**Design Document for:**

# Longo Shooter

**The game where I made up amazing mechanics**

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# Game Overview

**Intent**

This Document is designed to discuss the combat mechanics of a hypothetical multiplayer sci-fi shooter. In it, we will explore some of the formulas and ideas behind the mechanics, as well as how we anticipate that will work in an actual game.

## Goals:

* To emulate a multiplayer shooter concept in a science fiction setting
* To use the mechanics and weapon types to encourage more dynamic gameplay with many different play styles.
* To create meaningful choice for the player in how they balance the character to suite their own play styles.
* To balance offense and defense so that both can be equally viable strategies.
* To encourage tactics and skill with gameplay that is relatively fast paced overall, but still gives the players plenty of defensive and tanking options to be able to draw it a little more.

## Philosophy

### Philosophical point #1

The most important point here create a game where the player balances key aspects of the mechanics to help them create different the kind of characters best suited to their play styles. For instance, the players can balance the choice of being more tanky with being more mobile. Individually, there are a lot of aspects here that have already been done in other shooters. But not all of them have been tied together in this way before.

### Philosophical point #2

Our game has a sci-fi theme because it best fits the mechanics and planned weapons. For instance, there is an energy system. Energy weapons, healing, tech/repair, and jetpacks can all use it. These elements are best suited to a sci-fi setting. Most of the other aspects of the game could also fit into a more modern or near future them. However

### Philosophical point #3

It will be important to implement custom player characters. Some games use premade characters with their own lore, theme, and different play styles that are slightly adjustable. However, this takes away a lot of the inherent freedom and sense of self a player can have when creating their own character. Given that we want the players to balance key aspects of the mechanics and what they choose to focus on, it makes more sense to allow them more freedom to pursue this.

## Combat Overview

The combat system is built upon key aspects of the mechanics. Armor allows the player to go for more defense while sacrificing some potential speed, go for more speed while not being as tanky, or finding more of a balance between the two. This also plays into the movement mechanics, where movement speed and bonuses are balanced against things such as the weight of the gear and stamina meters. There is also an energy system the can feed healing, energy weapons, tech/repair, and jetpacks. But since there is a limited amount of energy, the player must balance what they want to use that energy on.

Players choose what aspects to focus on and how to apply that to the shooter gameplay.

Aim plays off of accuracy and recoil. The more successive shots you fire at your target the less accurate you become due to things like recoil and aiming getting harder. An enemy may have high defenses. But eventually, those armor protections will start to depreciate and they will become easier to kill the more you damage them. Good offensive weapons can make attacking more effective. Movement can be an offensive tool, allowing players to get to key spots sooner or take less time to advance.

On defense, much of how long you last will be determined by your health and armor protections. Movement also raises your defense better by making it easier for you to evade. So weighing being mobile with being bulky leads to key choices on that end. The gear a player also has weight. How much you weigh will directly impact how well and fast you move.

## Player Resources

### Health

The most important stat in the game is health because it determines if a player is alive. When a player takes damage, they lose a portion of that health based on the weapon's base damage and the damage formula. Anything above 0 health and they still live. Once a player gets down to 0 health, they die. The greater the total health, the more damage a player can take before dying. This is all pretty standard. Health does not naturally regenerate. However, health can be replenished through healing.

### Stamina

Stamina is used for things typically related to all but the simplest movement. Players have a default stamina of 100, but can get extra bonus stamina. Most movements beyond regular walking requires stamina. Sprinting, jumping, sneaking, and dodge rolls are all forms of movement that draw from the stamina resource pool. Most weapon attacks do not use stamina. However, the stamina resource can be required for certain advanced melee moves and blocking.

When not in use, the stamina meter will start to recharge. This may take a few seconds, depending on how much total stamina a player has and how much was used.

### Energy

Energy is a resource pool for tech, jetpack packs, and certain weapons. All of these things require energy to use. A player has 100 total energy by default. But they can increase their total energy with certain bonuses. when not in use, energy will recharge over time based on the formula.

## Weapons

Weapons help give the players options in combat. Different weapons can lend themselves better to different play styles. Players can also combine these to help create their own play style. For example, they could use a close ranged primary weapon to supplement their longer ranged primary weapon or vice versa. Then they add in other weapon types to help round out what they do. Players typically have access to a wide range of weapon types for their load out to encourage diverse gameplay.

