree, we tended to take either the most reasonable, the most reliable from previous experience, or when that failed, an average between conflicting values. Using the criteria below, you may come up with entirely different values than we did. If you prefer the stats you arrived at to the ones provided in the rules, please be sure to re-calculate the point cost for any weapon you modify.

Firepower (AP): The armor-piercing firepower of any weapon stand represents the number of centimeters of homogenous steel plate a shot from that weapon can penetrate at five-hundred meters, modified as follows:

1) x .9 for Low Velocity guns.
2) x 1.1 for High Velocity guns.
3) x 1.1 for Hyper-Velocity guns.
4) x 1.1 for Tech-Level 2 guns.
5) x 1.25 for Tech-Level 3 guns.
6) x 1.25 for Tech-Level 4 guns.

Example 1: The U.S. M.103 Heavy Tank (TL2) was equipped with a 120mm High Velocity gun. The M1A1 (TL3) was equipped with a gun of the same caliber. The M1A1's gun has a firepower of 20 as opposed to the 16 firepower of the M.103 (a difference of 25%).

Example 2: The Soviet ISU.122 (TL1) had a 122mm Low/Medium Velocity gun with a firepower of 11. The T.72 (TL3) had a gun of the same caliber with a firepower of 19. The difference between the two is ~75%. (11 / .9 [low to medium-velocity] x1.1 [high-velocity] x1.1 [hyper-velocity] x 1.25 [TL.3] = 18.48 (rounded up to 19).

NOTE: The numbers above should be considered more as guidelines than rigid requirements, to be used when the actual data is either uncertain or simply unavailable. Whenever specific data on a weapon's performance is available, use that instead.

Firepower (HE): Artillery Class Weapons

HE Firepower for Explosive Shells delivered by Artillery Class weapons is generated, based on shell weight and barrel diameter as follows:

Explosive Shells of ~65mm	4
Explosive Shells of ~75mm	5
Explosive Shells of ~85mm	6
Explosive Shells of ~95mm	7
Explosive Shells of ~105mm	8
Explosive Shells of ~150mm	9
Explosive Shells of ~175mm	10
Explosive Shells of ~200mm	11
Explosive Shells of ~250mm	12
Larger Shells	12+

Example 1: The Italian 65mm M.06 has an HE value of 4.

Example 2: The Italian 105mm M.56 has an HE value of 8.

Notes on modifying these 'generic' values:

1. Weapons of lower velocity tend to have higher explosive capacity.
2. Different nations often used different chemical formulae in their explosive 'filler'. Some were more effective than others.
3. Shell weight must be balanced off against rate of fire. Lighter shells are easier to manhandle than heavier ones. In addition, many heavier guns load and fire projectiles that are separate from the bags carrying the charges used to deliver them, slowing their rate of fire still further.
4. Artillery 'Rockets', which have quite thin skins and consequently even larger 'filler' charges than other weapons of the same caliber.
5. Although explosive performance has increased over time since WWII, these improvements have not been as significant as those in other types of weapons. Higher HE values have been achieved primarily through improved metallurgy in shell construction and advances in pyrotechnic chemistry.

Example 1: The Soviet 122mm M.38 has an HE value of 8, while the Soviet 122mm D.30 has an HE value of 9 due to its increased rate of fire and improved explosive filler.

Example 2: The U.S. 155mm M114A1 has an HE value of 10 due to the large explosive charge of its shells. The 175mm M.107 also has an HE value of ten. The explosive charge of its high-velocity shell is only slightly heavier than that of its smaller counterpart.

Firepower (HE): Cannon-Armed Stands other than Artillery Class Weapons

HE Firepower for cannon-armed stands other than artillery (Tanks, Assault Guns, etc.) is *based* on the same criteria as above. The value is normally lowered, however, to reflect the lower rate of fire permitted by the often cramped conditions in these types of vehicles. In addition, weapons like Assault guns often carry a 'mixed' ammo load that favors AP rather than HE ammunition (based on the role they are to play), reducing their capacity to act as artillery weapons. As cited above, high-velocity weapons tend to deliver shells with lower explosive capacity than lower-velocity guns. Hence the class of weapons called 'Infantry Close-Support Artillery Vehicles' in the WWII rules. These are basically tanks or similar vehicles armed with artillery guns, but with a limited ammunition capacity and little or no indirect-fire capability.

