Wargame: Red Dragon Mechanics Manual

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Contents

1 Movement

1.1 Speed

A unit's speed is its off-road speed: the speed at which the unit moves whenever it is ordered to move, but not to move fast. For units that can't use roads, and therefore can't move fast—infantry, planes, helicopters, and naval units—this is the only speed at which they can move.

Speed is lowest for infantry units—obviously, as they move on foot. Infantry can only manage between 15 and 30 kph.

Vehicular units can be broadly divided into two types by their system of locomotion: tracked vehicles and wheeled ones. Wheeled vehicles tend to be much faster, but also much lighter overall. Tracked vehicles can do anywhere between 35 and 80 kph (with the exception of the M-18, which manages 100 kph); wheeled ones, between 50 and 110 kph.

Helicopters move at speeds of between 180 and 350 kph. Since they have to accelerate at takeoff and decelerate on arrival, it takes them a few seconds to reach top speed or to stop.

Airplanes move at constant speeds of between 500 and 1100 kph.

Naval units move at speeds measured in knots—each kt is equal to approximately 1.85 kph. They move at speeds of 14 to 32 kt, or about 26 to 59 kph. Like helicopters they take a little bit of time to accelerate or to stop, though significantly less. Quite unrealistically, they are also all capable of turning in place.

Speed (KPH)	Infantry Units
15	ATGM teams, MANPADS teams, some Specialist Infantry.
20	Line infantry squads.
25	Fast/Shock infantry squads.
30	Very fast/Commando infantry squads.

Speed (KPH)	Vehicular Units
35	I-Hawk pattern tracked anti-air units.
40–45	Especially slow tracked units, such as the T-62M.
50	Transport trucks.
50–80	Most tanks.
100	South Korean M-18, fastest tracked unit.
80–100	Fast wheeled units.
110	The fastest ground unit, the P4 Milan 2 ATGM jeep.

Speed (KPH)	Helicopter Units
180	Mi-4s.
200	Mi-2s.
205–240	Bell UH-1 Hueys and other light NATO transports.
250	Mi-8s, SA 330 Pumas.
280–310	NATO fast and heavy transports, and gunships.
330	Mi-24s.
350	AH-1W SuperCobra.

Speed (KPH)	Planes
500	A-10 Thunderbolt II.
600	Slow planes—mostly cheap bombers.
750	Mid-to-low tier bombers and ground-attack aircraft.
900	MiG-29s, MiG-23s, F-4 Phantoms, and others.
1000	Default. The most common value.
1100	MiG-31 and MiG-31M Foxbat interceptors.

1.2 Road Speed

Wheeled and tracked vehicular units, touched upon earlier, are distinguished in large part by their differing road speeds—the speeds they achieve when fast moving down a road. Tracked units all have a road speed of 110 kph, regardless of their off-road speed; similarly, wheeled units all have a road speed of 150 kph, regardless of their off-road capacity.

No other units are capable of fast-moving down roads, and so no other units have road speeds.

1.3 Amphibious Speed

Vehicular units both tracked and wheeled with this trait can move onto and off of rivers and other bodies of water. This statistic ranges from N/A, in which case the unit cannot entreat onto rivers at all, up to 53 kph. It's generally the unit's off-road speed, rounded up.

Speed (KPH)	Vehicular Units
N/A	All non-marine units, which cannot enter water at all.
18–33 kph	Most cheap water-traversing transports.
40–48 kph	Most other water-traversing units.
50 kph	Most fast water-traversing units, including the LAV.
53 kph	The TPz Fuchs and TPz Fuchs Milan (FRG).

1.4 Sailing Type

Present only for ships and controls which sorts of waters they can enter. All ships are capable of traversing deep water, but are weeded out below that. Deep Sea ships can only traverse deep sea; coasters can approach the coastline; and

riverine boats can go down rivers, though they still cannot pass under most bridges.

1.5 Forest Movement

Infantry move just as fast in forest as they do on lighter terrain, but vehicular units that move through forest are significantly slowed down—tracked units move at 0.50 times their off-road speed, and wheeled one at 0.33 times their off-road speed. This means that maximum speed when moving through forest ranges from 17.5 to 40 kph for tracked units (50 kph for the M-18), and 16.5 to 36.3 for wheeled ones.

1.6 Turn Radius

Airplanes cannot turn in place like all other units (including, suspiciously, ships) can, and instead have a "turn radius" that determines, in meters, the radius of their turns. This is an important statistic for ground attack aircraft (it allows them to turn away from a target instead of evacuating after an attack, which helps maintain distance from enemy air superiority fighters) and particularly for air superiority fighters. Turn radii range from 150 to 500 meters.

1.7 Autonomy

How far a unit can move before it runs out of gas and is not longer capable of moving, in kilometers. Ranges between 200 and 700 km for tanks; between 150 and 1200 km for other vehicular units; and between 300 and 2000 for helicopters. Infantry, naturally, have infinite autonomy, as do, more surpisingly, supply units and naval units.