## Weapon Stats

### Base Damage

This is how much a weapon does per hit before defensive calculations. When a weapon is based on healing or repair, the base damage stat becomes how much health the weapon replenishes instead. Typically, defenses mean that the actual damage a weapon does will be at least a little less than its base damage implies.

### Fire Rate

Fire rate is how fast a weapon can fire off its shots over and over again. A fast fire rate means the weapon has more opportunities to hit and apply damage or healing/repair.

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| **Fire Rate Formula:** | FR = weapon fire rate |

Fire rate is shots per second.

### Effective Range

Effective range is how far a ranged weapon can normally damage (or heal/repair) a target at. Any calculations made beyond the effective range of a weapon will have a penalty on base damage. The farther outside the effective range, the greater the penalty. Too far and the base damage will eventually be 0.

### Accuracy

Accuracy is how often a ranged weapon can hit what it is aimed at, assuming perfect aim from a player. This is calculated using a formula based on the area of a circle. The player moves the circle around as an aiming tool. A weapon attack can come out in any trajectory that is relatively straight ahead, but from an angle circle. The smaller the circle, the less variation in where the attack can hit. Therefore, small circles represent high accuracy and larger circle represent lower accuracy.

The aiming circle also grows in size during sustained firing. So the longer the sustained fire, the less accurate the weapon becomes. This quickly goes back to the default after a break in firing. This mechanic is to discourage or at least give a tradeoff for blindly spraying the enemy instead of deliberately aiming each shot.

Advanced movements like sprinting and jumping will also make the aiming circle temporarily larger.

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| **Bullet Spread Formula:** | spread = (((100 - accuracy)/2) \* 3.14 )^2 \* (T/2) |

Spread refers to the size of the aiming circle.

((100 - accuracy)/2) This is calculate the base number for the circle size. 100 is used because it represents what perfect accuracy would be. Accuracy refers to the weapon stat accuracy. The /2 is to simulate a radius in the typical circle area formula. No weapon has perfect accuracy. So the highest theoretical accuracy a weapon can have is 99.

For example, an accuracy of 90 would result in a ((100-90)/2) or (10/2) = 5. This would make a fairly small circle area. But an accuracy of 50 would result in (100-50)/2)) or (50/2) = 25. That's 5 times as big a radius!

\* 3.14 )^2 This is meant to represent the circle area formula: A = πr^2

* 3.14 represents π or pie.
* r or radius was found from the previous section of the formula.
* ^2 represents an exponent of to the second power or squared.

\* (T/2) This represents time firing. T is seconds. So firing for 1 second straight would give you 0.5 or half the circle area from the formula. Firing for 2 seconds straight is the equivalent of the rest of the Bullet Spread formula. Firing for more than 2 seconds straight will increase the circle size larger than normal.

### Recoil

Recoil is how much a ranged weapon shakes after firing. This means that the aiming circle is twitched upward. Each shot gives a certain amount of shake before going back to normal. Firing in succession will combine the shake and make the ranged weapon increasingly more difficult to control the aim of. More deliberate shots will decrease the stacking of recoil. Most energy weapons tend to have somewhat less recoil than their ammo based counterparts.

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| **Recoil Formula:** | recoil = ((R/5) 0.1 ) (T/2) |

R refers to the recoil stat for the weapon.

((R/5) 0.1) Is to determine the shaking. So a recoil stat or R of 50 would be (50/5)0.1 or 5 \* 0.1 or .5 for a base recoil shake.

(T/2) is to calculate the firing duration to apply the recoil. T is seconds. So For every second, you get .5 shake. So for a recoil of 50, you would get 2.5 shake for 1 second, 5 shake for 2 seconds, etc.

### Portability

Strictly speaking, portability relates to the weight of a weapon. The greater the portability, the less a weapon weighs when the player is holding it. A heavy weapon would have very low portability. This relates directly to movement, as too much weight will slow a player down. If we assume 100% mobility means 0 weight.

### Effective AoE

Effective AoE is like the effective range stat, but for AoE. Instead of being linear and calculating from the weapon shot origin, it is spherical and calculated from the origin of the explosion in all directions.