Example 1: The German Pz.IVF1 was equipped with a short-barreled 75mm Infantry Gun. Though it carried special AP ammo, the largest proportion of its limited storage capacity was dedicated to HE shells. It did not carry indirect-fire sighting gear.

Firepower (HE): Small Arms Stands

HE Firepower for Small Arms (i.e. Infantry Stands and Machinegun armed vehicles) is generated differently than for Explosive Shells as follows.

Infantry:

1. Each Infantry Squad or equivalent in the unit armed with bolt-action rifles and nothing else	.9
2. Each Infantry Squad or equivalent in the unit containing at least one LMG or light mortar	1.2
3. Each Infantry Squad of equivalent in the unit armed primarily with semi-auto rifles and one assault rifle	1.5
4. Each Infantry Squad of equivalent in the unit armed primarily with bolt-action rifles and one German MG34/42	1.5
5. Each Infantry Squad or equivalent in the unit armed primarily with assault rifles or submachine guns	2

Machinegun (Infantry Support) Stands:

1. Each three-man, tripod-mounted, machinegun team	1
2. Support stands containing light mortars as well as machineguns (U.S., U.K., Japan, etc.)	+1
3. German MMG or Support stands	+1

Example 1: TL1 Infantry (Type F) platoons, [typical infantry for the Spanish Civil War or early Soviet Infantry] were equipped with little more than bolt-action rifles. Three squads made up such a platoon. (3 x .9 = 2.7). Its HE firepower would be 3.

Example 2: World War II submachine gun infantry platoons composed of three SMG-armed squads would have an HE firepower of 6 (2 x 3 = 6)

NOTES: 1. Cannon-armed stands (tanks, AT guns, etc.) for which there is no HE ammunition available, use either the value of their mounted machine guns or the firepower of their crews.

Example 1: British early-war tanks had no HE ammo. The platoons had three tanks each. Their HE firepower is 3, reflecting the firepower of the platoon's three MGs.

Example 2: 2lbr AT guns had no HE ammo. Their HE value is 2, reflecting the firepower of the personal weapons of their crews.

Range: 1. Artillery ranges reflect 80% of the weapon's maximum rated range (to account for atmospheric conditions, etc.).

Example 1: The U.S. 105mm Howitzer M.102A1 has a maximum range of ~11,200 meters. Its range in the rules is 89 inches (11,200 x .8 = 89.6, rounded down to 89).

Example 2: The U.K. 25lbr Mk.2 Gun/Howitzer has a range of ~12,000 meters. Its range in the game is 97 inches (12,000 x .8 = 97.6, rounded down to 97).

2. Small arms are rated at 500 meters (the maximum range at which rifle sights were reliable).

3. Units armed primarily with submachine guns or machine pistols are rated at 60% of bolt-action rifles (300 meters).

4. Machineguns are rated at 1,000 meters due to superior sighting gear and stable mounts. Light mortars (50mm or less) are the same.

5. Anti-tank weapons are rated based on the maximum range at which they retain at least 50% of their basic penetration.

Example 1: The U.S. 37mm M3 ATG's penetration was ~54mm at 30 degrees at 500 meters. That dropped off to ~25mm at 1,000 meters. Hence, its range is 10 inches.

Example 2: The German 50mm PAK.38's penetration was ~57mm at 30 degrees at 500 meters. That dropped off to ~34mm at 1,500 meters. Hence, it has a range of 15 inches.

6. 2,000 meters is a standard top range, representing the maximum sighting distance possible in mixed terrain under normal atmospheric conditions.

7. Thrown weapons (grenades, etc,) and pistols have a range of less than 50 meters. Therefore, their range is "0". They may only attack through Close Assault.

Defense (Armored): Each armored vehicle has an 'Armor Base – Front'. This represents the average thickness of armor it carries in centimeters of homogenous vertical steel plate. This value is increased by 10% (cumulative) for each 20% of slope.

[0 – 10 degrees x 1, 11 – 30 degrees x 1.1, 31 - 50 degrees x 1.3, 51 – 70 degrees x 1.6, etc.]

Example 1: The PzKfw.V Panther has a frontal armor value of 8 cm at 35 degrees of slope. Its armor value [front] is 10 (8 x 1.3 = 10.4).

