A Team-Building Reference

by Qoob

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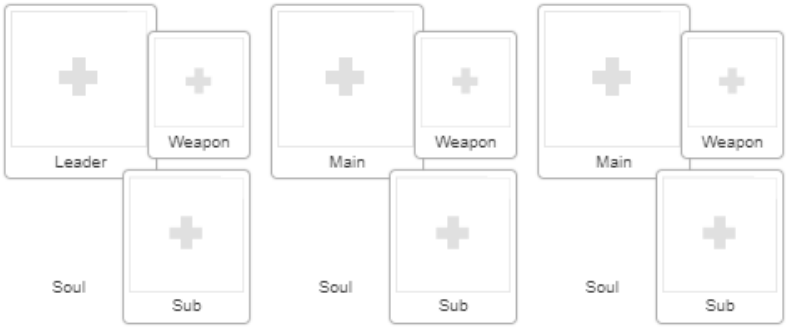
A Kino by any other name...
Kino and Juliet, William Shakespeare

1. Fundamentals

A **team** is a group of up to 6 units, 3 weapons, and 3 souls, as follows:



Of the six units, one is the leader, three are main units (including the leader), and three are unison units. A **unison** is also known as a **sub**(ordinate), though this might be confused with the commonly-used sub(stitute). There are several basic but important points to keep in mind when first building a team:

- ☞ All three-star and higher units have a leader ability and start out with three main or unison abilities (A123). These abilities are unlocked or upgraded via their **first manaboard** (**MB1**). At some point after their initial release, all three- and higher-star units gain access to a **second manaboard** (**MB2**), which unlocks and upgrades three further unison abilities (A456).
- ☞ One- and two-star units have no leader ability (displayed wrongly on iOS), no main ability (A3), and no second manaboard (A456).
- ☞ Leader units have their leader, main, and unison abilities active.
- ☞ Main units have their main and unison abilities active.
- ☞ Unison units have their unison abilities active.
- ☞ Units can equip weapons of any element.
- ☞ Units can equip souls only of their element.
- ☞ Unison units' souls do not matter; only leader and main units' souls do.
- ☞ **Main units inherit the stats and abilities of their unisons.** It is helpful to think of unison units as add-ons to main units, rather than independent units in their own right.
- ☞ When main units execute skill casts, they cast their skill and their unison's skill simultaneously using their combined stats and abilities. **The skills preserve their original elements.**

Example

The leader of this team is AHanabi and the leader unison is Karyl. This team would thus be commonly abbreviated as **AHanabi/Karyl SD**, where SD (short for skill damage) describes the main damage-dealing archetype associated with the team. For this team,

- ☞ AHanabi gains the effect of her leader ability, her main abilities (A123), her unison abilities (A456), Karyl's unison abilities (A12456), and any teamwide abilities from the other two mains and unisons not pictured.
- ☞ As an anniversary unit, AHanabi has three main abilities (A123) whereas most units only have one (A3).
- ☞ When AHanabi executes a skill cast, she casts her skill, which does fire damage, along with Karyl's skill, which does dark damage.

WF Collection Tracker

Unit and weapon information is presented poorly and incompletely in-game. Instead, refer to the WF Collection Tracker (henceforth the **tracker**) for the relevant information and also to generate a tracker for team-building purposes. Information from the tracker can also be searched through the Discord bot VEliyaBot in the associated Discord server. A list of commands is available here.

The tracker uses precise wording that may initially be difficult to differentiate. Several of the more subtle distinctions are listed below. These may not make much sense on an initial reading; come back to this box as necessary.

- ☞ '**allies**' or '**party members**' refers to your units, whereas '**combatants**' refers to all players' units in the same lobby. In particular, combatant-wide buffs affect all players' units, and combatant healing heals all players' units.
- ☞ 'effect amplified on ... characters (+50%)' means that the effect is boosted by 1.5×. This wording is primarily seen with regards to healing, so a heal that would otherwise heal each unit by 8% of their individual HP would now heal 12% to each unit that satisfies the given condition.
- ☞ 'every X combo' means 'at $X/2X/3X/...$ combo', whereas 'upon reaching X combo' means 'at X combo' only, not any multiples thereof.

- ☞ 'if **self** is' refers to the main unit with whom the specified unit is paired. If the specified unit is used as main, then 'self' refers to that unit. If the specified unit is used as unison, then 'self' refers to the paired main.
- ☞ 'ATK/SD/... against' is an additive increase to the ATK stat, not a multiplicative one. The 'against' wording indicates that the increase is conditional.
- ☞ '**damage dealt**' is a multiplicative increase to the damage type, not an additive one.
- ☞ A '**buff**' is a positive status effect that lasts for a certain duration (is not permanent and has a temporal component), and appears on the in-game HUD. Also see Sec. 1.5.

1.1. Team archetypes

All teams can be categorized into various archetypes depending on the manner in which they deal damage. There are four principal archetypes: **SD** (skill damage), **PF** (power flips), **DA** (direct attacks), and **AD** (ability damage).

1.1.1. SD

The predominant archetype, especially for short content, and widely supported in all elements. Focuses on dealing burst damage from skill casts. The main damage-dealing unit (**DPS**) is frequently the leader or the third main unit.

1.1.2. PF

A well-supported archetype that generally pools together units from multiple elements for now. Favored for harder content and when sustained damage is required. Focuses on dealing damage via power flips; see Sec. 1.3. The DPS is necessarily the leader because of the nature of PFs.

1.1.3. DA

A poorly supported archetype with limited viability, and only in a few elements. Favored for longer content when sustained damage is required, but frequently loses out to SD and PF unless specifically advantaged. Focuses on dealing damage by direct attacks—by collisions with enemies. Most faithful to actual pinball. All three main units serve as DPS, but one frequently contributes the most.

1.1.4. AD

An extremely poorly supported archetype with limited viability only in the light element. Favored only for particularly hard content when sustained damage is required, but almost always loses out to SD and PF unless specifically advantaged. Focuses on dealing damage through abilities. The DPS is frequently the leader, but there is insufficient diversity in AD units to make general claims one way or another.

1.2. Fever; the downed status

Stages with a boss include a **fever gauge**. The size of this gauge is boss-dependent and generally ranges between 50 and 1800.

Data Acquisition

The numerical information presented in this guide is obtained by datamining. The underlying `json` files provide exhaustive information about the game but are obfuscated and difficult to parse in general, and they contain more information than can be completely presented here. Raw datamined files are available on GitHub.

Frames

The unit of time used in the game data is the **frame**. There are 60 frames in a second.

The fever gauge is filled:

- ☞ by each skill hit on any enemy from a damaging skill; varying amounts.
- ☞ directly from certain skills and abilities; varying amounts.
- ☞ by PFs; varying amounts, see Sec. 1.3
- ☞ by DA and AD hits; 1 each.