### DoT Damage

DoT refers to damage over time. Some weapons have an effect initiates a damage, healing, or repair cycle for a limited amount of time. DoT damage functions like base damage, but works on a per tick bases. A damage tick typically happens once every second. Due to the nature of DoT, the same numbers are usually much smaller than regular weapon base damage numbers.

### Duration

Duration is how long a DoT effect lasts. This is usually for a limited number of seconds. For instance, a 5 second DoT effect might have 5 ticks of damage that happens once every second for 5 seconds.

### Ammo

Ammo is how many uses a weapon has. So a weapon with 3 ammo has only 3 uses. Ammo for ranged weapons like guns is often separated into clips. Most ammo based guns get 2-4 clips off. When a clip runs out of ammo, a player must reload the next clip to continue using the weapon.

A few ammo based weapons like the flamethrower might use a type of fuel instead of typical ammo like bullets. In this case, the weapon uses a certain amount of the total fuel every second similarly to energy. But unlike energy, fuel is not automatically replenishing.

### Energy Cost

Some weapons use energy instead of ammo. These weapons cost energy. Energy is given to players in a meter. The default energy is 100. However, players can get bonuses to energy to increase that pool.

### Health

Strictly speaking, health is not a common stat for weapons. But some weapons are peaceable and/or function like a minion and thus need health. Health for these weapons works similarly to player health, and a weapon with health is destroyed when its health reaches 0. Weapons that use health includes things like mines and tech.

## Weapon Types

### Melee Weapons

Melee weapons are made for hand to hand range combat. They can do a lot of damage but have very limited range. Players typically have melee weapons at least as back up options. It can be more of a focus, though. Players that focus on melee will need to work out how they can survive while they close the gap between them and their enemies to get into melee range.

Most melee weapons are unlimited use and have no ammo. They sometimes have special abilities that use stamina. But the default attack typically doesn't use up anything. There are also energy based weapons which use up energy every strike. But this does not necessarily mean that a special ability wouldn't also use stamina. Energy weapons are often better at DPS and may have faster fire rates than their regular counterparts.

There is also blocking. Blocking can reduce incoming damage incoming melee damage. How much depends on the weapon and the player's other defenses like armor. Blocking takes stamina and slowly reduces the players stamina over time. There are shields players can use with certain weapons with high block ratings and zero damage.

### Primary Weapons

These are the main types of guns that the player can use. A player will generally focus on balancing two types of primary guns into their play style. (Although, they can potentially focus on more or less depending on what they carry.) A primary weapon can be ammo based or energy based. Ammo based weapons can be powerful and allow a player to save energy for other things. However, they have limited use. Energy weapons can be used as long as you have energy. But that means it also takes away from other things it could be used for. Energy weapons often (but not always) have faster fire rates compared to their ammo counterparts.

There are 5 main types of primary weapon:

* **Assault Rifle**

Assault Rifles are a very balanced weapon that has a good combination of damage, fire rate, and range. This gun type is fairly versatile and can be used in many different situations.

* **Submachine Gun**

Submachine guns are a close to mid ranged weapon that focuses on beating the opponents with fast fire rates. They typically do less damage per shot than other primary weapons.

* **Sniper Rifle**

Sniper Rifles are a high damaging weapon with superior range. However, their fire rate and clip size is much lower than most other primary weapons.

* **Shotgun**

The Shotgun is a high damaging close ranged weapon that can do spread damage. Its limited range and accuracy mean it can only generally be used effectively up fairly close to the opponent. It also has a lower fire rate.

* **Machine Gun**

Machine Guns are powerhouses of damage and fire rate. They are also powerful enough to hit very far away. However, they have high recoil and low accuracy. This effectively makes them much more close ranged in practical use than their effective ranges might suggest. They are also very heavy and thus their weight can make movement much more difficult. Ammo based machine guns have large clip sizes and a lot of ammo.

### Secondary Weapons

These are backup guns used . They typically have lesser combat capabilities than primary weapons. However, secondary weapons can still be handy in a pinch, particularly if you run out of resources for your primary weapons. For instance, an energy based primary attacker might want an ammo based secondary weapon or vice versa. Or maybe they want to stock up on ammo weapons to save the energy for something else. Whatever the case, secondary weapons mean the player isn't left completely helpless in ranged combat if they run out of juice for their other weapons.