Though naturally helicopters should be guzzling fuel whenever they are airbourn, in Wargame they only use up fuel when moving. Hovering does not use up any fuel, nor does landing or changing altitude. Thus if a helicopter runs out of fuel while on the move, it will stop and land in place, not crash into the ground.

Range (KM)	Vehicular Units
150 KM	LVKV fm/43 visual SPAAG (SWE).
200-480 KM	Old, heavy units.
500-700 KM	Most units.
700+ KM	High range transports and jeeps.
1000 KM	Very high range transports and jeeps.
1200 KM	Stolly wheeled transport (ANZAC).

1.8 Time over Target

Airplanes do not have an autonomy, but rather a time over target, which ranges from 60 to 105 seconds. This statistic is of secondary importance, but does

come in handy at times on air superiority fighters. Planes that exceed their autonomy run out of fuel and have to leave the battlefield, automatically going into "Evac Bingo".

Since airplanes always fly at the same speed, their actual autonomy is their speed multiplied by their autonomy (though for planes, time over target is a more interesting statistic). The largest autonomy in the game belongs to the Su-27PU, which covers slightly under 28 km on a tank of fuel. The lowest autonomy belongs to the A-10 Thunderbolt II—ironically because it has both the lowest possible speed and highest possible autonomy—which can only do just over 14.5 km before running out of fuel.

2 Vision

2.1 Stealth

Stealth effects the visibility of your unit to other units. The Stealth options are "Poor", "Medium", "Good", "Very Good", and "Exceptional".

Stealth	Units
Poor	All non-recon ground vehicles, most other units.
Medium	All recon scout vehicles, some stealthy units.
Good	Basic infantry.
Very Good	Recon infantry squads.
Exceptional	Scout snipers, the F-117 Nighthawk.

Stealth effects how well the unit is able to hide from other units, interacting with optics and terrain in this regard. All unit types have stealthiness in their domains, including ships (one example, the La Fayette) and planes (the F-117 Nighthawk in particular).

2.2 Optics

Regular units have either "Poor" or "Medium" optics. Units with "Good" or better optics are considered recon units, and "Very Good" is the baseline for recon. Units can have either optics or air detection; units with air detection have "Poor" optics, and vice versa.

Optics	Units
Poor	Most vehicles.
Medium	Some higher-costed combat vehicles, infantry.
Good	Cheap recon units.
Very Good	Most recon units.
Exceptional	High-end recon units.

Coastal and riverine ships also have optics, of between "Good" and "Exceptional" quality.

A unit's optics tells you how well and out to what distance your unit can see the enemy. Forest or hedgerows offer cover to the unit, and make it significantly harder to keep it spotted; ubran sectors make infantry, in most cases, all but invisible to units outside of the town, unless they are firing their weapon. Weapon firing noise increases spotting distance, but by what amount is not known, though easily testable.

The maximum optical spotting distance, by a unit with exceptional optics against a no-stealth unit on an open field, is 5000 m. The minimum spotting distance, by a regular infantry unit intra-town against an exceptionally stealthy occupier, is 450 m. The most important values to know are 3500 m, the open-field spotting distance of a "Very Good" recon unit, and 2150 m, the effectiveness of the same against forest or hedgelines.

For a breakdown of how Optics interacts with Stealth: `https://www.dropbox.com/s/l2u8w7tuj7igiul/WargameRD_Hidden_Knowledge_Spreadsheet.xls`.

2.3 Air Detection

Units which are targetted at the air domain—airplanes and anti-air units—have no optics, but air detection instead.

Air Detection	Units
Medium	The B-5—which, we will see, breaks a lot of rules.
Good	Low-cost anti-air units, most low-cost planes.
Very Good	Most anti-air units, most planes.
Exceptional	High-end air superiority fighters.

Air detection lengths are not currently know. Note that "Good" optics is anything but for airplanes—the opposing aircraft can get to within medium AAM firing range before it is spotted with these optics. And the B-5 is just blind, really.

Since airplanes fly at roughly the same altitude relative to one another, their spotting radius given any particular level of optics is higher than that of ground-based anti-air units, which have to reach up to the aircraft's altitude.

2.4 Optics Sea

Naval optics exist seperately from regular optics, but naval units can be sighted using regular optics as well: the difference is that units with naval optics are able to spot ships out much further, as this optics type is grossly more effective on the water (and does nothing on land). Nonetheless, recon units can be used to scout ships (all but one lack any stealth, and there's no cover on the water, after all).

Optics Sea	Units
Good	Lynx HA S.2 ASM helicopter.
Very Good	Some ships, most ASM helicopters.
Exceptional	Most capital ships, some ASM helicopters.

2.5 Weapon Firing Noise

Some weapons are "noiser" then others, and this is simulated in the engine with regards to weapons firing. Most weapons, when fired, greatly increase the ease with which a unit can be spotted, but some do more than others— sometimes units can fire their weapons without being spotted at all. A few "silenced" weapons, carried by infantry, are completely silent, and make the unit no easier to spot at all.