The fever gauge is depleted:

- ☞ by not being in fever; -0.060 every second.
- ☞ by being in fever; -6.67% of base fever gauge every second.

This depletion rate means that the base fever duration every trigger is 15 seconds, ignoring any potential fever duration enhancement or fever generation during that period.

When the fever gauge is filled, **fever** is triggered. At this point,

- ☞ Depending on the map, certain buff potions may spawn at specific locations on the map. Directly moving over these potions activates them for effects such as regeneration, skill gauge fill, and attack buffs.
- ☞ Depending on the map, boosters may spawn on the map. Dashes prioritize boosters. Upon striking a booster, units are launched in the direction specified on the booster.
- ☞ Bosses are able to be **downed** once a hidden down gauge is filled. When downed, their attacks are canceled, they are stunned for a certain duration, and they take 1.5× damage during that time. The size of the down gauge and the duration of the stun varies for each boss. Like the fever gauge, the down gauge is filled by damaging skill hits (varying), PFs (varying, see Sec. 1.3), DAs (1), and AD hits (1).
- ☞ Note that the downed status may be triggered by two other means: by breaking a boss's weak spots when they appear (shown with red crosshairs), or after a skill chain involving 4 or more main units (including other players' units in co-op). A skill chain may be triggered when main units cast skills in quick succession. Bosses may also be immune to being downed when there is an active trial, denoted by a red or purple bar.

☞ Certain bosses may directly become downed on fever activation.

Each time fever ends, the required gauge to trigger the next fever is multiplied by 1.25×. Each time a boss is downed, the required gauge to trigger the next down is multiplied by 1.1×. In other words, the fever gauge and down gauge each scale as a power law, `current gauge` = `base gauge` × $\mathtt{m}^{\mathtt{n}}$, where `m` is the multiplier and `n` is the number of times that the effect has been triggered. This scaling law makes it significantly harder to trigger and remain in fever multiple times.

1.3. Power flips

Power flips (PFs) occur when launching off the flippers at a **combo** of at least 9. There are three levels of power flips that occur with at least 9, 15, and 39 combo respectively. Combo is obtained from skill, PF, DA, and AD hits. Power flips depend solely on the leader's element, stats, and power flip type, not any other unit's. Each unit has one of five power flip types: sword, bow, fist, special, and support. Relevant data for these power flips are presented below.

1.3.1. Sword

Generically strong and widely used for its area-of-effect (AoE) damage and decent auto-play performance. Great combo generation with sufficiently many adds; can chain multiple PFs in a row effectively. Extremely reliant on penetration for damage and chaining. Unlike other PF types, which land hits near-instantly, sword PFs form an aura around the leader for a short period of time. Getting the maximum number of hits (and hence damage) requires staying near the target for essentially the entire duration of the PF.

1.3.2. Bow

Poor auto-play performance. AoE damage; very good combo generation, and can chain even without adds. Extremely strong fever generation; frequently used for this purpose in non-PF teams.

1.3.3. Fist

Decent auto-play performance if stage has few or no adds, which is unfortunately rare. Essentially single-target with strong damage, though it can hit densely packed mobs. Decent combo generation particularly from below the enemy, where each main unit can hit two DAs rather than the usual one, and benefits significantly from multi-hit as a result.

1.3.4. Special

Decent auto-play performance for a terrible PF type. Large AoE, but weak damage and essentially no combo generation makes it near-impossible to chain. Its niche is meant to be filling the down gauge particularly quickly, which is essentially irrelevant. A future buff significantly increases its damage and combo generation, making it a strong non-penetration alternative to Sword PF.

1.3.5. Support

Not used for PF teams but rather as utility for non-PF teams for the penetration, float, and attack buffs it generates. A Support PF lead is particularly valuable to DA teams.

Power Flip Data

Type	Lv.	Mult.	Dist.	Down	Fever	Hits	Desc.
Sword	1	2.75×	140	1.5	3	3	big, 1.17 s
	2	3.5×	160	2	3	4	big, 1.5 s
	3	5.5×	280	3	4	5	bigger, 1.83 s
Deals damage (**Mult.**) within discs of increasing radius, duration, (**Dist.**, **Desc.**) and number of possible hits (**Hits**) with increasing power flip level.							
Bow	1	1.83×	100	3	6	3	mid
	2	0.5×	100	0.75	1.5	2	side
		2×	180	1.5	3	4	mid
	3	0.5×	100	0.75	2	2	far
		1×	120	0.5	0.67	3	side
		2.5×	180	1.5	3	4	mid
Deals damage (**Mult.**) within beams of increasing width (**Dist.**), number (**Hits**), and deviation from normal (**Desc.**) with increasing power flip level.							
Fist	1	0.9×	10	0.5	0.5	3	small
		2.8×	85	10.5	1.5	1	small
	2	1.2×	10	0.5	0.5	4	smaller
		5.8×	95	13	4	1	small
	3	1.5×	10	0.5	0.5	5	smaller
		12.5×	110	17	6	1	small
Deals damage (**Mult.**) within small discs of increasing radius (**Dist.**, **Desc.**) and number (**Hits**) with increasing power flip level.							
Special	1	5×	200	15	4	1	bigger
	2	7×	250	20	6	1	bigger
	3	13×	350	25	8	1	biggest
Deals damage (**Mult.**) within large discs of increasing radius (**Dist.**, **Desc.**) with increasing power flip level.							
Support	1	-	-	-	-	-	30%/2.5 s, 1 s
	2	-	-	-	-	-	40%/3 s, 1.5 s
	3	4×	mapwide	1	1	1	50%/4 s, 2.5 s
Generates stronger and longer ATK buffs, and longer penetration and float buffs, (**Desc.**) with increasing power flip level. Deals damage (**Mult.**) at Lv. 3.							

The heading abbreviations are **Mult.** for multiplier, **Dist.** for distance (of some sort), and **Desc.** for description. The **Down** and **Fever** headings correspond to the amount by which the down and fever gauges are filled by the respective PF. All **Mult.**, **Down**, and **Fever** values listed are for a single instance of damage; total values are obtained by multiplying by the number of **Hits**.

1.4. Unit levels

Unit levels serve as a multiplier on their base ATK and HP. The multiplier is piecewise linear and is 0.1× at level 1, 1× at level 10, 6× at level 80, and 6.6× at level 100. Equivalently,

$$\texttt{multiplier(level)} = \begin{cases} \texttt{level}/10 & 1 \le \texttt{level} \le 10, \\ 1 + (\texttt{level} - 10)/14 & 10 \le \texttt{level} \le 80, \\ 6 + 3(\texttt{level} - 80)/100 & 80 \le \texttt{level} \le 100. \end{cases}$$

What this piecewise-linear relationship tells us is that we should try to level units as much as possible, but the marginal benefit for doing so drops sharply after level 80. (Each level also requires more EXP, but this is largely irrelevant after a while.) In addition, MB2 abilities are only unlocked past a certain level: A4 unlocks at level 90, A5 at level 95, and A6 at level 100.