The 'Armor Base – Flank/Rear' is 50% of this. It isn't accurate but functional.

Example 1: The PzKfw.V Panther has a frontal armor value of 10. Its side / rear armor value is 5.

Example 2: The PzKfw.VIa Tiger has a frontal armor value of 11. Its side / rear armor value is 6.

NOTES: 1. Armored vehicles with particularly low silhouette should gain a defense advantage. Particularly large vehicles should be penalized.

Example 1: The PzKfw.IV has a defense value of 7. The Stug.IIIf has a defense value of 8, primarily due to its lower silhouette.

Defense (Other):
This is based on dispersal. The idea being that 100 men distributed over 10,000 square meters and ten men distributed over the same area are equally vulnerable (from a mathematical viewpoint).

Example: If a given weapon produces 30% casualties in a 10,000 square meter area, a 100-man unit would lose thirty men, and a ten-man unit would lose three men. Percentage-wise, the result is the same.

An arbitrary value of six was used for personnel stands based on the casualty producing capability of 75mm guns during WWI. Since the HE value of this weapon was set at 5, this produces a 'D' result about 9% of the time. Two such hits destroy the unit. The same personnel stand struck by two such sections (a 'closed' sheaf) destroys the stand about 12% of the time. If the stand is moving the potential damage is much worse: Two 'average' die-rolls (7) will destroy the unit. The functional result is that infantry caught in the open are essentially pinned in place. Infantry caught moving in the open by even 'light' artillery are, for all intents and purpose, DEAD!

NOTES: 1. Units other than personnel have a defense related to their comparative size. Objects about the size of a jeep have a defense of three. Larger objects have values that are proportionately lower. (The larger the object, the lower the defense value).

Example 1: A medium truck (not an armored vehicle, but the effect is the same) is much larger than a Kubelwagen. The Kubelwagen has a defense value of 3, the truck's defense value is 1, due to its high silhouette.

2. Horse Cavalry stands have a defense of five (5) for a reason. Cavalry units' defense is rounded DOWN to a two rather than UP to a three, making them more vulnerable when moving than infantry stands.

Example 1: Rule 10.0 for Special Weapons in Micro Armour®: The Game - WWII (page 14) states that the defense value of personnel stands in the Movement Posture is halved (rounded down) from 6 to 3. Since horsed-cavalry are considered personnel stands, their defense value is rounded down from 5 to 2.

Speed: 1. Tracked vehicle speeds are based on their maximum 'published' movement rate in miles per hour. Since this represents the vehicle's performance on smooth/flat ground under perfect weather conditions, it represents the movement rate for that vehicle on a 'good' road.

Example 1: The M.4 Sherman and PzKfw.IV were both rated a 20 – 22 mph. To achieve this rate of speed, the vehicles were tested under ideal conditions. This yields a road movement rate of 20, a value halved to ten mph for cross-country movement.

This value is reduced by half for cross-country movement, primarily in the interest of the health and well-being of the crew, and to reflect the caution normally exercised by combat-vehicle drivers in unfamiliar country.

2. Wheeled vehicles move at 25% of their road movement rate cross-country, due to the vulnerability of wheeled suspensions.

3. Infantry movement is based on a standard 'battlefield' shuffle of 2.5 – 4 MPH (averaging 3).

4. Horses move at 8 MPH, wagons at 6 MPH.

NOTES: The movement rate for all stands is expressed in miles-per-hour for the following reason:

1. The time scale is three minutes per turn.

2. The distance scale is 100 meters per inch.

3. 1000 meters equals ~.66 miles. One mile equals ~1,660 meters.

4. A stand moving at 1 MPH moves 100 meters in three minutes (1,660 meters / 20 turns per hour = ~83 meters).

5. No stand moves every turn (due to Cohesion limits) and will often move faster or slower depending on conditions. Hence, an average of 100 meters per turn.

6. Two vehicles with the same maximum speed might have two slightly different movement rates based on ground pressure (defined as a vehicle's weight in pounds divided by its 'footprint" (surface area of tires/tracks) in square inches. This can also be described as the horsepower to weight ratio. The lower the ground pressure is, the more nimble the vehicle.

