

Halo Infinite Balancing Project - Multiplayer

PROJECT DESCRIPTION

My hopes in this project is to serve as an example of my skills in game balance and technical design. This project focuses on the sandbox in the video game *Halo Infinite*, diving into balancing issues relating to weapons, equipment, and vehicles that are present in the title as of the time of this document's creation. Please keep in mind when observing this document that I do not have access to any tools or methods of testing for these adjustments and therefore cannot guarantee their effectiveness which I would normally utilize during this process for testing purposes. Each adjustment is written in a purely hypothetical context.

GOALS

- Define the issue and the reasoning behind my solution.
- Create a priority list for each change. Divide into phases based on importance and impact on other weapon balancing.
 - Example:
 - Phase 1: Adjust Assault Rifle headshot modifier. Keep an eye on the performance of the Sentinel Beam and Commando.
 - Phase 3: If the Commando continues to underperform, apply adjustments to Commando.
- Work with data analytics based on weapon performance.
- Create control groups like the Battle Rifle to balance weapons around.

RULES

1. Small value tweaks will be emphasized. This is to maintain the identity of the item in question's original design intended by the developers and accustomed to players.
 - a. In the event where small tweaks will not resolve an issue and more dramatic changes are needed that will alter the item's original design identity, the item will receive the label of "rework". Reworks are viewed only as a last solution.
2. Weapons will be categorized by Precision, Automatic, Special, and Power to aid adjustments and create performance comparisons. One weapon within the precision and automatic categories will be chosen to be a control variable. The performance of adjusted weapons will be compared to the control variable to measure its effectiveness.
 - a. For precision weapons, these weapons will be balanced around its effectiveness against the Battle Rifle as the Battle Rifle is in a sweet spot of balance.
 - b. For automatic weapons, these weapons will be balanced around the sentinel beam.
3. Each Phase must limit the amount of adjustments made so that control variables are maintained for testing purposes. This is particularly important for weapons balanced around other weapons as one weapon must remain unchanged in order to effectively document results.
4. Each Phase will be considered an individual hypothetical patch released to live servers containing all of the Phase's changes. Each Phase would be separated by a time frame of 2-4 weeks in order to monitor the impacts of the changes on servers. In the hypothetical event that a severe balancing issue arises that hinders gameplay, a small patch which would strictly address only the specific issue would be deployed on live servers as soon as possible.

NOTES

- This document does not take into account the work time involved to reflect any changes or additions ingame nor the involvement of other disciplines in the work pipeline.
- A "monitor" section will be included in each phase to show general information of what I would be focusing on after a Phase is pushed to servers. The overall effect of balancing changes on the sandbox would normally be monitored overtime via analytics and feedback surveys, however this will not be conducted for this project due to a lack of tools for testing purposes.

GUIDE

Balancing Key

- ~ ~ **New**: New Mechanic
- + + **Buff**: Major Buff
- + **Buff**: Minor Buff
- // **Neutral**: Neutral Change
- **Nerf**: Minor Nerf
- **Nerf**: Major Nerf

Current Weapon Time-To-Kill Data Sheet

To aid the balancing process, I recorded data for each weapon's time-to-kill in seconds to report the maximum and minimum effectiveness of all current weapons in the sandbox at short (3.5m), medium (10m), and long (30m) ranges. This data was recorded to show imbalances in weapon effectiveness by drawing comparisons to another weapon's effectiveness. Since the Battle Rifle will be used as the primary control group, all weapon kill times are color coded based on the Battle Rifle's maximum effective kill time of 1.5 seconds. A kill time higher than 1.5 will have a shade of red, while a kill time lower than 1.5 will have a shade of green. A color will appear darker the further the kill time is from 1.5. This data sheet provides useful information when making balancing adjustments.