Units firing non-silenced weapons are 1 to 8 times as easy to spot. This makes the maximum spotting distance in the game, going off of the values in the previous section, 40000 m, or 40 km. It's rather unlikely, however, that nothing will block the view of spotter at these ranges, at least on the ground.

3 Damage Resistance

3.1 Strength

All units in Wargame have a certain set amount of health or "strength", ranging from 2 to 15 for most units, and between 40 and 300 for naval ones. Infantry units range the most in health for standard units, coming in squads anywhere between two-man sniper teams to fifteen-man heavy infantry and militia squads; ten is the standard amount across all categories, and is particularly standardized among air units and tanks, which emphalmost never veer from that count.

Strength	Infantry Units
2	Scout snipers, ATGM teams, MANPADS teams.
5	Light scouts, Specialist infantry squads.
10	Line infantry squads.
15	Heavy and Militia infantry squads.

Strength	Helicopter Units
4	Utility helicopters.
6	Light helicopters.
8	Medium helicopters.
10	Heavy helicopters.

Strength	Vehicular Units
5	Light units, particularly jeeps.
10	Everything else.

A unit's health is displayed below its name when selected. You can also tell at a glance when a unit is at low health by a "repair" icon that appears above it in-game. Though the use of two to ten blocks for health seems to imply that unit health can only be a whole number, this is not true—the game engine calculates health as a float with 32 units of accuracy, and then rounds up or down when appropriate to give you the displayed health.

The recently added B-5 is the singular exception to this common design point, having 15 health.

3.2 Armor

Armor is applied to the four combat sides of the unit: front, sides, back, and top. Most of the armor in the game comes in the form of tank armor, which ranges from 2/2/1/1 on the most anachronistic surplus-issue cavalry tanks (the Chinese ZTS-63-1 in particular) to 23/11/6/4 on the most up-armored superheavy tank (the Challenger 2).

Combat-capable vehicles tend to have at least 1 armor on the front, sides, and top, and almost always at least one armor in the back, though combat systems mounted on jeeps and trucks usually do not. Tracked units tend to have heavier armor then wheeled ones when serving similar roles, which is balanced against their lower speeds. Wheeled units have a very low cealing to how high their armor can go, with the heaviest units carrying merely 2/2/1/1 armor.

Although all units have the capacity to have armor in the game engine, not all of them use it—infantry can never have armor. Only two series of planes have (light) armor, the A-10 Thunderbolt II and the Su-25 Frogfoot series (up to 2/1/2/1 on the Su-25T), making them unique amongst planes. Most heavy attack helicopters have a little bit of armor as well in the front and the sides, with the notable exception of the AH-1 Cobra series—the most heavily armored helicopter, the Ka-50/Ka-52 Akula, has 1/1/1/0 armor.

Max Armor	Unit Class	Units
1/1/1/0	Helicopters	Ka-50/Ka-52 Akula
1/1/1/1	Supply unit	MTP-LB
2/2/1/1	Wheeled units	Various
2/1/2/1	Airplane	Su-25T
7/3/2/2	Infantry carrier	BTR-T
15/6/3/2	Anti-air guns	Challenger Marksman
20/9/3/3	Control vehicles	T-80UK
20/12/6/3	Support vehicles	Chimera
23/11/6/4	Tanks	Challenger 2

Units with zero armor on a side vulnerable to attack can be attacked by and take damage from any weapon all the way down to infantry small arms. Units with 1 armor where attacked are considered “bulletproofed” and take very little damage from small arms fire, 0.1 damage per unit of HE. Units with more than 1 armor ignore damage from small arms fire completely, and can only be killed by infantry when hit with their anti-tank launchers. A high enough armor value will in some situations prevent a unit from taking any damage at all!

4 Range

4.1 Range – Ground

Range against ground is the range of the weapon against targets on the ground (this includes landed helicopters). Most units are able to attack in this domain

even if only in terms of self-defense, with the notable exception of most missile anti-air systems. Ranges go from 455 m for infantry submachine guns to 42 km (effectively the entire map) for super-heavy artillery systems. Range modifies accuracy and damage in important ways, something which will be discussed in the damage subtypes section.

Range	Weapon Type
455–980 m	Infantry small arms.
1225 m	Grenade launchers.
525–1400 m	Infantry launchers.
1575–1750 m	Autocannons.
1575–2275 m	Tank cannons.
1050–2975 m	ATGMs.
2975–3500 m	Air AGMs.
4200–5250 m	SEAD missiles.
Up to 6125 m	Naval guns.
3850–7700 m	Mortars.
12200–42000 m	Artillery.

Ships are considered part of the ground domain, and any weapons that can fire onto ground units can fire onto ships. Whether or not these weapons are effective are another question.

Range	ASM Type
4200–4900 m	Helicopter ASMs.
4200–6300 m	Air ASMs.
4900–7700 m	Ground AShMs.
5250–9450 m	Naval ASMs.