Here are some examples:

PzKfw.IVH	11.1
PzKfw.VIA	11.6
PzKfw.VIB	9.1
PZKfw.V	14
E.100	8.6
Maus	6.38
T.34/76	15.9
T.34/85	14.2
JS.II	9.7
JS.III	9.7
SU.100	11.4
M3 Stuart	17.8
M4A3 Sherman	14.7
M48A2	18.4

Example 1: The standard infantry movement rate in the WWII rules is three, representing a standard battlefield shuffle of 2.5 – 3 mph.

Example 2: The standard infantry movement rate for more modern infantry is four (3 – 4 mph), representing the lighter weight of modern infantry gear and the comparatively greater stamina of later generations.

Cargo Capacity:

1. This is generally expressed in 250lb increments.
Example: A jeep has a capacity of 4, based on a towing capacity of 1/2 ton.

2. The capacity of larger vehicles is based on the limitations of their suspensions.

Example: A U.S. 2.5 Ton truck is rated a 2.5 tons, but this is its cross-country rating. It can actually carry up to ten tons of freight over good roads before risking damage to its suspension. It was given a carrying capacity of 14 (3,500 lbs) as a 'safe' level of loading over difficult terrain.

NOTES: 1. Bear in mind, one transport stand generally represents anywhere from three to six actual vehicles (and possibly more).

2. A good rule of thumb is to ascertain the towing weight of those weapons a vehicle was commonly used to transport, and match these up.

3. The personnel carrying capacity of a transport stand is based on the number of transport points required by a standard infantry stand (8).

Transport Req:

This is based on the general practice of the nation involved. If a particular vehicle was habitually used as a prime-mover for a specific weapon, it stands to reason that the vehicle should be able to transport that weapon.

Example 1: The U.S. used its general purpose 2.5 ton truck for nearly every towing job that came up. However, the M.4 and M.5 High speed tractors were specifically designed for use as artillery prime movers for its heavier 155mm and 203mm guns. Therefore, these tractors should be given a high enough cargo capacity to handle these weapons effectively.

Example 2: The same is true for the German SdKfz.7 heavy half-tracked tractor. It was the most common prime mover used for their 88mm Flak.36, as well as many of their other heavy 150mm. etc. artillery pieces. Therefore, its cargo capacity should reflect an ability to handle these weapons effectively.

NOTE: Rule 11.06 in the 'Modern Micro Armour – The Game' rulebook outlines the adverse effects of attempting to tow or carry items beyond the rated capacity of a given transport stand.

Notes on Assigning Tech Levels:
One of the major determinants is the Sighting Gear employed on a given weapon:

1. (TL0) Normal – Basic reticle pattern (cross hairs), requiring training and experience to achieve accuracy due to 'kentucky windage'.

2. (TL1) Stadia Reticle – This form of sight had graduated lines above and below the center line. A trained gunner could estimate the range if he could recognize the target and know its approximate height. It took less time to train a talented gunner to use this effectively.

3. (TL1-2) Ranging Machinegun – During WWII it dawned on some British tank gunners that if they fired a burst of machinegun fire before a gunfight began, they could accurately estimate the range to various landmarks in their field of fire. Once they realized that the tank's coaxial MG could be adjusted to correspond with the main gun, they could reduce the number of 'ranging' shots necessary before scoring a direct hit on the enemy. As it turns out, the US 50cal M2 heavy MG has THE most reliable ballistic characteristics of any light weapon in existence to this day (a useful tool in so many ways).

4. (TL2-3) Stereoscopic Coincidence – This gun sight uses the same principle as ranging binoculars. The gunner focuses the dual image appearing in the sight and reads the range from a scale superimposed on his field of vision. Just like focusing a camera!

5. (TL3) Primitive Laser Range Finders – These used two light beams focused precisely on the target to give accurate range data.

6. (TL4) Advanced Laser Sights – These are linked to an onboard computer which passes the range data obtained by a single focused beam DIRECTLY to the gun itself. The gunner simply needs to place the cross hairs on the target and wait for the little green light to appear in his sight telling him it's time to shoot! The most advanced MBTs actually have TWO such rangefinders, one for the gunner and one for the vehicle commander. Even as the gunner is engaged in destroying the first target, the commander is sighting in on a second one. Once the tube is clear, the commander simply switches control to the gunner and the turret automatically swings left or right based on the image in his sight. The gunner then simply loads up and waits for the gun to be adjusted and the little light to go on.