Weapon	3.5m - Current TTK Headshot / Direct	3.5m - Current TTK Bodyshot / Splash	10m Current - Headshot / Direct	10m Current - Bodyshot / Splash	30m Current - Headshot / Direct	30m Current - Bodyshot / Splash
Precision						
Battle Rifle	1.5	2.8	1.5	2.8	1.5	2.8
Commando	1	1.8	1.1	1.8	1.25	1.95
Sidekick	1	1.5	1.1	1.6	1.2	1.7
Mangler	1.3	1.9	1.3	2	1.4	2.1
Stalker Rifle	1	2	1	2	1	2
Shock Rifle	0.1	2.2	0.1	2.2	0.1	2.3
Pulse Carbine	0.9	2.1	1	2.3	1.3	2.6
Automatic						
Assault Rifle	1.1	1.6	1.2	1.6	1.7	1.85
Sentinal Beam	0.8	1	1	1.1	1.6	2
Needler	1.1	1.1	1.3	1.3	2.4	2.4
Disruptor	1.9	1.9	1.9	1.9	2.05	2.05
Special						
Bulldog	0.6	0.6	1.3	1.3	-----	-----
Heatwave	0.7	0.7	0.9	1.5	1.2	1.7
Hydra (Primary)	1.4	1.4	1.4	1.4	1.6	1.6
Hydra (Secondary)	2.15	2.8	2.3	2.9	2.5	-----
Plasma Pistol	1.7	4.5	1.7	4.5	2.2	4.7
Ravager	1.2	3.3	1.25	3.5	1.4	3.8
Power						
Energy Sword	0.15	0.15	-----	-----	-----	-----
Gravity Hammer	0.6	2.3	2.3	2.3	-----	-----
Cindershot	0.7	1.7	1	2	1.3	2.2
Rocket Launcher	0.1	0.1	0.3	0.3	0.8	0.8
Skewer	0.1	0.1	0.1	0.1	0.1	0.1
Sniper Rifle	0	0.9	0	1	0.1	1

Phase Order

Phase 1: High Priority Adjustments

- This phase will focus on current issues with the most significant impact on gameplay causing balancing issues and frustration for players. This phase will also incorporate a global nerf to electricity, removing its ability to kill Spartans by no longer damaging Spartan health. This nerf is due to deaths by electricity feeling unfair to players, causing frequent confusion and frustration.

Phase 2: Re-adjustments

- This phase will evaluate the results of the Phase 1 adjustments and make any needed re-adjustments to weapons that become weaker or stronger than intended.

Phase 3: Mid-Low Priority Adjustments

- This phase will focus on less prominent issues impacting balancing or causing frustration for players.

Phase 4: Re-adjustments

- This phase will evaluate the results of the Phase 3 adjustments and make any needed re-adjustments to weapons that become weaker or stronger than intended.

PHASE 1: High Priority Adjustments

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Changes:

Weapons:

Assault Rifle

The Assault Rifle is frequently out-performing most precision and automatic weapons within their most effective ranges. Removing the weapon's headshot bonus damage modifier will prevent the Assault Rifle from out-performing precision weapons at medium range while still being effective against precision weapons at close range. This should also prevent the weapon from dominating the Commando and Sentinel Beam in engagements.

- **-- Nerf:** Remove headshot bonus damage modifier
 - → 1x Modifier

Cindershot

The Cindershot's current state is too powerful due to its gravitational pull from explosions. This pull hinders counterplay potential, does not allow players a fair opportunity to escape, and makes the skillful process of hitting an enemy with consecutive shots too easy. The most effective solution without impacting the weapons performance is by reducing the amount of displacement inflicted to Spartans caused by the gravitational pull of the weapon's explosions. Reducing explosion displacement would additionally help the Cindershot fit its role as a skill based power weapon that is easy to use but difficult to master as shots must be aimed more strategically.

- **- Nerf:** Gravitational Pull Displacement is Reduced

Disruptor

The Disruptor struggles against all weapons in engagements and is currently the weakest weapon in the sandbox. Additionally, the Disruptor will be affected by the global nerf of electricity where only shields are depleted but Spartan health is not affected, removing electricity's ability to kill. This will not affect the weapon's individual projectile damage. Because of the weapon's current low damage output and the global nerf of electricity, the Disruptor will gain a buff in damage requiring one less shot to kill, improving the weapon's time-to-kill. This adjustment should see a dramatic improvement to the Disruptor's viability against other weapons.