4.2 Range – Helicopters

Range against helicopters. Autocannons and machine guns can attack helicopters are close range. On planes, infrared (short) AAMs can attack planes, as can their cannons.

Note that guided anti-air missiles that fire at helicopters that encroach their range will fail if the helicopter then leaves their range while the missile is in the air.

Range	Weapon Type
525 m	Grenade launchers.
525–1050 m	Machine guns.
1575 m	Autocannons.
2100–2625 m	MANPADS systems.
1750–2800 m	Anti-air guns.
2275–3325 m	IR anti-air missiles.
2100–3500 m	Radar anti-air missiles.
Up to 3500 m	Naval anti-air missiles.

Range	Weapon Type
1575 m	Unguided air-to-air rockets.
1575 m	Autocannons.
1750 m	Short AAMs.

4.3 Range – Airplanes

Range against airplanes. Most weapons cannot attack airplanes—defense against them is the domain of dedicated anti-air units.

Note that guided anti-air missiles that fire at airplanes that encroach their range will not fail if the airplane leaves their range while the missile is in the air.

Range	Weapon Type
1750–2625 m	Anti-air guns.
1820–2625 m	IR anti-air missiles.
3150–4550 m	Radar anti-air missiles.
Up to 4900 m	Naval anti-air missiles.
5600 m	PATRIOT air nukes.

Range	Weapon Type
2100 m	Unguided air-to-air rockets.
1575–2800 m	Autocannons.
3150–4200 m	Short AAMs.
4900–7700 m	Medium AAMs.
10500–11900 m	Long AAMs.

5 Attack Power

5.1 Caliber

This statistic does not in of itself have any impact on the game, though larger-caliber weapons generally do more damage.

5.2 Ammunition Carried

The number of rounds of ammunition carried for the weapon. This statistic is most important for missile systems, which tend to come in limited numbers. In most other cases you'll run out of fuel or health before you run out of ammo. Since MLRS systems fire all of their rounds at once, their ammunition carried acts as their salvo size. Ammunition ranges from 1 (some bomber payloads) to 9000 (the STRV 103C's machine gun) rounds.

Magazine Size	Weapon System
2–8 missiles	Heavy anti-air systems.
4–10 missiles	Medium anti-air systems.
4–12 missiles	Light (IR) anti-air systems.
2–12 rockets	Infantry launchers.
20 or 50 rounds	Infantry sniper rifles.
24–48 rounds	Tank cannon rounds.
2–80 missiles	MLRS systems.
10–96 rockets	Unguided rockets.
330–840 rounds	Autocannons.
330–2000 rounds	Anti-air guns.
320–4800 rounds	Infantry small arms.
300–9000 rounds	Mounted machine-guns.

5.3 AP Power

AP stands for "Armor Penetration" and is a measure of the units armor-penetrating power. AP ranges from "None" for HE-only weapons up to 30 for high-end AGMs, and all the way up to 200 for high-end AShMs.

AP	Weapon System
1–3	Autocannons.
5–10	Cluster bombs.
10–24	Infantry anti-tank launchers.
6–24	Tank cannons.
13–25	ATGMs.
26–30	AGMs.
60–200	ASMs and AShMs.

The formula for AP damage against units with at least one unit of armor on the side attacked is ((AP - Armor)/2) + 1. So a 30 AP AGM does 5 points of damage to a tank with 22 armor—the Challenger 2 is thus unique in that it is the only tank, with its 23 armor, to survive two hits from 30 AP AGMs to the front.

Against vehicles with zero armor weapons with AP will instead do exactly double their AP in damage. Factually this means that even the lowest-AP weapon will kill unarmored targets in one shot (as, excepting autocannons, they all deal more than the 5 AP required to do so), and is the larger half of the reason that bulletproofing on units is a useful property.

For a tabular breakdown of AP damage see: `https://www.dropbox.com/s/l2u8w7tuj7igiul/WargameRD_Hidden_Knowledge_Spreadsheet.xls`.

An important note to make is that cluster bombs do more damage then they may at first seem to: they deal damage against units' top armor, which is always much less then their ground-combat frontal armor.

5.4 HE Power

HE stands for "High Explosive". HE damage is directed against units without armor, and against infantry in particular—weapons lacking AP will do their HE damage instead. HE ranges from 0.5 for some light machine guns all the way up to 20 for 1000 kg bombs (and, in its hardy spirit of break design philosophies, 30 for the B-5's 2000 kg bomb). All weapons have either AP power or HE power; weapons with only AP power (for instance, AGMs) cannot target infantry, which can only be hurt by HE damage.

HE	Weapon System
0.5	Flamethrowers.
0.5–1	Small Arms.
1	Autocannons, grenade launchers.
3–4	Sapery launchers.
3–4	Tank cannons.
3–8	Air-to-air missiles.
3–9	Anti-air missiles.
10–20	HE Bombs.
30	B-5.