General Notes

Many values can be inferred through 'context'. Weapons of a specific performance should have characteristics and 'stats' close to those of other weapons of similar performance. Improved weapons should have improved characteristics over their predecessors. When in doubt, go with your instincts, and never ignore the input of well-informed play testers.

POINTS FORMULAS

To calculate the point cost for most non-artillery weapons (Tanks, Infantry, APCs, etc.) armed with conventional weapons) in the modern rules, use the following formula:

2 (AP.f x AP.r / 10 + HE.f x HE.r / 10 + DV.m + MV.m + MV.a + CC / 8) x TL.m x F.m = Point Cost WHERE:

AP.f	=	Armor Piercing Firepower
AP.r	=	Armor Piercing Range
HE.f	=	High Explosive (or Small Arms) Firepower
HE.r	=	High Explosive Range
DV.m	=	Defense Value.modified (x 1 if Armored, x .5 if Non-Armored)
MV.m	=	Movement Value.modified (x.5 if tracked, x .15 if Wheeled, x .15 if Foot, If Movement = 0, add 0 and multiply subtotal x .9)
MV.a	=	Movement Value.amphibious
CC	=	Cargo Capacity
TL.m	=	Tech-Level.modifier (TL1 = 1, TL2 = 1.2, TL3 = 1.44, TL4 = 1.73, TL5 = 2.07)
F.m	=	Facing Modifier (Restricted Facing = x .9)

ATGM systems or vehicles carrying ATGMs along with other weapons point values are calculated using the following formula:

2 [DN (MAP.f x MAP.r / 10 + MHE.f x MHE.r / 10)] + [(1 - DN (AP.f x AP.r / 10 + HE.f x HE.r / 10) + DV.m / 2 + MV.m / 2 + MV.a + CC / 8) x TL.m x F.m, WHERE:

DN	=	Depletion Number (3 = .9, 4 = .8, 5 = .7, 6 = .6, 7 = .5)
MAP.f	=	Missile Armor Piercing Firepower
MAP.r	=	Missile Armor Piercing Range
MHE.f	=	Missile High Explosive Firepower
MHE.r	=	Missile High Explosive Range
AP.f	=	Armor Piercing Firepower (for additional non-missile weapons)
AP.r	=	Armor Piercing Range (for additional non-missile weapons)
HE.f	=	High Explosive (or Small Arms) Firepower (for additional non-missile weapons)
HE.r	=	High Explosive Range (for additional non-missile weapons)
DV.m	=	Defense Value.modified (x 1 if Armored, x .5 if Non-Armored)
MV.m	=	Movement Value.modified (x.5 if tracked, x.15 if Wheeled, x.15 if Foot, If Movement = 0, add 0 and multiply subtotal x .9)
MV.a	=	Movement Value.amphibious
CC	=	Cargo Capacity
TL.m	=	Tech-Level.modifier (TL1 = 1, TL2 = 1.2, TL3 = 1.44, TL4 = 1.73, TL5 = 2.07)
F.m	=	Facing Modifier (Restricted Facing = x .9)

NOTE: Man Packed (MP) ATGMs are not multiplied by 2 as above. All other factors apply.

Artillery Weapons (Guns, Mortars, and Rocket Launchers) points are calculated using the following formula:

TL.m x F.m x DF.m x [(AP.f x AP.r) + (HE.f x HE.r) x RF x S] + DV.m + MV.m + MV.a WHERE:

F.m	=	Facing Modifier (Restricted Facing = x .9)
DF.m	=	Direct Fire Modifier (If the weapon is capable of Direct fire only multiply x .9)
AP.f	=	Armor Piercing Firepower (for additional non-missile weapons)
AP.r	=	Armor Piercing Range (for additional non-missile weapons)
HE.f	=	High Explosive (or Small Arms) Firepower (for additional non-missile weapons)
HE.r	=	High Explosive Range (for additional non-missile weapons)
RF	=	Range Factor (Range = 1-100 x .1, 101-150 x .09, 151-199 x .08, 200-250 x .07, 251-299 x .06, 300-399 x .05. 400+ x .04)
S	=	# of Sections in the unit (1, 2, 3, 4, etc.)
DV.m	=	Defense Value.modified (x 1 if Armored, x .5 if Non-Armored)
MV.m	=	Movement Value.modified (x.5 if tracked, x .15 if Wheeled, x .15 if Foot, If Movement = 0, add 0 and multiply subtotal x .9)
MV.a	=	Movement Value.amphibious
CC	=	Cargo Capacity
TL.m	=	Tech-Level.modifier (TL1 = 1, TL2 = 1.2, TL3 = 1.44, TL4 = 1.73, TL5 = 2.07)