- **++ Buff:** Increased Shot Damage
 - 9 → 8 Shots to Kill
- **-- Nerf:** Electricity No Longer Depletes Spartan Health

TTK: 1.9s → 1.7s

Energy Sword

The Energy Sword is designed to be the most powerful close range weapon in the sandbox, however it is overperforming at its role causing engagements against the weapon to feel unfair. These changes should help with maneuvering and countering against the Energy Sword while maintaining its status as the strongest close range weapon in 1v1 engagements and its ability to succeed in 1v2 engagements. Increasing the primary swing reset time will make missing swings more punishing as well as provide more opportunity for enemies in 1v2+ engagements to take down a sword user. It is important to note that melee reset time will remain the same, replicating the Energy Sword's mechanics in previous iterations. Lunge range will also be slightly decreased as it felt that the sword could lunge at enemies from an unfair range which felt frustrating to players.

- **-- Nerf:** Decreased Primary Swing Reset Time
 - 1 → 1.4 seconds
- **- Nerf:** Decreased Lunge Range
 - 7.7 → 6.5 meters

Gravity Hammer (Rework)

The Gravity Hammer differs from the Energy Sword by being a strong crowd control weapon against enemies as well as vehicles and should have the power to consistently take down numerous enemies in one swing. The Gravity Hammer currently has a variety of issues causing the weapon to feel inconsistent, lack its crowd control capabilities and expected lethality against spartans and vehicles, and feel generally unsatisfying and clunky during gameplay. I believe some of the weapon's inconsistency in damage and its lacking crowd control capability are due to a damage drop-off when the target is not aligned with the crosshair. Expanding the width of the maximum damage area will greatly improve this feeling of inconsistency and allow the Gravity Hammer to take down multiple enemies with a single swing more easily. To additionally improve the weapon's lethality against vehicles, the weapon will receive a slight damage increase to explode vehicles like Warthogs in a single swing in replacement to sending vehicles into "doom" states. A boost in gravitational knockback will also be added to send vehicles flying in the hopes of flipping them over or sending them off cliffs in situations where the Gravity Hammer's swing is within range of the target but too far to inflict maximum damage.

To address the weapon's issues with clunkiness and unsatisfying gameplay, numerous changes will rework the weapon's functionality. Firstly, the weapon will receive a new melee mechanic to replace its existing one as this is a primary source of frustration. The Gravity Hammer's current melee behaves differently than all other weapons, functioning identically to the primary swing by having a long wind up before impact. This creates an awkward delay in damage feedback causing the melee to be greatly unsatisfying while also giving the player a disadvantage against spartans with no shield who are within melee distance. The new melee will function the same as the standard melee seen on all other weapons in the sandbox, this being a melee which lunges the player toward a target within melee distance and instantly inflicts the default melee damage without delay. The current Gravity Hammer has a mechanic that makes the player impervious to all melee damage, including Energy Sword lunges, while in the swing animation prior to impact. This animation would cause other players to instantly die if they were to melee a player during this animation despite the weapon not being effective yet. Dying as a result of this mechanic with no punishment to the Gravity Hammer user felt unfair. To address this issue while simultaneously improving the weapons overall satisfaction, the swing wind-up time will be significantly reduced to help provide much faster feedback and remove melee opportunities during the wind-up animation (*I feel this would be a better adjustment rather than removing the mechanic as removing the mechanic would make the Gravity Hammer too vulnerable within the range it is designed to be used in*). It is important to note that with this change, the swing cooldown time will still be maintained at its current ~1.6 seconds to prevent swing spam and give enemy spartans an opportunity to counter the weapon.

- **~ ~ New:** Replace Swing Melee with Instant Melee
 - When in melee distance, lunge at enemies with a standard melee typical of other weapons and instantaneously inflict default melee damage.
 - This melee removes the awkward swing animation and delayed melee damage.

- **++ Buff:** Swing Wind Up Time Decreased
 - ~0.6 → 0.2 seconds
- **+ Buff:** Increased Swing Damage Radius
 - → 4 Feet from Center
- **+ Buff:** Increased Vehicle Damage
 - Blows up the Warthog in one swing when in maximum damage range
- **+ Buff:** Greatly Increased Gravity Knockback

Shock Rifle

The Shock Rifle will be affected by the global nerf of electricity where only shields are depleted but Spartan health is not affected, removing electricity's ability to kill. This will not affect the weapon's individual projectile damage.