Every unit has its own base ATK and base HP; a lower base ATK is usually compensated for by a higher base HP, and vice versa. These values can be viewed in-game or from the datamine.

Levels and Stats

Rarity	**Base Lv.**	**Mult.** (%)	**Max. Mult.** (%)	**Evol. ATK**	**Evol. HP**
1	40	0.4	4.8	30	150
2	50	0.5	5.0	40	200
3	60	0.8	6.4	50	250
4	70	1.5	9.0	54	270
5	80	3.0	12.0	60	300

The base maximum level for **Rarity**-star units is **Base Lv.**. This base maximum can be raised up to level 100 for any unit by using astral gems or duplicates of the corresponding rarity, 5 levels at a time. Each astral gem or duplicate additionally provides an additive multiplier **Mult.** to the base stats, for a total of **Max. Mult.** at level 100; this process is known as **uncapping**. Units can be **evolved** by unlocking all major nodes in their MB1. In addition to unlocking alternate art for units, evolution also grants units a post-multiplier boost of **Evol. ATK** to their ATK and **Evol. HP** to their HP.

A unit's ATK is thus

$$\texttt{ATK(level)} = \texttt{baseATK} \times \texttt{multiplier(level)} \times (1 + \texttt{uncapCount} \times \texttt{uncapMult}) + \texttt{evolATK},$$

and similarly for HP.

Example

Nimbus has a `baseATK` of 110 and a `baseHP` of 468. We would like to calculate the ATK of an evolved level 94 Nimbus that has been uncapped to level 95. Since Nimbus is a 4-star unit with a base level of 70, it must have taken 5 uncaps to uncap it to level 95, so `uncapCount` is 5. `multiplier` can be calculated with the above formula, and `uncapMult` and `evolATK` can be read off the table. We find

$$\texttt{ATK}(94) = 110 \times 6.42 \times (1 + 5 \times 0.015) + 54 = 813.165 \to 814.$$

Whether or not decimal values are rounded up or down is inconsistent and actually split by the time at which a unit was introduced. Older units round up, whereas newer units round down, but this distinction is essentially irrelevant.

As a rule of thumb, 5-star units generally gain about a 20-25% multiplier to their ATK going from level 80 to level 100, not including unlocked MB2 abilities. This increase can be significant, particularly for the DPS, but is a decision to be weighed carefully because 5-star astral gems are relatively rare.

1.5. Status effects

Status effects, comprising **buffs** and **debuffs**, are generated by skills or abilities. Debuffs can be **cleansed**—removed—by skills and abilities, and buffs can be **stripped**. On Godly difficulty and higher, bosses gain significant resistance to debuffs on repeated applications. Further, on Godly difficulty and higher, bosses are immune to resistance down debuffs not of their element.

Debuff Decay

All but three debuffs have the decay schedule

Number	0	1	2+
Duration	100%	75%	50%

A debuff that has already been repeatedly applied to the boss **Number** times has its duration reduced to the corresponding percentage of its original value. Its effect is unchanged. A **repeat application** is strictly defined and must involve the same player, the same unit, the same boss, and the same debuff. On a repeat application, the debuff has its duration reduced according to the decay schedule. If the original debuff is still active, its duration is extended by the reduced amount. Multiple non-repeated debuffs may be simultaneously active on the boss.

Likely because of their exceptionally strong effect, the three debuffs paralysis, stun, and slow instead have the magnified decay schedule

Number	0	1	2	3	4	5	6+
Duration	100%	75%	50%	20%	10%	5%	1%

Paralysis and slow (but not stun) are also exceptional because the **Number** counter here is shared by all players and all units. Only a single stack of paralysis or slow can be active at once; all players' paralysis and slow debuffs contribute to this stack. As a result, while initial applications of paralysis or slow can last for a considerable duration, the effect of subsequent applications decays extremely quickly.

Examples

Consider the following data:

- ☞ Bianca: fire res. debuff (30 s).
- ☞ XBianca: fire res. debuff (30 s), ATK debuff (30 s).
- ☞ Renoir: thunder res. debuff (20 s), paralysis (10 s).
- ☞ Bonnie: thunder res. debuff (15 s), paralysis (8 s).

We now present a number of scenarios and evaluate the resulting status effects. Each comma denotes a separate status effect shown on the boss.

1. **Cast Bianca and XBianca.** The boss has: fire res. debuff (30 s) from Bianca, fire res. debuff (30 s) from XBianca, ATK debuff (30 s) from XBianca.
2. **Cast Renoir and Bonnie, in that order.** The boss has: thunder res. debuff (20 s) from Renoir, thunder res. debuff (15 s) from Bonnie, paralysis (**16** s = 10 s + 6 s).
3. **Cast Bonnie and Renoir, in that order.** The boss has: thunder res. debuff (20 s) from Renoir, thunder res. debuff (15 s) from Bonnie, paralysis (**15.5** s = 8 s + 7.5 s).
4. **Cast Bianca twice.** The boss has: fire res. debuff (**52.5** s = 30 s + 22.5 s).
5. **Cast Bianca twice, then XBianca.** The boss has: fire res. debuff (**52.5** s = 30 s + 22.5 s) from Bianca, fire res. debuff (30 s) from XBianca, ATK debuff (30 s) from XBianca.
6. **Cast Renoir four times.** The boss has: thunder res. debuff (**55** s = 20 s + 15 s + 10 s + 10 s) from Renoir, paralysis (**24.5** s = 10 s + 7.5 s + 5 s + 2 s).
7. **You cast Bianca, and another player casts their Bianca.** The boss has: fire res. debuff (30 s) from your Bianca, fire res. debuff (30 s) from their Bianca.
8. **You cast Renoir, and another player casts their Renoir.** The boss has: thunder res. debuff (20 s) from your Renoir, thunder res. debuff (20 s) from their Renoir, paralysis (**17.5** s = 10 s + 7.5 s).

Notice in particular (via 3. and 4.) that the mechanics behind paralysis and slow mean that the order in which different paralyzing or slowing skills apply can have an impact on the duration of the debuff.

Below, we present an exhaustive list of all status effects and their descriptions. Several character-specific buffs or debuffs (ACeltie, Rhode, Zeta, HSelgir, XFluffy) are not presented because they simply serve as counters for these units' kits, with no intrinsic effect of their own.

Status Effects

Adapted from this resource.