Infantry small arms will only do damage at units with 0 (x1.0) or 1 (x0.1) armor; units with higher armor, they cannot damage with their rifles. The damage done by other HE weapons drops less precipitously—indeed, it does full damage at armor 1—but still drops to 0.1 by armor 6, and to 0.01 by armor 14. For a full list of HE versus armor values see `https://www.dropbox.com/s/l2u8w7tuj7igiul/WargameRD_Hidden_Knowledge_Spreadsheet.xls`.

The most interesting application of this mechanic is that it controls how much damage HE bombs do against armored units, for instance, how much damage two precision-guided 20-HE Paveway II can be expected to do against top armor, after the Nighthawk's recent buff.

Damage	Roof Armor	Units
40	0	Unarmored units.
40	1	Bulletproofed units. Cavalry tanks.
16	2	Mid-low tiered tanks. A few suport units.
12	3	Mid-heavy tiered tanks.
8	4	Heavy and superheavy tanks.
6	5	T-80BU superheavy tank.

Take note of that the next time you try to Nighthawk a tank!

5.5 HEAT

Weapons with the HEAT ("High Explosive Anti Tank") tag always do at least one damage, even when their AP is less then the armor of their target, and they will always fire if a target presents itself in range. All anti-tank missiles and some light tank cannons are HEAT weapons.

5.6 KE

Weapons with the KE ("Kinetic Energy") tag will not be able to do any damage if their damage output is less then the target's directed armor—instead they will display that their weapon is "Inefficient". However, every 175 m closer to the target from maximum range that the unit gets, its AP rises by 1. This allows weak tanks to seriously damage heavy ones at close ranges, and the BMPT to clean up weak tanks at close ranges with its autocannon, for instance. This is an important and desirable property for tanks to have—and indeed, the vast majority do. Combined with the range bonus, which also occurs every 175 m under maximum range, this makes maximum range an important aspect of damage output for these units.

The highest achievable gun AP in the game is a shot fired at point blank range by an M1A2. 24 base damage plus a 12 AP bonus makes for 36 bonus damage per shot, enough to one-shot any other vehicle with 17 or less armor.

For a set of armor damage efficiency visualizations, see `http://imgur.com/a/TJCI7`.

5.7 Firemodes

Fire and Forget missiles, once launched, will behave independently of the launching platform. After a recent engine tweak, they also behave independently of whether or not the unit is still sighted after the missiles have been launched—you can kill units you don't see quite often.

Semi-Active missiles must be guided to the target by their launching platform, though the launcher need not stay still while the missile is in the air. Targets that escape visual sight or exit range while the missile in the air will be spared a hit chance. Helicopter-launched AGMs are a notable exception (as are air ones), as they will continue to home while the target is in sight, regardless of the launch platform's range to target. This was a fairly recent buff.

Guided missiles perform similarly to SemAct ones except in that they cannot be used on the move—the launch platform must stand still to aim, fire, and direct the missile, and cannot move until after an impact or a miss.

Gunned weapons lack a firemode tag. Their to-hit calculations are made at firing, and once the round is away it will hit or miss regardless of the states of the target or of the launch platform.

6 Accuracy

6.1 Base Accuracy

Accuracy determines, all other variables notwithstanding, how often a weapon will hit a target. Base accuracy ranges from 10 percent to 75 percent, with the exception of some ASM launch platforms, which can reach up to 85 percent accuracy (ships are... kind of hard to miss). A weapon's damage output depends on its accuracy and its rate of fire: thus while 25% accuracy is all right for a

Vulcan firing at 122 RPM, 30% is unusable for a MiG-21PFM loaded with high-value AGMs.

Accuracy	Weapon Type
10–30 %	Machine guns.
15–70 %	Tank cannons, autocannons.
25–65 %	Guided missiles.
35–70 %	ATGMs.
40–85 %	ASMs.

6.2 Size

A unit's size applies a relatively small accuracy buff or debuff for units firing on it. Sizes range from "Very Small" to "Big", and this stat occurs in all units besides ships and planes, including infantry, which are universially Very Small. The magnitude of the effect ranges from -10% to +5%. The cutoffs for what is considered "medium" or "large" is very arbitrary.

Size	Accuracy Change
Very Small	-10%
Small	-5%
Medium	No change.
Large	+5%

6.3 ECM

ECM is a statistic present on aircraft that does what Size does for ground units, but to a much larger extent, causing incoming missile (and gun) fire to be progressively less accurate than normal. ECM ranges between 0% and 60%, where only the EF-111A Raven has 60% ECM—the rest cap out at 50%.

ALB Descriptor	Percentage Debuff
None	0%
Bad	-10%
Medium	-20%
Good	-30%
Very Good	-40%
Exceptional	-50%
Exceptional	-60%

6.4 Distance

Every 175 m closer to a target a unit is below maximum range increases its accuracy by 5%. Thus, at point blank range, even tank cannons which are noramlly 20% accurate hit almost every shot. The maximum achievable accuracy is still 85%, as always, meaning that accurate weapons, at close range, have a very

high chance of causing a critical hit. This also means that a higher maximum range tends to contribute to a units accuracy in combat.