- **-- Nerf:** Electricity No Longer Depletes Spartan Health

Sniper Rifle (Rework)

The Sniper Rifle feels consistently unreliable due to its inaccuracy and performs poorly at long range because of slow bullet travel. Additionally, the Sniper Rifle struggles to feel like a dominating power weapon during engagements with lower tier weapons due to its slow rate of fire and is overshadowed by its lower tier competitor, the Shock Rifle. To keep the Sniper Rifle a dominant weapon at long ranges and improve general reliability, the bullet travel speed would be increased dramatically so that bullets will travel to targets instantaneously (*Alternatively, the Sniper Rifle can be converted to hitscan if the problem persists*). Additionally, first shot accuracy will be increased to be 100% accurate to the center of the crosshair, removing the possibility for the bullet to miss the target when the crosshair is correctly on it. To improve the Sniper's role as a dominant power weapon, the fire rate would be dramatically increased to raise the weapons time-to-kill, allowing it to be more viable in 1v1 engagements so that missing a shot will be more forgiving, as well as 1v2 engagements since more shots can be fired for more offensive power. To accommodate the increased fire rate, the bloom reset time will be decreased to match the new fire rate with an additional 0.2 second decrease to reset bloom faster than the previous version. It is important to note with this adjustment that shots will still need to be paced properly to maintain full accuracy.

- **++ Buff:** Dramatic Increased Fire Rate
 - 0.9 sec → 0.6 sec
- **++ Buff:** Dramatic Decreased Bloom Reset Time
 - 1.2 sec → 0.7 sec
- **+ Buff:** Increased First Shot Accuracy
 - → 100% Accurate

- **+ Buff:** Dramatically Increased Projectile Speed

TTK (Bodyshot): 0.9s → 0.6s

Ravager

The Ravager's buffs from Season 2 improved the weapon's lethality, however the weapon's primary burst still underperforms in most engagements. The primary fire's direct impact damage is in a good place, however its splash damage fails to add lethality during engagements. To improve the weapons lethality, the primary fire's splash damage to Spartan health will be increased along with a slight increase to the splash damage radius to give the Ravager a little more space to control during engagements. This will remove an unnecessary extra burst to kill a Spartan with no shields.

- **+ + Buff:** Increased Splash Damage to Health
 - 7 → 5 Shots to Kill
- **+ Buff:** Slightly Increased Splash Damage Radius

Pulse Carbine

The Pulse Carbine's performance struggles severely due to the weapon's limiting range and its inconsistency in accuracy, making it one of the lowest performing weapons in the sandbox. This inaccuracy issue is caused by a combination of the weapon's slow projectile speed and its projectile tracking on targets. Target tracking will often either undercorrect or overcorrect, frequently causing projectile's to miss the target despite the player aiming correctly and accommodating for projectile travel speeds. The slow projectile speed also hinders the weapon's range, allowing players too much time to dodge shots at mid-range distances.

- **+ + Buff:** Greatly Increased Projectile Speed
 - Speed increased to the Plasma Pistol's primary fire projectile speed

Grenades:

Dynamo Grenade

The Dynamo grenade will be affected by the global nerf of electricity where only shields are depleted but Spartan health is not affected, removing electricity's ability to kill. With this change, the Dynamo Grenade maintains its unique role within the grenade category with its devastating

crowd control capabilities as it quickly strips Spartan shields within a large radius and counters all vehicles. It is worth noting that I believe that the Dynamo grenade will still maintain its status as the most powerful grenade in the sandbox despite its ability to kill being removed.

- **-- Nerf:** Electricity No Longer Depletes Spartan Health

Equipment:

Drop Wall

The Drop Wall struggles to be useful in defensive situations as well as establishing map control due to its ease of destructibility. The Drop Wall also frequently fails to protect players in its most useful purpose, defending the player in the middle of a firefight. Increasing the shield health will give the Drop Wall a stronger presence, allowing players to use the equipment more effectively in defensive situations or in attempts to take map control. Additionally, there would be an increase to the health of the shield base to increase the difficulty of destroying the equipment.