Typically, secondary weapons will be in the form of pistols and are more portable than most primary weapons. (Although there might be a few exceptions). Of these there are two general types. First, there are the ones that do fairly high damage with low fire rate. Then, there are the ones that do low damage but with a better fire rate than the former category. Again, these stats are typically not as good as primary weapons.

### Special Weapons

These are additional weapons that are greatly varied and can offer additional options for a player. Some are focused on support. There are healing weapons that focus on healing allies and tech weapons that are based around building and repairing. These generally use energy.

Some are based more on damage. Things like launchers and flamethrowers are powerful weapons with limited use or expensive energy cost. There are also some more unique weapons. The damaging focused special weapons often have expensive fuel/energy costs or limited ammo/fuel.

### Explosives

Explosives are limited use AoE weapons the player can use. They are meant more as a complimentary weapon than something for Therefore, explosives are either very limited in ammo or have huge energy costs. Energy based explosives usually due less damage than their ammo counterparts.

Typically, explosives consists of three types:

* **Grenades**

Grenades are thrown and explode on landing or relatively shortly after it, depending on the type. They are more meant to be used in the midst of a fire fight than other explosives.

* **Mines**

Mines are trap explosives that are placed. They are set in advanced by the player and are typically best used out of combat. They are triggered when stepped on or by movement within motion detection range. Mines have a low amount of health. They often blow up if they lose all their health. This means players who spot them can take them out. However, they will want to be farther away while doing so because the mines will damage them if they are in the explosion radius. This also means that the mines can be blown up near other players to damage them.

* **Bombs**

Bombs are dropped or placed explosives that have a timer. They must be released close to the players. They can do a lot of damage. However, it can be hard to hit moving players with them, particularly in the middle of a fire fight. They are more meant to destroy stationary targets like tech or to initiate a fight from close ranged stealth.

### Other Weapons

This consists of everything else. The other categories each have slots. And any remaining slots are used for these. Many of these function more like timed abilities than they do as weapons. The ones that aren't like that are typically related to tech. Tech can consists of things like turrets, drones, stations, and force fields. Since certain special weapons are based on supporting tech, players who use tech often use these in conjunction.

## Armor

Armor functions as damage mitigation. It is assumed that all players have some armor. The default armor value is 50. More tanky armor will have additional protections to that. Lighter armor may have less than that. However, there is typically at least some protection as no armor starts at -50 protection.

The dynamics armor forces the player to balance are protection and movement. Armor with significantly greater protection than average will typically have less movement. An armor with less protection will typically allow a payer to be more mobile. There can also be a balance between the two.

Then there is something called armor depreciation...

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| **Armor Depreciation:** | depreciation = (armor/25) (damage/100) |

Armor depreciation is a mechanic which was put in place to prevent battles from dragging out because of infinite tanking due to healing and highly protective armor. At some point, the armor weakens. Specifically, that point is after the player loses 100 health. After that, the protections from the armor start to weaken and this formula kicks in. Protections are reset after death.

(armor/25) is because we want the armor to lose protections based on a fourth of its protections. So higher protective armor will depreciate at a faster rate. But lower armor will depreciate slower because they have less protections to lose. This also means that the depreciation rate slows down as it goes on because there is less of a protection bonus to take from. This ensures higher protection armor is punished more. Yet is also ensures that it is not punished more when they are depreciated to the amount of lower tier armors.

(damage/100) is because we want the armor to depreciate at an average of 1 point per 100 damage multiplied by whatever the armor figure intends.

Armor is calculated as the bonus + 50. So an armor bonus of 50 is actually treated as 100 because 50 + 50 is 100. Then it would be (100/25) = 4. So the player would have 4 armor depreciation for every hundred damage.

However, a player cannot gain armor through depreciation. So if the protections are - 25, that means that -25 + 50 = 25. So that modifier will be (25/25) or 1 result in 1 depreciation per 100 damage. That is the lowest number. If the armor comes out to less than 25, the (armor/25) section will simply be treated as 1.

## Armor Types

### Light Armor

Light armor has the lowest protections and is often focused heavily around movement. Most light armor will have negative protections and weight less than other armor types. The light armor that doesn't has 0 or slightly higher than average protections, but at the cost of greater weight compared to other light armors. All light armor has positive a movement speed bonus associated with it.