This effect is present only on direct-fire weaponry—guns, autocannons, grenade launchers, and so on. Missiles do not get an accuracy bonus no matter what their distance to the target is—thus, ATGM teams tend to fare worse against target at point blank ranges than high-quality anti-tank launchers.

To get a weapon's maximum accuracy bonus, divide the weapon's range by 175 and then round down if you get an integer, or subtract one if you get a whole number (you have to do this because the accuracy bonus is incremental, and because units cannot ever be within zero meters of one another).

For example: the gun with the longest range in the game is the BMP-3's 2450 m range 2A70 cannon (all other cannons max out at 2275 m). 2450 / 175 = 14, and we subtract 1 from this to get 13. Multiply by 5% to get the game-maximum +65% accuracy bonus for firing at point blank range on land.

The maximum air-to-air bonus is +75% on 2800 m range air-to-air autocannons.

The maximum naval bonus and the maximum bonus in the game is a whopping +170% on the Kongo's 6125 m range main cannon.

An interesting property to make note of: most, though not all, of the weapon ranges in Wargame are multiples of 175 m.

6.5 Veterancy Bonus to Accuracy

Probably the most important effect of veterancy is the bonus it gives to accuracy. These bonuses occur in multiples of 8%.

Veterancy	Bonus
Rookie	0%
Trained	+8%
Hardened	+16%
Veteran	+24%
Elite	+32%

6.6 Critical Hits

There is a base 1% chance that whenever a unit is hit by a weapon it will recieve a critical hit with an additional, randomized, negative impact. Even weapons that fail to damage the unit can impart critical hits, and, naturally, the higher the weapons rate of fire, the larger the chance and incidence of critical hits it imparts. Critical hits can be inflicted on any unit—vehicle, tank, plane, helicopter, or ship—except infantry. Since critical hits tend to cause additional damage as part and parcel of their impact, critical hits caused by sufficiently high-damage units can insta-kill where it normally wouldn't be possible, or cause damage with weapons that normally could not do any. Heavy anti-air missile carriers generally, and BUK-M1s specifically, are famous for this.

At the same time, the maximum accuracy in the game, accounting for all bonuses, is 85%. What links critical hits and accuracy together is the fact that any accuracy achieved that goes above 85% is added onto the critical hit chance instead.

For instance, while tank cannons rarely deal criticals at extended ranges, they can impart life-threatening ones at point-blank ranges, a fact that particularly works in the favor of weaker-gunned tanks.

The highest possible critical hit chance on the ground is that of super-heavy tank firing its main gun at point-blank range. With 70% base accuracy, a +32% Elite veterancy bonus, a +60% range bonus, and for kicks a +5% size bonus, this translates to a 70% critical hit chance.

The highest critical hit in naval battles is that of a Kongo firing its main gun at point blank range. Kongos come in Hardened (+16%) with a cannon with 40% base accuracy, and its maximum range bonus is +170%. This translates to 85% accuracy and 40.28% critical hit chance at point blank range—indeed, ships engaging in naval battles at point blank range quickly get covered in critical hit effects.

6.7 Stabilizers

Stabilizers, only present on guns and gunned units, are a measure of how accurate a weapon is while firing on the move. No weapon is as accurate firing on the move as it would be while standing still, but some can still maintain a decent rate of damage while maneuvering. Missiles do not have stabalizers, for reasons that should be obvious. Stabilizers used to be applied as a multiple to overall accuracy, but in Red Dragon this was changed to flat hit chance while moving. This statistic range from 0% or "None", in which case the unit cannot fire on the move at all, to 65% for the highest-quality heavy tank stabalizers.

6.8 Effect of Morale on Accuracy

A unit's morale has a strong effect on accuracy (the precise mechanics of morale are the topic of another section). The effects of morale are -20% accuracy for a worried unit, -40% for a shaken unit, and -60% for a panicked one. The minimum accuracy in the game is a hilariously impotent 4% for rookie innaccurate panicked machine gun units firing at the edge of their range.

7 Turrets

All weapons in the game are mounted on "turrets" in engine terminology, even when this isn't strictly the case (for instance, missile carriers).

Different turrets have different cones of fire. Some have a 0 degree cone of fire—they must be aimed exactly at the target in order to fire (for instance, tank cannons).

For these units the most important attribute is the unit's and the turret's turn rate—how quickly the unit can pivot itself and/or its weapon around to take another shot. This is an important attribute even with weapons with a more generous cone of fire (particularly airplanes) as it determines the speed with which they can turn into an attack.

Cannons have a 0 degree cone of fire, for obvious reasons. Most missiles—short AAMs, medium AAMs, AGMs, AShMs—have a 70 degree cone of fire, but there is a great deal of variation amongst naval ASMs. Long AAMs have a 30 degree cone of fire. Ground-based anti-air missiles have a 360 degree of fire—they target independently of where their turret is facing.