Label	Image		Description
Stackable			Multiple applications refreshes the buff duration and strengthens the effect by the buff count. Buff duration does not decay on reapplication. If the buff expires, all stacks are lost.
Permanent			Persists indefinitely until dispelled (on ally) or stripped (on enemy).
Indelible			Cannot be dispelled or stripped. Expires after a finite duration (as usual).
Permanent and Indelible			Persists indefinitely and cannot be dispelled or stripped.
Conditional			Triggers when condition is met, reducing count by one. Persists indefinitely otherwise.
ATK			Increases or decreases ATK%.
DA			Increases or decreases DA%.
PF			Increases or decreases PF%. Teamwide buff only and benefits from all units' selfish buff extension as a result.
SD			Increases or decreases SD%.
AD			Increases or decreases AD%.
Elem. Res.			Increases or decreases elemental resistance%. All-element resistance is shown; buffs or debuffs in each of the six elements individually are possible.

Label	Image		Description
DA Res.			Increases or decreases DA resistance (damage dealt). This stat corresponds to `statModDASlayer` in the damage formula of Sec. 1.6.2 and represents a multiplier to DA damage.
PF Res.			Increases or decreases PF resistance (damage dealt). Teamwide buff only and benefits from all units' selfish buff extension as a result. This stat represents a multiplier to PF damage.
SD Res.			Increases or decreases SD resistance (damage dealt). This stat represents a multiplier to SD.
AD Res.			Increases or decreases AD resistance (damage dealt). This stat represents a multiplier to AD.
Damage Cut			Decreases damage dealt by a constant. All-element damage cut is shown; buffs in each of the six elements individually are possible. Shares icon with resistance up.
Invincible			Immune to most sources of damage. Self-inflicted damage and poison still apply.
Regeneration			Recovers fixed HP every 2 seconds.
Poison			Takes fixed damage every 2 seconds. When inflicted on enemies, additionally gains non-stackable 10% all-element resistance down and 10% ATK down.
Paralysis			On allies, prevents DAs, PFs, skill casts, breaking weak points, and breaking coffins. On enemies, freezes them in place for the effect duration, prolonging the downed status, duration of weak spots, and trial timers.
Stun			Largely identical to paralysis but does not share the same decay multiplier.
Slow			Reduces movement speed by 50% and action timers by 75%. (In comparison, paralysis reduces action timers by 100%.)
Lethargy			Reduces skill charge rate by 50%.
Silence			Prevents skill casts.

Label	Image		Description
Fever Gauge			Increases or decreases fever gauge generation from skill hits, DAs, PFs, and ADs. Does not increase direct fever generation from skills and abilities.
Down Gauge			Increases or decreases down gauge generation from skill hits, DAs, PFs, and ADs.
Character			Increases or decreases damage based on character element, race, and gender.
Down			Increases or decreases damage during the downed status.
Debuff Immunity			Immune to being inflicted with debuffs. Debuffs already present are unaffected.
Multi-Hit			Does additional DAs with an overall boost to DA damage.
Penetration			Passes through most obstacles, though not shields or coffins. Teamwide buff only and benefits from all units' selfish buff extension as a result.
Float			Ignores gravity, maintains speed during collisions, and allows for guarding with dashes. Teamwide buff only and benefits from all units' selfish buff extension as a result.
Speed Up			Capped at +100%. Linearly increases movement speed between 100% and 200%, decreases friction between 50% and 5%, and increases restitution between 30% and 100%. Friction reduces acceleration and restitution retains speed after collisions.
Adversity			Increases damage based on fraction of HP lost.
Combo			Gains additional combo every flip for a given number of flips.
Guts			Activates upon taking lethal damage, reducing HP to 1 and granting invincibility for the remainder of the buff. Currently unique to Beatrix.
Bipolar			Increases all-element resistance%. Decreases the effect of the buff with every debuff on the character, potentially up to negative values.

1.6. The damage formula

All damage dealt in the game follows the formula presented in Sec. 1.6.2. Maximizing damage naturally requires an intuitive understanding of the formula. We present the results here in summarized form, and defer the full analysis to Sec. 1.6.2.

1.6.1. Key takeaways

Generally speaking, there are six relevant factors to damage:

- ☞ **Unit's base attack.** The sum of the weapon's base attack, the main unit's base attack, and a quarter of the unison unit's base attack.
- ☞ **Unit's attack stats.** The total ATK% stat on the unit.
- ☞ **Unit's damage type stats.** The total damage type (DA/PF/SD/AD%) stat on the unit.
- ☞ **Target's status effects and unit's status modifiers.** The sum of all active non-downed status modifiers (often called **punishers**) on the unit. Status modifiers are active if the target is afflicted with the status.
- ☞ **Target's downed status and unit's downed modifiers.** The sum of all active downed modifiers on the unit. Further multiplied by 1.5× when the boss is downed, and only applies when the boss is downed. Separate from other status modifiers.
- ☞ **Target's elemental resistance and unit's elemental advantage.** The sum of all resistance modifiers on the target corresponding to the damage source's element. Further multiplied by 1.5× when the target is weak to the damage source's element.

Add stats corresponding to the same factor, then multiply the different factors together.

The damage formula provides essential constraints and guidelines for team-building. In particular, it reveals two rules of thumb that are worth keeping in mind during the team-building process.

- ☞ **Spread stats out among the various factors.** For instance, a total of 400% in stats generates a $(1+4)(1) = 5\times$ multiplier if all 400% were to go to ATK%, but a $(1+2)(1+2) = 9\times$ multiplier if distributed evenly between ATK% and, say, SD%. In general, however, the distribution of stats is not so clear-cut because the choice is often between a disadvantageous distribution with more total % in stats and an advantageous distribution with less total % in stats.
- ☞ **Align buffs, status effects, and damage sources.** The multiplicative nature of the factors in the damage formula generally favors periods of burst damage and periods of no damage to long stretches of relatively constant damage, and this is reflected to some extent by the team archetypes in common use.

1.6.2. Formula in full

This subsection can be skipped and referred to only as necessary. Much of this subsection is reproduced in the WF wiki article on damage, for which I am the main contributor.