### Medium Armor

Medium Armor maintains a balance of protection and movement. A player wearing medium armor will not extreme movement or protections. But they also will not often have negative in either category. Occasionally, medium armor on the heavier side will have a limited movement penalty. The protection bonus for medium armor will always be 0 or above.

### Heavy Armor

Heavy Armor has very high protections and is tanking focused. The protection bonus for heavy armor is always 50 or above. This means that all heavy armor doubles the default protections *at a minimum.* Most heavy armor has a negative movement speed bonus associated with it. The exceptions to this will be closer to the minimum heavy armor protection and have 0 or only a slight movement speed increase. All heavy armor has a very high weight. So even the heavy armor with a slight movement speed bonus would typically slow a player down.

## Damage Formula

The damage health results in how much health is taken away. This is calculated by plugging in a weapon's base damage stat, an enemy's defenses, and other factors.

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| **Damage Formula:** | damage = (x - x( 0.01 ((z + armor)/2))) (1 + WB) ( 1 - R ) (ER) (0.8 ~ 1.2) |

Here are what each factor means:

x refers to the base damage of the weapon

+ Armor refers to the default armor value assumed in every player. This value is 50 and constant.

z refers to the armor protection bonus. A positive bonus gives additional protection. A negative bonus takes away from the default 50 protections.

x( 0.01 ((z + armor)/2))) This section uses the above 3 factors to calculate mitigation. The z + armor is the protection. The reason why they are added together and divided by two is to average them out. We then multiply x or base damage by 0.01 of that to get our base mitigation, which is then subtracted from weapon's the base damage or x to get the main part of the real damage.

(1 + WB) - WB means total weapon type bonus. This calculates For example, a 50% bonus for a weapon would give a WB of 0.5 and then that would be added to 1 for a total of a 1.5 damage multiplier. A 10% bonus would be a 1.1 multiplier. Etc.

(1 - R) - This R refers to resistance. This section was added because certain gear or bonuses have resistance to certain weapon types. Most of the time, R will be zero and the formula will just be multiplied by 1. But if there was a resistance, For instance, a 20% resistance to fire damage would be the equivalent of - 0.2 and 1 - o.2 would result in only 0.8 as much total damage.

ER refers to the effective range and is decided by this formula:

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| **Effective Range Formula:** | If range traveled <= weapon effective range, ER = 1 | | | | |
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|  | Else, ER = (1 - (range traveled - effective range) | | | | |

In other words, the default effective range value is 1 and would have no impact on the formula. This assumes the weapon hits in effective rates. But beyond effective range, the extra distance traveled is calculated based on the bottom section where it is then subtracted from 1 to create a negative multiplier.

(0.8 - 1.2) This section is basically adding slight variation in the damage. This is so that the damage is not completely static from hit to hit. The variation is small so that it isn't too luck based. But a slight RNG adds a slight variety.

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| **Healing Modifier:** | healing = (x - x( 0.01 ((z + 75)/2))) (1 + WB) ( 1 - R ) (ER) (0.8 ~ 1.2) |

Healing functions like damage, but by replenishing health instead of taking it away. Still, the calculations for finding the number are almost exactly like the regular damage formula, but applied positively to health instead of negatively. The main difference is the armor is replaced by the static 75. This means that all incoming healing will be that much less effective than incoming damage from the same base values.

For instance, a base damage number of 25 against an armor protection of + 25 would be calculated as damage as...

25 - 25(0.01(( 25 + 50)/2)))

25 - 25(0.01((75)/2)))

25 - 25(0.01(37.5))

25 - 25(0.375)

25 - 9.375 = 15.625

However, for healing those same numbers would be calculated as...

25 - 25(0.01(( 25 + 75)/2)))

25 - 25(0.01((100)/2)))

25 - 25(0.01(50))

25 - 25(0.5)

25 - 12.5 = 12.5

So in that scenario, the damage dealt is 16.625 but the damage healed is only 12.5. That is a healing deficit of 4.125.

## Movement and Stamina

Movement is very important in this game. Being fast allows you go get places and get out of the way faster. Stamina allows you to use more advanced maneuvers, but acts as a cap to avoid he unlimited spamming of them.

### Movement

Movement is based on the default movement speed, which is assumed to be 100%. The actual player movement speed is then found by applying that with negative and positive modifiers.