Anti-Aircraft Missile Systems point values are calculated using the following formula:

TL.m [(AP.f x AP.r) + (HE.f x HE.r) x RF] + DV.m + MV.m + MV.a WHERE:

AP.f	=	Armor Piercing Firepower (for additional non-missile weapons)
AP.r	=	Armor Piercing Range (for additional non-missile weapons)
HE.	=	High Explosive (or Small Arms) Firepower (for additional non-missile weapons)
HE.r	=	High Explosive Range (for additional non-missile weapons)
RF	=	Range Factor (Range = 1-100 x .1, 101-150 x .09, 151-199 x .08, 200-250 x .07, 251-299 x .06, 300-399 x .05. 400+ x .04)
DV.m	=	Defense Value.modified (x 1 if Armored, x .5 if Non-Armored)
MV.m	=	Movement Value.modified (x.5 if tracked, x .15 if Wheeled, x .15 if Foot, If Movement = 0, add 0 and multiply subtotal x .9)
MV.a	=	Movement Value.amphibious
CC	=	Cargo Capacity
TL.m	=	Tech-Level.modifier (TL1 = 1, TL2 = 1.2, TL3 = 1.44, TL4 = 1.73, TL5 = 2.07)

NOTES:

1) Point values for Anti-Aircraft Guns are calculated as for non-artillery weapons above.

2) Point values for Anti-Aircraft Systems combining guns with missiles require the gun points to be calculated x .5 and the Missile

points to be calculated x .5 and combining these before adding the other factors.

3) Anti-Aircraft Missile system points are not multiplied by 2 as per non-artillery weapons above.

Helicopter point costs are calculated using the following formula:
TL.m x 2 [DN (MAP.f x MAP.r / 10 + MHE.f x MHE.r / 10)] + [1 - DN(AP.f x AP.r / 10+HE.f x HE.r / 10)] + DIV + MV / 10 + CC /8 WHERE:

TL.m	=	Tech-Level.modifier (TL1 = 1, TL2 = 1.2, TL3 = 1.44, TL4 = 1.73, TL5 = 2.07)
DN	=	Depletion Number (3 = .9, 4 = .8, 5 = .7, 6 = .6, 7 = .5)
MAP.f	=	Missile Armor Piercing Firepower
MAP.r	=	Missile Armor Piercing Range
MHE.f	=	Missile High Explosive Firepower
MHE.r	=	Missile High Explosive Range
AP.f	=	Armor Piercing Firepower (for additional non-missile weapons)
AP.r	=	Armor Piercing Range (for additional non-missile weapons)
HE.f	=	High Explosive (or Small Arms) Firepower (for additional non-missile weapons)
HE.r	=	High Explosive Range (for additional non-missile weapons)
DIV	=	Defense Value
MV	=	Movement Value
CC	=	Cargo Capacity

The point values for fixed-wing Aircraft used in the rules are calculated as follows:
TL.m [(FV x #FA) + (OV x #OA) + (10 x DV)] WHERE:

TL.m	=	Tech-Level.modifier (TL1 = 1, TL2 = 1.2, TL3 = 1.44, TL4 = 1.73, TL5 = 2.07)
FV	=	Firepower Value
#FA	=	The number of “Fire” attacks allowed per mission.
OV	=	Ordnance Value (The first Ordnance value listed for a given aircraft)
#OA	=	The maximum number of Ordnance attacks allowed per mission (based on the first value listed).
DV	=	Defense Value

NOTE: Aircraft Ordnance Values represent their total bomb or missile-carrying capacity modified by the number of “Hard-Points” on the aircraft for mounting these weapons. The various Ordnance Values for a given aircraft simply represent different “configurations” that may be used. Therefore, different bomb loads are not calculated separately.

- John Fernandes