The B-5 once again breaks the rules, this time in the company of the IL-102, by mounting a backwards-facing turret that can only fire at units behind the plane.

8 Rate of Fire

Rate of fire tells you how quickly a weapon fires in either rounds per minute or in terms of reload time.

The rate of fire displayed in unit cards is, in many cases, a highly derived statistic that makes little sense. This is particularly true of fast-firing machine guns and cannons, and can even affect missile carriers—the Gazelle 341F Celtic, for instance, lists a 20 second reload time for some reason. Rate of fire tries to take into account a lot of in-game variables, and basically, completely fails to do so.

8.1 Aim Time

There is a certain aim time that takes place before every burst, shell, or missile, and begins as soon as the target enters sight. This does not account for whether or not the turret is turned to face the target—a tank that turns around to hit a faraway missile carrier will often manage an "instant" shot because turning it turret clocked its entire aim time.

Aim Time	Weapon Type
0.2–1 sec	Anti-air guns.
0.4 sec	Most weapons.
2 sec	Interceptor missiles.
4–10 sec	Mortars.
10 sec	MLRS systems.
10–35 sec	Artillery.

There are exceptions. Interceptor missiles have a 2 second aim time.

If a unit exits vision or range, even briefly, the unit's aiming is disrupted. This causes missiles to auto-miss and projectile weapons currently being aimed to have to restart aiming.

After the shot is fired, or lands or misses in the case of guided weapons, the unit must re-aim its weapon. taking at a minimum another 0.4 seconds to fire again.

8.2 Reload Time

All units have a reload time. Weapons begin their next reload cycle as soon as the current weapon is fired. This allows missiles fired at long ranges, for instance, to reload almost instantly. Note that since weapons still have to re-aim after shots you still have to wait a minimum of 0.4 seconds to fire again, but if the weapon has not finished reloading yet, you will have to wait longer.

8.3 Effect of Morale on Aim and Reload Time

Morale damage degrades aim time and reload time. Units take 33% longer to aim and reload when worried, 100% longer when shaken, and 200% longer when panicked.

8.4 Autoloaders

However, units with autoloaders, something not explicitly shown in the game but which will soon be added into the game as an AUTO tag, will not take longer to reload their weapons—though they will still take longer to aim.

See `http://www.wargame-ee.com/forum/viewtopic.php?f=155&t=47156` for a list of units with autoloaders.

8.5 Bursts

All weapons in the game are fired in bursts, even if they are only bursts of one in the case of missiles and tank cannons. Each burst has an equivalent rate of fire and equivalent burst fire time; at the end of the burst the unit must reload according to its reload time.

The ratio of burst time to reload time is what determines a unit's rate of fire.

For an analysis of AAA rates of fire see `http://www.wargame-ee.com/forum/viewtopic.php?f=155&t=47156`.

The mechanics of burst fire is the primary reason why the ROF statistic in the armory can be so wildly inarticulate.

Probably the most visible instance of burst fire mechanics is the one-two firing of MiG-31, 31M, and F-14 Tomcat long AAMs, with a one second delay between individual missiles.

8.6 Effect of Squad Size

The size of an infantry squad affects its combat ability, but not in the way you would expect. As the size of a squad decreases, whether due to squad size or to

damage the squad has recieved, the unit's reload time increases. This is due to the way that the engine works—burst length and rate of fire are immutable, as infantry units are considered a special type of vehicle by the engine.

This effect compounds with morale, making heavily damaged and suppressed infantry units extremely slow to fire (and extremely inaccurate at that).

9 Morale

9.1 Suppression

All weapons in the game deal suppression damage, anywhere between 46 and 1500 suppression damage per impact. Weapons will deal their full suppression in damage on imapct, but near misses will also do damage within a certain "suppression radius" that is related to the weapon's dispersion radius.

All units enter the game with 0 suppression damage, and the maximum damage a unit can have at any one time is 800.

Suppression	Morale
0	Fine.
200	Worried.
400	Shaken.
600	Panicked.
800	Suppression cealing.

Armor has nothing to do with suppression, and for this reason even weapons which do no or minimal damage to a target will auto-fire at 350 m or less for the purposes of suppressing the target.

9.2 Suppression Cooldown

Units which have recieved suppression damage slowly recover their morale. The base morale recovery rate is 20 morale per second, and it is increased by veterancy.

Bonus	Rate	Veterancy
+0%	20	Rookie.
+150%	30	Trained.
+200%	40	Hardened.
+250%	50	Veteran.
+300%	60	Elite.

A Rookie unit at 800 suppression will take 40 seconds to return to Calm, while an Elite one in the same position will take only 13 1/3 seconds.

9.3 Stunning

If a unit takes 300 suppression damage within the space of a second it will be stunned for 8 seconds, rendering it unable to do anything and breaking whatever action it was taking before it got stunned (helicopters can still move while stunned, but will flip around in the air perhaps unrealistically). Not currently know how long a stun lasts, but units do seem to be immune to stunning... while stunned. They temporarily do not recover morale, however. A unit that gets out of a stun has to repeat its aiming cycle, though not its reload.