Damage Formula

```
unitAttack * (1 + max(-0.5, attackModifier))
+ createdBySkillAction ? (randomInt(0, 2) + skillBaseDamage)
* WeakAndHostile ? 1.5 : NotWeakAndNotHostile ? 0.5
* totalResist > 0 ? 1/(1 + totalResist) : (1 - totalResist)
* targetHasPinch ? 1.5 * (1 + statModPinchSlayer)
* targetHasGuard ? 0.2
* (1 + conditionSlayer)
* (1 + characterSlayer)
* (1 + statModAdversity * attackerFractionHealthLost)
* createdByDA ? (1 + statModDADamage) * statModDAResistMult
    * (1 + statModAdditionalDADamage) / statModAdditionalDATimes
* createdByPFAction ? (1 + statModPFDamage) * statModPFResistMult
* createdByPFAction AND ChargeLevel > 0 ? (1 + statModPFLvDamage * (1 +
  statModPFLvDamageSlayer))
* createdBySkillAction ? (1 + statModSDamage) * statModSDResistMult
    * skillMultiplier * (1 + skillSlayer)
    * enablesComboBonus ? (1 + 0.005 * CurrentCombos)
    * enablesCoffinCountBonus ? (1 + 0.026 * TotalCoffinCounts)
    * enablesBuffCountBonus ? (1 + 0.1 * TotalBuffCounts)
    * enablesRangeBonus ? (1 + min(0.5, Distance^2/700))
* createdByAD ? (1 + statModADDamage) * statModADResistMult
* (1 + randomFloat(-0.05, 0.05))
- elementDamageCut
* targetIsInvincible ? 0
```

The calculation is performed line by line; do not follow standard order of operations. The ternary operator `A ? B : C` means if `A`, then `B`; otherwise, `C`. Input `C` is optional and defaults to 1.

1. **Base damage.** `unitAttack` is the base attack of the attacker. `attackModifier` is the sum of all attack stats on the attacker (via abilities, weapons, souls, and buffs). `attackModifier` cannot go below -0.5.

2. **SD only; base SD.** If the damage arises from a skill, additional flat damage is dealt to the target. `randomInt(0, 2)` is a random integer between 0 and 2, inclusive of both. `skillBaseDamage` is usually 300 or less and is generally insignificant.

3. **Elements.** `Weak` deals with elemental advantage, and `Hostile` determines whether the damage is dealt to a player or enemy. Enemies with an elemental weakness take 1.5× damage from units or attacks of that element. In addition, they only deal 0.5× damage to units of that element.

4. **Resistance.** `totalResist` is the total elemental resistance the enemy has against damage of that element, which can be positive or negative. The damage multiplier is defined piecewise

for positive and negative values. Example: a +150% resistance corresponds to a multiplier of $1/(1+1.5) = 0.4$, whereas a −150% resistance corresponds to a multiplier of $1-(-1.5) = 2.5$. `totalResist` is the sum of resistance down effects inflicted by you on the enemy (caps at −150%), by the enemy on itself, by poison (−10%), and by the Bipolar status effect.

5. **Downed.** `targetHasPinch` checks if the enemy is downed. `statModPinchSlayer` is the sum of all downed damage modifiers on the attacker.

6. **Guarded.** `targetHasGuard` checks the player's guard status. Guarding is active for player targets when moving toward an enemy attack at high speed, and gives a 0.2× damage multiplier.

7. **Status effects.** `conditionSlayer` is the sum of all status effect modifiers on the attacker to a target subject to those status effects and applies, for example, via Bianca's A2 and Cipher's A1.

8. **Race and element.** `characterSlayer` is the sum of all character-specific (element, race, and potentially gender) modifiers on the attacker, and applies, for example, via Vyron's A3.

9. **Adversity.** `statModAdversity` is the sum of all adversity modifiers on the attacke. This multiplier scales linearly with `attackerFractionHealthLost`, the fraction of health that the attacker has lost.

10. **DA only; DA damage.** `statModDADamage` is the sum of all DA stats on the attacker. `statModDAResistMult` takes the sum of all DA resistance modifiers on the attacker and the target and transforms it into a multiplier following line 4.

11. **DA only; multihit.** `statModAdditionalDADamage` is the additional damage dealt by multi-hit, and `statModAdditionalDATimes` is the number of multi-hits. Example: Sonia's A3 gives her a multi-hit of ×2/+50%, so `statModAdditionalDADamage` = 0.5 and `statModAdditionalDATimes` = 2. In other words, Sonia's multi-hit causes her to do two attacks, each at $(1+0.5)/2 = 0.75$ times their usual strength.

12. **PF only; PF damage.** `statModPFDamage` is the sum of all PF stats on the attacker. `statModPFResistMult` takes the sum of all PF resistance modifiers on the attacker and the target and transforms it into a multiplier following line 4.

13. **PF only; PF multipliers.** `statModPFLvDamage` is the PF multiplier from Sec. 1.3, which depends on the level (1, 2, 3) and type (sword, fist, bow, special, support) of PF. `statModPFLvDamageSlayer` is an additional multiplier to the damage for specific PF levels and applies, for example, via Rolf's A3.

14. **SD only; skill damage.** `statModSDamage` is the sum of all SD stats on the attacker. `statModSDResistMult` takes the sum of all SD resistance modifiers on the attacker and the target and transforms it into a multiplier following line 4.

15. **SD only; skill damage.** `skillMultiplier` is the multiplier associated with the attacker's skill. `skillSlayer` is the character-specific modifier associated with a skill, as is the case for Azel or Kugui.

16. **SD only; combo multiplier.** This applies, for example, via Kannon's skill. `currentCombos` is capped at 9999.
17. **SD only; coffin multiplier.** This applies, for example, via Luna's skill.
18. **SD only; buff multiplier.** This applies, for example, via Ellya's skill.
19. **SD only; distance multiplier.** This applies via Selgir's skill. This multiplier scales as the squared distance.
20. **AD only; ability damage.** `statModADDamage` is the sum of all AD stats on the attacker. `statModADResistMult` takes the sum of all AD resistance modifiers on the attacker and the target and transforms it into a multiplier following line 4.
21. **Random fluctuation.** `randomFloat` is uniformly distributed between −0.05 and +0.05, causing each instance damage to fluctuate between 0.95× and 1.05× of its deterministic value.
22. **Flat damage reduction.** `elementDamageCut` accounts for flat elemental damage resistance the target has against damage of that element, and applies, for example, via Walter's skill.
23. **Invincibility.** This accounts for whether the enemy is currently targetable.

1.7. Skill casts

Because buffs, status effects, and damage sources generally result from skill activations, it is natural to attempt to align skill casts. This is relatively straightforward in manual play because skills can be cast at will, but potentially a much more difficult issue with auto-play. We focus on auto teams unless otherwise specified.

During auto-play, units cast their skills (i) upon reaching 100% skill gauge, (ii) while a non-invulnerable enemy is present within their skill activation range, and (iii) in order from left to right within a team if multiple skills are simultaneously available.

The effect of a skill is manifold; principally, it can provide buffs, inflict debuffs, deal damage, generate combo, generate gauge, and redirect movement. Understanding the effect of a skill requires testing it in action; a text-based description (as in the tracker) is generally insufficient. Skills can be previewed in-game, although this does not necessarily reveal the full scale of their complexity and particularly their interaction with other units. For instance, Bonnie's 60× skill multiplier looks very strong until you realize that she shoots out two waves of five stingers radially, each of which has a 6× skill multiplier. While it is possible to get all 60× damage, doing so requires non-trivial planning specifically built around her skill.