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| **Movement Speed:** | speed = 100% - ((weight - strength)/1) + B |

There is no negative number for ((weight - strength)/1); if < 0 then = 0

Weight is a negative modifier and presents how much the gear weighs. It negatively impacts speed as a percentage.

Strength is how much weight a player can carry beyond the default amount without impacting their movement speed. It can cancel out weight by however much strength the player has. This is why it is subtracted from weight in the formula. It is also why any calculation that results in excess strength over said weight is simply calculated as zero. A player cannot gain speed from positive strength numbers.

B refers to speed boosts. It is the total sum of any speed bonuses the player may have. Armor typically has a speed bonus. B can be positive, negative, or neutral. A negative speed bonus from armor can make the B a negative stat that further decreases speed. If B is 1 then it will have no impact on a player's speed.

Weight is calculated with the following formula:

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| **Weight Formula:** | weight = ArmW + WeapW + G - 50 |

ArmW is the weight of the armor. This is in the stats of the armor.

WeapW is the weight of the weapon. Only the weight of the weapon the player is holding is factored into this. What that creates is a dynamic where using more portable weapons will have less of a factor on total weight, and vice versa.

G refers to the total weight of other gear such as jetpacks or backpacks. Anything beyond armor or any weapons that are carried beyond the basic slots in a backpack will increase the weight.

- 50 is there because it represents the default carrying weight a player can tolerate without it impacting movement speed.

### Stamina

Stamina is used for advanced movements. It acts as was described in the player resource section. Movements that use stamina are advanced movements. Sprinting, jumping, sneaking, and dodge roles fall into this category.

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| **Sprinting Formulas:** | Sprint Speed = (speed \* 2) (1 + SM) | | | |  | SM = sprint speed modifier | | |
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|  | Sprint Stamina Usage = (25) (1 - SU) (T) | | | |  | SU = stamina usage modifier | | |

**Sprint Speed** refers to how fast a player moves while sprinting

speed refers to the default movement speed of a player, as calculated in the movement speed formula.

We multiply speed \* 2 because sprinting is roughly double the speed of walking by default.

SM is a sprint speed modifier, which means that players can get positive or negative bonuses. Like previous modifiers, it is added to 1.

**Sprint Stamina Usage** is how must stamina it costs the player to sprint.

(25) is because the default sprint costs about a quarter of the default stamina every second.

(1 - SU) refers to a stamina usage modifier. But in this case, a bonus is subtracted from 1 to be applied negatively. This is because it is better to use less stamina in this case.

T refers to time. It represents the amount of time the player is sprinting for and is measured in seconds. The cost in this formula cost is applied once every second, so the total cost will naturally be multiplied by the number of seconds spent sprinting.

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| **Dodge Roll Formula:** | Dodge Roll Usage = (35) (1 - SU) |

A dodge roll is an evasive maneuver that the player uses. They roll in a direction to get out of the way of incoming attacks. But this costs a lot of stamina per attempt.

(35) is we want players to only be able to do 2-3 of them without replenishing stamina to avoid spam. The default stamina is 100. So a player would have to really focus on stamina to do more dodge rolls.

(1 - SU) is a stamina usage multiplier similar to the one found in the Sprint Stamina Usage formula.

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| **Jumping Formulas:** | Jump Distance = (speed / 100) | | | |  |  |  |  |
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|  | Jump Usage = (15) (1 - JU) | | |  |  | JU = jump usage modifier | | |

Jump Distance is how far as player can jump. But this formula is actually a modifier based on the default jumping distance.

speed appears because jumping is actually tied to movement speed. So a more mobile player will also be able to jump farther. The interesting thing here is that this also means that sprinting increases jump distance.

(speed / 100) speed refers to how fast the player is moving. Normally, this is just the default movement speed. But when sprinting, speed will also changed to the sprinting speed. The reason why we divide that movement speed by 100 is because the default player movement speed is assumed to be 100 without any extra weight. Therefore, a default movement speed with no extra weight would result in a jump distance modifier of 1.

This also means that extra weight can inhibit jumping. Since jump distance is tied to movement and extra weight slows down movement, that extra weight would also shorten jumps.

Jump Usage refers to the stamina a jump takes.