- **+ Buff:** Decreased Deploy Time
 - 0.6s → 0.3s Activation Upon Landing
- **+ Buff:** Increased Shield Health
 - 2 → 6 BR Shots Before Depletion
- **+ Buff:** Increased Base Health
 - 2 → 8 BR Shots Before Destruction

Vehicles:

Banshee

The Banshee's role as a deadly yet quickly traversable vehicle in campaign struggles to carry over into multiplayer with significantly smaller map sizes to traverse in. This causes the vehicle to be frustrating to fly as it cannot maintain a speed effective for ground combat and causes maneuvering around obstacles in smaller spaces to be impossible, causing the banshee to frequently crash into environmental objects. To address this issue, the vehicle's base movement speed will be dramatically decreased to allow for easier maneuverability during combat and map traversal. The Banshee's current health turns the vehicle into a glass cannon with its health being too low to effectively last during combat.

- **++ Buff:** Increased Health
- **++ Buff:** Dramatically Decreased Base Vehicle Speed

Monitor:

- Assault Rifle
 - Against automatic weapons
 - Against precision weapons
- Commando
 - Against Assault Rifle
 - Pick up rate
- Cindershot
 - Accuracy percentage
- Disruptor
 - Performance against all weapons
- Energy Sword
 - Performance in 1v1, 1v2, 1v3, and 1v4 engagements
 - Survivability
- Gravity Hammer
 - Performance in 1v1 and 1v2 engagements
 - Player frustration via feedback surveys
- Sniper Rifle
 - Performance in 1v1, 1v2, 1v3, and 1v4 engagements
 - Against the Shock Rifle
 - Accuracy percentage
 - Accuracy percentage to targets beyond 30 meters
- Pulse Carbine
 - Accuracy percentage
 - Pick up rate
- Ravager
 - Performance against all weapons
 - Pick up rate
- Dynamo Grenade
 - Use rate
- Drop Wall
 - Average life-time
 - Use rate
 - Change in “Boom Block” medal rate
- Banshee
 - Average life time while operated by players

PHASE 2: Re-adjustments

This phase will evaluate the results of the Phase 1 adjustments and make any needed re-adjustments to weapons that become weaker or stronger than intended.

Changes:

Weapons:

Cindershot

If the Cindershot continues to prevent counterplay and prevent players fair opportunities to escape the weapon despite the reduction to explosion displacement, the explosions will no longer displace Spartans.

- **-- Nerf:** Explosions No Longer Displace Spartans

Disruptor

If the Disruptor continues to underperform in 1v1 engagements, the magazine size will be slightly increased to make missing shots more forgiving for the player. This will also help the Disruptor fit the role of an automatic weapon and increase its viability in 1v1 and 1v2 engagements.

- **++ Buff:** Increased Magazine Size
 - 10 → 12 rounds

Energy Sword

If the Energy Sword continues to be too powerful, players with the weapon will now receive a small amount of damage if an enemy player melees them during a successful lunge. If the sword user is meleed during a lunge with no shield, they will kill the enemy player while also being killed in the process.

- **-- Nerf:** No Melee Immunity During Swing
 - Sword users take a small amount of damage if they are meleed during a successful swing

- Sword users will die while killing their opponent if they are meleed during a successful swing with no shield

Gravity Hammer

If the Gravity Hammer continues to underperform in close range 1v1 and 1v2 engagements, the swing cooldown time will be decreased to raise the weapon's TTK and give enemies less time to counter the weapon. To match the decreased swing cooldown time, melee cooldown time will also be decreased. In the event that the decreased swing wind-up time does not resolve the issue of unfair deaths due to melee during swing animations, melee immunity will be removed from the weapon.

- **+ Buff:** Decreased Swing Cooldown Time
 - 1.6 → 1.4 seconds
- **// Neutral:** Melee Time After Swing
 - 1.6 → 1.4 seconds
- **- Nerf:** No Melee Immunity During Swing

Pulse Carbine

If projectile tracking continues to cause issues with either projectiles missing targets or becoming unfairly accurate, projectile tracking will be removed. This will help solidify the weapon's role as a precision weapon where players must accurately lead their shots.