Even two skills with a similar description may vary significantly in terms of coding and ultimate effect; a full description of a skill's behavior requires datamining the relevant skill `jsons`.

1.7.1. Skill gauge

The definition of **skill gauge** is overloaded and refers both to a quantity that accumulates and to the value at which that quantity is depleted to activate a skill cast. Skill gauges range from 240 to 750. The skill gauge of a main unit and their unison is shared among the pair, and is the average of the individual skill gauges. If no unison is present, the skill gauge is that of the main unit.

The **maximum skill gauge** defaults to 100% but can be raised with abilities up to a maximum of 200%. Skill casts reduce the skill gauge by 100%, so an increase to the maximum skill gauge allows for gauge to be banked for subsequent casts.

The **starting skill gauge** defaults to 0% but can be raised with abilities up to the maximum skill gauge (and beyond, though to no effect).

Skill gauge can be obtained via skills and abilities (possibly associated with weapons or souls), but predominantly through unit movement. The skill gauge thus obtained is proportional to the distance traveled and is roughly 10/s, though this value may vary considerably given the units' movement. Collisions and dashes tend to reduce movement speed, but far less so when float is active. Speed up buffs also increase gauge generation, although this increase is reduced by some extent to prevent it from being overpowered.

Skill gauge is also affected by the **skill charge rate** stat, which multiplies the rate at which skill gauge is obtained from movement, and by **gauge refund**, which we define here specifically as the percentage of skill gauge that is returned to a unit after that unit's skill cast.

- ☞ A unit with a skill charge rate of x casts skills $1+x$ times as quickly, with an effective skill gauge of `base skill gauge`$/(1+x)$.

☞ A unit with a gauge refund of x casts skills $1/(1-x)$ times as quickly, with an effective skill gauge of `base skill gauge`$(1-x)$.

Notably, an equal amount of gauge refund is always better than an equal amount of skill charge rate. In fact, gauge refund is the only stat that scales superlinearly in-game, with each percent of gauge refund being more impactful than the last. As an example, a skill charge rate of +99% would correspond to a 1.99× multiplier to skill casts, whereas a gauge refund of 99% would correspond to a 100× multiplier to skill casts, though the latter is obviously unfeasible to achieve.

The outsized impact of gauge refund makes it as valuable as it is rare. Whereas older units occasionally had unconditional gauge refund, it has essentially vanished from new units as its impact on game balance was gradually realized.

Skill Timeline Tool

The skill timeline tool allows for a visualization of the timeline for skill casts in a team. This is otherwise non-trivial to calculate because of gauge refund, skill charge rate, and other gauge-generation effects.

Each column in the skill gauge increment matrix corresponds to a main and unison unit pair. The elements of this column denote the effect that the unit pair has on other unit pairs in the team. On skill cast, if the leader gives 20% gauge to the leader, 10% gauge to the second main, and 0% gauge to the third main, then the elements of the first column would be 20, 10, and 0 respectively. Additional skill gauge increment matrices may be generated if necessary.

This tool can also account for skill charge rate and approximate other sources of gauge generation (for example, by special map effects, or through fever) at certain points along the timeline. In addition, maximum skill gauge and skill priority can be set via the settings. However, complicated gauge-generating mechanisms will not be captured perfectly, and neither will very restrictive skill proximity. The timeline is a very useful tool, but don't trust it blindly.

1.7.2. Proximity and hitbox

All units with damaging skills have an associated **skill activation range**, which may be mapwide. A unit whose skill activation range is not mapwide is said to have **proximity** constraints. This range is affixed to the unit, and the skill activation range associated with a main unit and their unison is the intersection of the individual skill activation ranges. Two units with wildly different skill activation ranges may have a very limited intersection, or even none at all. In the latter case, the main unit's skill activation range takes precedence, and the unison's skill activation range is ignored.

The **skill hitbox** is the range over which the skill can land at least part of its hits. There is generally very good overlap between the skill activation range and the skill hitbox—otherwise the skill would cast where it wouldn't hit—but this overlap is imperfect, and interactions between the main and unison skills may lead to unpredictable results. A notable example when the skill activation range and skill hitbox may differ considerably is with a main and unison with non-intersecting skill activation ranges, in which case the unison's skill hitbox is decoupled from its skill activation range. Generally, however, bad combinations can only be identified by in-game testing.

Skill Range Tool

Snack has made a skill range tool (links to Discord) that allows visualization of units' skill activation ranges. Extract the zip file and double-click on `index.html` to open up the tool in a browser window. There are a few minor bugs associated with Section-type skills and a Direction Kind of 2, but these are rarely relevant. **There is an important bug with circular ranges: what is stated as the diameter should instead be the radius. This means that all radii should be doubled and all circular areas four times as large. The center of each circular region remains the same.** Units are listed by their **dev names**, the names used to refer to these units in the code; these are most straightforwardly obtained by using the `/whois [character name]` command in VEliyaBot in the Discord server.

1.8. Weapons and souls

Weapons serve two roles: an additional source of stats (ATK and HP) and an additional ability. While weapons are not intrinsically element-locked and can be equipped by any unit, they frequently have activation conditions with elemental restrictions. Regardless, the flexibility with which weapons may be used within teams confers considerable advantages.

Most weapons can be **awakened**—upgraded by means of combining duplicate weapons (dupes). There are five awakening levels; a base, unupgraded weapon is 1/5 awakened, and four dupes are required to get to **max awakening**. Upgrading weapons and melting down dupes produce souls, which have the abilities of the base, unupgraded weapon. Souls do not contribute to HP or ATK. Unlike weapons, souls can only be equipped by units of the same element. A few rare weapons come at max awakening and need not be upgraded; souls cannot be obtained for such weapons.

There are two classes of upgradable weapons: ones with base abilities that are at 25% of their maximum value, and ones with base abilities that are at 50% of their maximum value. Each dupe increases the weapon's abilities by a quarter of the difference:

Base	**2/5**	**3/5**	**4/5**	**Max**
25%	43.75%	62.5%	81.25%	100%
50%	62.5%	75%	87.5%	100%

Upgrades also increase the weapon's ATK and HP by a modest amount up to their maximum value. Many weapons also have separate, additional awakening bonuses at 3/5 ("Awaken Lv3") and 5/5 ("Awaken Lv5") that can be extremely important, and which are not available as souls.

Note that weapons that confer buffs of some form are frequently disadvantaged as souls because both the buff effect and duration are halved or quartered. Older weapons generally only have the buff effect halved or quartered, not the duration; newer weapons tend to have both.