(15) is because we intend a player can only jump like 6 to 8 times in a row without replenishing stamina to avoid too much jump spam. Only a player with too much

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| **Sneak Formulas:** | Sneak Speed = (speed / 10) (1 + SKM) | | | |  | SKM = sneak speed modifier | | |  |
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|  | Sneak Usage = 6 (1 - SKU) (T/2) | | | |  | SKU = sneak usage modifier | | |  |
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Sneaking is a limited stealth technique that sacrifices mobility. Just pressing the sneak button will result in a crouch. This can allow them to or make their hit area smaller. The player can crouch for as long as they like by holding the sneak button. This costs nothing by itself. Although, stamina also does not recover while crouched.

It only begins to cost something when the player moves while crouched. This is how you sneak.

Sneak Speed is lower than the average movement speed. This is done because you are also much quieter. Situations where staying crouched while moving will also benefit from sneaking.

(speed / 10) This is because the average sneak is about one tenth of a player's movement speed. A with more mobility will have a slightly faster sneak, but it will still be quite slow. A player cannot sprint while sneaking.

(1 + SKM) This is because SKM is for a sneak movement speed modifier. This is also why it is added to 1. For instance, player with a 20% sneak speed bonus would go 1.2 times faster while sneaking than they otherwise would.

Sneak Usage refers to stamina cost. This is applied on a per second basis while sneaking.

6 is there as the default amount because it needs a lower value. Staying crouched and slow for a long time is not much of a problem and may even be necessary to sneak up on someone. But there is still a cost to limit infinite sneaking. The player has to move normally sometime.

(1 - SKU) is basically like the SU stamina usage modifier, but for sneaking. SKU refers to sneak usage instead.

(T/2) This is time. T refers to seconds. It is divided by 2 because sneaking can be slow and deliberate and the rate at which stamina is depleted should be twice as slow as normal. The formula also required a large enough number to be noticeably impacted by modifiers. Just having something like (3 \* t) wouldn't haven't have lent itself as well to that.

**Blocking and advanced melee attacks:**

The cost depends on the melee weapon and is a part of their stats. Advanced attacks count as one use and cost a certain amount per use. Blocking is measured on a per second basis, costing a minimum of 1 second.

## Energy Uses

As mentioned in the player resource section, energy is. The energy meter works on

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| **Max Energy Formula:** | E = 100 + EB |

E = Max energy

EB = energy boost or bonus

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| **Energy Recovery Formula:** | Rc = ((E/10) / 2) T |

Rc stands for recovery. This is how quickly the energy replenishes.

((E/10)/2) This is to imply that the energy recovers at 1/20th the max. E stands for a the amount of energy a player would have in a full energy bar as calculated in the Max Energy formula. Since the default is 100, that would come out as (100/10)/2) or 10/2 or 5. Then it would be 5 T.

T is time per second as calculated in seconds. Energy replenished by the amount calculated in the prior parts of the formula once every second when not in use and stops replenishing when the energy meter is full. The total energy recovered would be multiplied by the amount of time or seconds when not in use or full.

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| **Weapon Usage Rate Formula:** | Usage = (Power/4) (T) (1 - EM) |

Usage means the energy cost associated with using the weapon. Damage weapons that use energy cost the amount calculated by this formula.

(Power/4) Power refers to the power requirement, or the energy cost stat associated with energy based weapons. This is then divided by 4. The reason for this is because energy weapons are somewhat cheaper to use than their healing or repair counterparts.

T refers to time in seconds. This is typical with duration based cost.

(1 - EM) This is an energy cost bonus modifier. EM specifically means efficiency modifier. Similarly to the stamina SU, EM is subtracted from 1 because the less the resource costs, the better it is for the player.

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| **Healing Usage Rate Formula:** | Usage = (Power/3) (T) (1 - EM) | | |
|  |  |  |  |
| **Mech Repair Usage Formula:** | Usage = (Power/3) (T) (1 - EM) | | |

Calculating the energy usage of healing and repair weapons is similar to calculating the usage of energy damage weapons. The only difference is (Power/4) becomes a bit more expensive at (Power/3). That's a 3rd of the cost of the base value as opposed to a 4th. So not factoring in modifiers, a base energy cost of 24 would cost 8 energy per second for a healing or repair weapon but only 6 for a damage weapon with the same value.

Healing and repair is almost identical in purpose. The only difference is healing replenishes the health of player and the repair replenishes or adds to the health of tech.