Some say that airplanes that are stunned lose ECM protection. This has not been tested, but does seem likely.

9.4 Veterancy Bonus against Stun Time

Stuns are much more effective against lower-veterancy units then against more elite ones.

Bonus	Stun Time	Veterancy
-0%	8 sec.	Rookie.
-19%	6.4 sec.	Trained.
-39%	4.8 sec.	Hardened.
-60%	3.2 sec.	Veteran.
-80%	1.6 sec.	Elite.

10 Dispersion

10.1 Artillery and Mortar Dispersion

Dispersion is a statistic that's listed up-front on artillery and mortars. The lower the dispersion, the tigher the artillery's cone of fire—the more accurate it is.

Artillery has the same dispersion at all ranges in which it can fire. True dispersion in the game is actually the listed dispersion divided by 74.28571429.... In-game dispersion ranges between 3640 and 9400 m, or between approximately 49 and 127 m.

Mortars have between 2275 and 3640 m of dispersion, which translates to about 30 to 49 m of dispersion.

Artillery and mortars have half as much dispersion against locations that are spotted by other units.

10.2 MLRS Dispersion

MLRS dispersion is the same as artillery dispersion, except for the fact that MLRS systems have a minimum and maximum dispersion value—they are significantly more accurate at close ranges than at long ones.

MLRS dispersion ranges wildly between 35 m minimum for the magical ATACAMS cluster rocket MLRS, and 2624 m for a BM-30 Smerch firing at the edge of its range.

10.3 Dispersion for non indirect-fire weapons

For non-artillery units, dispersion is important because it interplays with suppression—even when a weapon misses, if it's not a missile it can still cause suppression damage. You can see the dispersion of a weapon manually by telling it to fire pos at something—the circle that is drawn is the radius of your shot, and therefore, your dispersion. Highly accurate weapons can also be used to fire pos against targets that cannot be seen, but can be splashed.

Non indirect-fire units do not list a dispersion in their statistics, but you can infer it from their accuracy, as there is a scalar relation.

10.4 Veterancy Bonus against Dispersion

Veterancy decreases dispersion. However, according to the armory tooltip this only applies to artillery units.

Bonus	Veterancy
-0%	Rookie.
-10%	Trained.
-19%	Hardened.
-30%	Veteran.
-39%	Elite.

10.5 Morale Malus to Dispersion

Unknown.

11 Ballistic Velocity

Different weapons in Wargame have different airspeeds. This is most important for missiles, which have a relatively low airspeed—the faster the missile the less of a chance your foe has of getting out of ranging and escaping, something particularly important to helicopters.

Small-caliber machine guns are hitscan weapons—their bullets instantly reach and damage the opponent, assuming they land the shot. This is done to (greatly) reduce hardware stress, since bullets reach their target almost instantly anyway.

Most missiles seem to have one of two airspeeds, a slow speed used by most ground-attack missiles (TOWs and down, Kokons and down), ground or naval ASMs, and heavy anti-air missiles, and a fast speed used for high-end ground-attack missiles (Hellfire, Ataka V, Vikhr, most REDFOR tank ATGMs), air AGMs, air ASMs, SEAD missiles, and light anti-air missiles.

All cannons and autocannons seem to fire at the same high, but not instantenous, velocity.

Testing shows that the speeds of the various air-to-air missiles are, approximately, 2500 meters per second for long AAMs; 2400 meters per second for medium AAMs; and 2100 meters per second for short AAMs.

12 Supply

Supply units contain a certain amount of supply, which are provided to units that have not changed morale status or been delt damage for a sufficient length of time (uncertain), in a certain radius. Multiple units can draw supply at once—there is no upper limit. There are three types of supply, fuel supplies, repair supplies, and ammunition supplies, and units can draw all three simultaneously.

Note that, like, health, supply carried is stored as a float, but displayed as an integer.

12.1 Supply Rates

Supply works the same for fuel and health regardless of the unit. However, the supply rate for different weapons varies as it is dependent on their supply cost—an arbitrary number that determines how much supply a unit of ammunition of the weapon consumes.

Type	Per Second Cost	Per Second Supplied	Per Unit Supplied Cost
Fuel	5	30	1/6 per unit of fuel.
Health	5	0.1	50 per unit of health.
Ammo	25	25	Varies by weapon.

12.2 Ammo Supply Rates

A unit of ammo takes anywhere between 5 and 3000 units of supply to resupply. This means that the maximum resupply rate is 5 units of ammunition per second, and the minimum is two minutes.

12.3 Air Unit Resupply

Air units automatically resupply in the airport once they have evacuated. If they have to resupply any of their individual weapon loadouts, they will have to resupply *all* rounds of the weapons in that category, which can have quite a large effect on how long you have to wait before your unit is operationally available again.