El kiño imposible...
Don Kinote, Miguel de Cervantes

2. Team-building in the abstract

2.1. Team archetypes, revisited

We examine the four principal archetypes and combinations thereof, in all six elements where possible, by presenting a generic skeleton subsequently bolstered by specific examples from each element. The teams shown are meant to illustrate team-building principles, not to be copied directly; see Ch. 3. For simplicity, we will use Blobbles of various colors to mark specific roles.

Roles

	DPS. Main damage-dealing unit in the team.
	Support. Broadly defined; provides some form of support for the associated team archetype.
	Special. Denotes a specific spot on the team with some unusual purpose to be discussed subsequently.
	Special. Denotes a specific spot on the team with some unusual purpose to be discussed subsequently.

For in-depth understanding, I recommend studying the teams below in the following manner. First, read the skills and abilities of all units that appear that you're unfamiliar with. Second, visualize how the team functions during a match. Third, figure out which units, weapons, and souls are core to team function. For units which have alternatives, what are those alternatives, and what makes the chosen options superior to those alternatives?

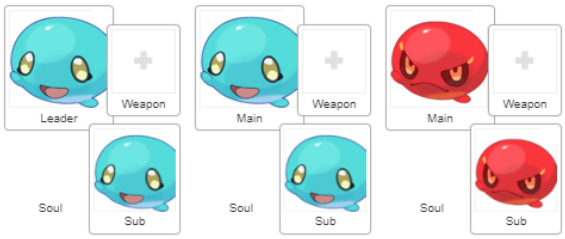
I provide commentary for each of the teams shown below, though this commentary is intended to grow more and more concise as (presumably, hopefully) your understanding improves.

2.1.1. SD

The generic skeleton is

with the leader and the leader unison as the primary DPS, and all other units as support. By its very nature, SD is reliant on proper **skill rotations**—the order in which each of the three unit pairs in a team casts their skill—for dealing damage, and gauge manipulation and skill proximity therefore play particularly important roles. In particular, with this skeleton, it is generally a poor idea for the leader to cast first, devoid of any buffs or debuffs provided by the four supports, unless proper skill order can be restored by subsequent rotations.

Preventing the leader from casting may involve using a unit with strict proximity as the leader or the leader unison, or by deliberately restricting the leader from having full starting skill gauge (but which is provided quickly after the four supports cast their skills). The other two main slots are more or less equivalent, though the middle unit tends to take less damage and usually holds Yata-no-Kagami (Orochi's Mirror) when used. Otherwise, the alternative skeleton



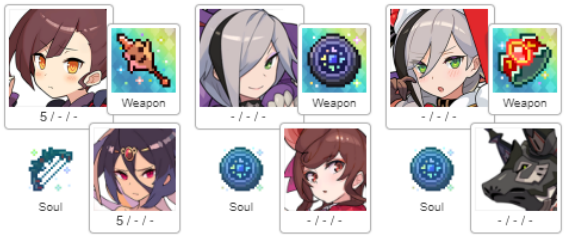
is also frequently employed. By placing the DPS in the third slot, the supports will be able to cast first and preserve proper skill rotation. This alternative skeleton can also be viable if a support has a much stronger leader ability than the DPS. Nevertheless, this skeleton is not as frequently used because of **Sha Suzu** (SSS), who provides strong supportive stats **and 30% skill gauge** to the leader, a remarkable boon for preserving skill order and tethering her skill cast to the leader's.

Both skeletons assume the presence of one, and only one, main DPS slot. This is partially a result of the damage formula—the multiplicative nature of the damage factors means that we get significantly more impact by concentrating stats on one main unit and their unison than by spreading them out evenly across all units—and partially a practical consideration, since establishing a stable rotation is far more difficult with two main slots to contend with. Some supports may do respectable damage in their own right, though this is largely an incidental benefit.

What makes for a strong SD DPS? Strong skill multiplier, **strong skill** (in relation to proximity, AoE, timing, ...), **starting skill gauge**, good abilities (stats, buffs, punishers), good base ATK. Generally, selfish stats are preferred on the DPS, but even units with party-wide stats in their abilities can be very strong DPS units.

What makes for a strong SD support? Starting skill gauge, **gauge manipulation**, **res. down**, **damage multipliers**, good abilities (stats, buffs, punishers), good skill (in relation to proximity, tracking, gauge and rotation). Starting skill gauge is paramount; it speeds up all rotations by one rotation and allows immediate damage.

2.1.1.1. Fire SD



AHanabi doublecast. Rotation goes 2, 3, 1, 1. Skill order fails thereafter; this team is designed to end fights within the first rotation only. AHanabi's gauge refund, Nasir's starting gauge, Yugiri's gauge, Deimos's refund are required to enable a doublecast with AHanabi. (**Exercise:** Evaluate AHanabi's skill gauge on every unit's skill cast to see how this happens.) AHanabi provides starting gauge to everyone.

Rolf provides **tracking**—movement toward the enemy—to account for Nasir's proximity. He isn't strictly necessary, but makes things considerably faster and more reliable. Bianca and XBianca are extremely strong generic supports, and Nasir does a lot of damage.

None of the four supports' main abilities are important in a short fight, and they can be rearranged at will. However, Rolf must be either the third main or unison to have Yugiri casting before AHanabi. (Why?) In addition, Bianca must be either the second main or unison because her skill is slow and its effects do not apply instantaneously. This would not be obvious just from reading her skill description. As a result, she needs a buffer between her skill cast and the DPS cast.

SSS is not used (and cannot be used) in this team because Deimos requires that all six units be of the fire element. Nevertheless, the DPS is still in the leader slot because AHanabi's partywide gauge is a leader ability, and Bianca and XBianca only buff the leader.

Example: Damage Formula In Use

A similar analysis as below is carried out automatically by Echo's spreadsheet (links to Discord), but is quite a bit less flexible with regards to conditional stats. I do my own calculations of this nature on a spreadsheet and it's worth doing it yourself at least a few times, but you may wish to save yourself the trouble afterwards.