### Cloaking

Cloaking refers to a device or ability that allows a player to become invisible to the naked eye. A cloaked player can be detected through certain anti-stealth gear or tech. They will also be uncloaked when damaged or attacking. But otherwise, a cloaked player will be undetectable to other players through sight. However, they can still be heard or collided with.

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| **Cloak Usage Formula:** | Cloak Usage = 8 (1 - ST) (T/2) |

Cloaking costs energy. Cloak Usage refers to that.

8 is there as twice the assumed default cost per second. But 8 is used instead of 4 for slightly better synergy with modifiers.

(1 - ST) This is an energy cost modifier. ST stands for Stealth energy efficiency bonus. It is subtracted from 1 because less cost is better.

T/2 is there are way to calculate per second cost. T is seconds. The /2 is to allow us to use 8 for modifier synergy instead of 4. The energy cost kicks in once every second.

### Jetpacks

Jetpacks allow the player to move around at great speeds or fly using energy. They are optional and not allowed in every mode. But most players will have at least a default one they can go to. The thing with jet packs is they cost energy and increase weight. So it is a trade off. The weight associated with Jetpacks is calculated as part of the G variable in the Weight formula. The energy used is calculated in the following formulas:

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| **Jetpack Usage Formula:** | Usage = (Power/2) (T) (1 - EM) |

Jetpacks can be used by pressing or holding down the flight button. The flight button can be held for sustained flight or used in short bursts to soften landings or correct jumps.

Usage refers to how much energy it costs per second to use one. When energy runs out, the jetpack stops working.

(Power/2) is because jetpacks are the most energy intensive things in the game. They cost literally twice as much energy as a damage weapon with the same base energy cost. So if a 24 base cost damage weapon actually costs 6 energy per second, and if a healing or repair weapon costs 8, a jetpack would cost 12 at the same base energy cost.

T refers to time in seconds. As with other energy usage formulas, the cost is applied once every second and the total cost is multiplied by a number of seconds. If the player is using a jetpack applies a simple tap of the flight button instead of holding it, that also counts as 1 second.

(1 - EM) is the same energy cost bonus modifier found in other energy usage formulas.

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| **Jetpack Burst Dash:** | Usage = (Power \* 5) (T) (1 - EM) |

This is a really powerful and fast movement burst in the direction the player is facing. It is more horizontal than vertical in trajectory. But it uses an extreme amount of energy. The formula for this is the same as the regular Jetpack usage formula, except for the cost.

(Power \* 5) - That is really expensive. Where flight for a jetpack with a 24 cost usage rate cost 12 energy per second, a power dash for the same jetpacks costs 120 energy for one burst. Keep in mind that the default energy level for players is only 100. In order to perform that maneuver even once, a player needs to increase their max energy pool and/or have an EM bonus.

The extreme cost here is so that the player cannot spam such a great ability.

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| **Flight Formula:** | net thrust = thrust - weight |

It should be noted that the jetpack won't let you fly or perform a burst dash if you are too weighed down. So this formula calculates that.

Thrust is the force the jetpack generates when lifting. Every jetpack generates a certain amount of thrust.

Weight refers to the total gear of the player as calculated in the Weight formula.

Net thrust refers to how much extra thrust there is over the amount of weight the player has in gear. If the net thrust is < = 0, the jet pack will not do anything. If the net thrust is > 0 but < 10, flight isn't possible but the burst dash and a double jump through pressing the flight button is. If there is => 10 net thrust, all functionality of the jetpack is possible including flight.

It should be noted that the weight can change based on what weapon the player is holding. So a player might not be able to fly with a heavy weapon like a machine gun, but maybe they could with say a light pistol.

### Light Jetpacks

Light jetpacks have lower weight and power costs. But in exchange, they have less thrust relative to other jetpacks.

### Medium Jetpacks

Medium jetpacks have an average weight, thrust, and power cost. It is a good balance.

### Heavy Armor

Heavy jetpacks have very high thrust and can lift a lot more weight. But in return, they use up more power and weigh more themselves.

**Example of jetpack size dynamics...**

|  |  |  |  |
| --- | --- | --- | --- |
| **Jetpack:** | Weight | Thrust | Power |
| *Light* | 5 | 60 | 8 |
| *Medium* | 10 | 100 | 16 |
| *Heavy* | 20 | 160 | 24 |