- **+ Buff:** Projectile Tracking Removed

Monitor:

- Cindershot
 - Accuracy percentage
- Disruptor
 - Performance against all weapons
 - Performance in 1v2 engagements
 - Change in player accuracy percentage
- Gravity Hammer
 - Performance in 1v2, 1v3, and 1v4 engagements
 - Player frustration via feedback surveys
- Pulse Carbine
 - Accuracy percentage

PHASE 3: Mid-Low Priority Adjustments

This phase will focus on less prominent issues impacting balancing or causing frustration for players.

Changes:

Weapons:

Commando

The Commando in its current state is out-performed by all precision weapons at all ranges as well as most automatic weapons at medium range. As a result, the weapon struggles to find an effective place in the current sandbox. Additionally, the tuning of the weapon's current bloom settings makes firing at targets too difficult and frequently feel inconsistent during engagements.

- **+ Buff:** Slight reduction to maximum bloom radius

Sidekick

The Sidekick outperforms all precision weapons at medium range engagements. Increasing bloom settings on the weapon will lower its domination in high-skill play while maintaining its effectiveness in lower-skill engagements.

- **-- Nerf:** Shorter Bloom Activation
 - 4 → 2 Shots
- **-- Nerf:** Dramatic Increase to bloom per shot
 - 7 → 5 Rapid shots to hit maximum bloom

Plasma Pistol

The Plasma Pistol is designed to be a support weapon; poor performance by itself but contains an alternate fire plasma charge that is strong enough to be used as a powerful aid during engagements against shielded opponents and vehicles. In its current state, the weapon struggles to maintain its role as a viable support weapon due to its inconsistency in plasma charge tracking and its ability to no longer serve an important role in anti-vehicle combat. The tracking on the plasma charge is too weak, resulting in charged shots frequently missing moving targets by undercorrecting its movement during travel. To address its issue in consistency and reliability during engagements, the alternate fire plasma charge shot will receive increased tracking. The removal of the Plasma Pistol's ability to EMP vehicles also removed one of the weapon's two primary purposes and hindered its role as an effective support weapon. To improve the weapon's role in the sandbox and give it more purpose, the electric effect will be added to allow the charge shot to EMP vehicles similar to previous iterations of the Plasma Pistol. Hopefully these changes will see the weapon picked up from weapon racks more and frequently used in vehicle-dense game modes like Big Team Battle.

- **+ Buff:** Increased Charged Shot Tracking
- **~ ~ New:** Charge Shot Is Electrified
 - Charged shots will now EMP vehicles with a single shot

Monitor:

- Commando
 - Against automatic weapons
 - Against precision weapons
 - Pick up rate
- Sidekick
 - Against precision weapons
- Assault Rifle
 - Against Commando
 - Against Sidekick
- Plasma Pistol
 - Pick up rate
 - Charged Shot accuracy percentage

PHASE 4: Re-adjustments

This phase will evaluate the results of the Phase 3 adjustments and make any needed re-adjustments to weapons that become weaker or stronger than intended.

Changes:

Weapons:

Commando

If the Commando continues to underperform in engagements with Phase 1 adjustments, bloom inaccuracy will activate after the 7th rapid fire shot. This will allow the weapon to kill before bloom activates via headshots, further boosting its precision power in engagements.

If the Phase 1 adjustments cause the Commando to frequently dominate against other precision weapons at medium range, decreasing the damage to require 8 headshots to kill in order to raise the maximum effective time-to-kill should create balanced engagements. To accommodate the decreased damage, bloom inaccuracy will activate after the 7th rapid fire shot in order to maintain the reliability established in Phase 1.

If too weak

- **+ Buff:** Bloom reduction per shot
 - 6 → 7 shots

If too strong

- **- Nerf:** Reduced damage
 - 7 → 8 Headshots to Kill
- **// Neutral:** Bloom reduction per shot
 - 6 → 7 shots

Sidekick

If the Sidekick continues to outperform precision weapons, the weapon will receive an increase to bloom reset time. This will make rapid firing less efficient at medium and long range and will slightly increase the weapon's time-to-kill when pacing shots to maintain accuracy.

- **- Nerf:** Increased bloom reset time
 - 0.1 sec → 0.2 sec

Monitor:

- Commando
 - Against automatic weapons
 - Against precision weapons
 - Pick up rate
- Sidekick
 - Against precision weapons
 - Against automatic weapons