We may inquire as to whether or not Haniclitus (218 ATK, 310% ATK) is a better choice than Parashu (225 ATK, 280% SD) here. To make this comparison, we may set up a matrix to evaluate the damage formula in full. We will focus on the stats at the second cast of the doublecast, and we assume that all MB2 abilities are maxed. With Haniclitus, we have

Name	**ATK%**	**SD%**	**punish%**	**res%**	**ATK**	**Mult.**	**Damage**
AHanabi	1.91		0.075		985	14	
Nasir	0.2	0.75			229	38	
Haniclitus	3.1				218		
Predator	0.8						
Bianca	0.25		0.15	0.25			
Yugiri		1.1					
Mirror		2					
Mirror		0.5					
XBianca	0.95		0.2	0.25			
Rolf	0.4						
Deimos	0.5	0.5					
Mirror		0.5					
Total	9.11	6.35	1.425	1.5	1432	52	9,207,561

The table's rows are organized as leader, leader unison, leader weapon, leader soul, second main, ..., though you can do the analysis in whatever order suits you. Remember that only a quarter of the unison's ATK (rounded down) is added to the leader's ATK. We only consider the leader and leader unison's ATK and skill mult because they are the DPS. In the **Total** row, we sum up the values from all rows, adding a base 100% to all %-based columns, then multiply them together to obtain the **Total Damage**. We ignore the minute contribution associated with AHanabi and Nasir's base skill damage. In comparison, with Parashu,

Name	ATK%	SD%	punish%	res%	ATK	Mult.	Damage
AHanabi	1.91		0.075		985	14	
Nasir	0.2	0.75			229	38	
Parashu		2.8			225		
Predator	0.8						
Bianca	0.25		0.15	0.25			
Yugiri		1.1					
Mirror		2					
Mirror		0.5					
XBianca	0.95		0.2	0.25			
Rolf	0.4						
Deimos	0.5	0.5					
Mirror		0.5					
Total	6.01	9.15	1.425	1.5	1439	52	8,795,607

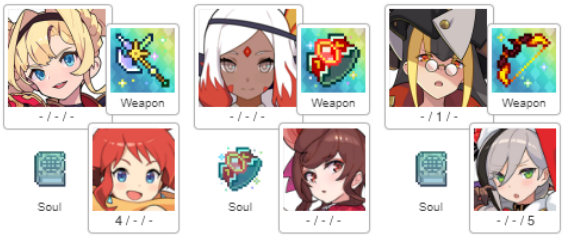
We thus identify that Haniclitus is indeed better because the stats before choosing either weapon were roughly evenly distributed at 600% ATK and 600% SD, and Haniclitus gives more overall stats than does Parashu.

MB2 Notation

The structure of the MB2 nodes is fixed for all units. Each ability consists of one large node and five smaller nodes. The large node confers half the maximum value of the ability, generally rounded up, and each small node confers an additional 10% of the ability's value. The large node must be activated before any smaller nodes can be activated. Activating the A5 large node requires activating the A4 large node first; activating the A6 large node requires activating both the A4 and A5 large nodes first. Once a large node is activated, all smaller nodes for the same ability can be activated in succession without other prerequisites. We explain the notation with a few examples:

- ☞ **-/-/-**: All MB2 abilities locked.
- ☞ **0/-/-**: A4 unlocked (large node activated).
- ☞ **4/-/-**: A4 large node and four small nodes activated.
- ☞ **5/-/-**: A4 maxed (large node and five small nodes activated).
- ☞ **5/0/0**: A4 maxed, A5 and A6 unlocked.
- ☞ **-/0/-**: A5 unlocked. The connectivity of the MB2 nodes means that A4 also has to be at least unlocked, but writing **-/0/-** instead of **0/0/-** implies that A4 is unimportant at least for this team.

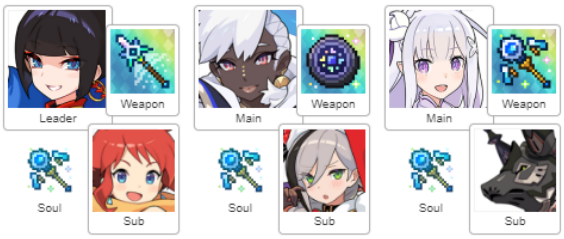
Unless otherwise stated, the listed MB2 investment is the minimum required, and having more MB2 nodes activated will not hurt you.



Zeta doublecast. Very intricate. Rotation goes 2, 3, 1, 3, 2, 3, 1 and falls apart thereafter. The net result is that Zeta casts twice without losing her combo. Zeta's gauge, Kannon's starting gauge, Enni's gauge, Yugiri's gauge, Nicola's gauge, XBianca's gauge refund, and Flamewing Bow's max gauge (!) are all required for the doublecast. Enni and Nicola provide starting gauge for themselves.

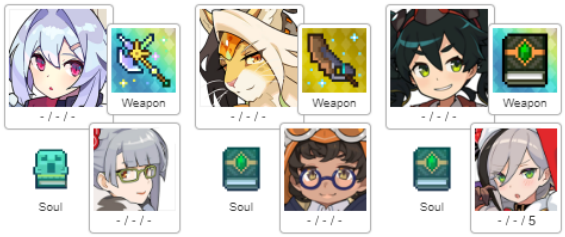
Exercise: Input this team into the timeline tool and compare it to results obtained by hand, evaluating each unit's skill gauge after each unit's skill cast, to identify how the doublecast occurs. For the tool, you will have to figure out a way of effectively incorporating Zeta A1. Note also that Yugiri's gauge refund has a small delay, so Enni/Yugiri, despite casting **before** Nicola/XBianca (who starts out with maximum skill gauge), can nevertheless refund Nicola's gauge by 10%.

Kannon does a lot of damage under the right conditions with her shockingly high multiplier and independent scaling with combo count, which is particularly notable in this team. Reaching high levels of combo either with float (usually in wind) or by a barrage of fast skill activations (as here), accompanied by a DPS that benefits off combo count, defines **combo SD**. She requires a tracker (here, Zeta) to be used at full strength.



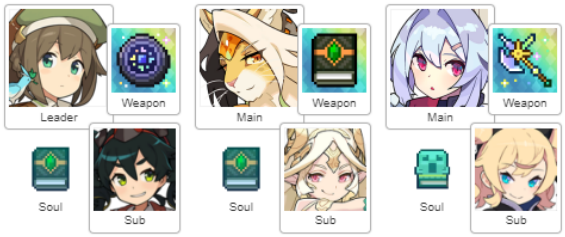
"Fire" Combo SD. Rotation goes 2, 3, 1 and falls apart thereafter—and if your teammates are really bad, you'll die. This is an older team that takes advantage of Water SD's strong initial stats and an on-element fire DPS unison and support, but works essentially only for the first rotation.

2.1.1.2. Wind SD



Fast Fluffy. Extremely fast rotations. The precise rotation order is largely irrelevant because skills cast so quickly that debuffs are almost always up. Useful against a fight with many waves of enemies. NYSuzuka, Kohane, and XBianca generate considerable combo for gauge from Death's Tomb. SSS, Kohane, XBianca, Owl Sword, and Death's Tomb generate considerable gauge for the entire party. Fluffy, Nevia, and Kohane provide starting skill gauge to each other.

Note that none of Fluffy, NYSuzuka, Nevia, SSS, or XBianca have proximity issues, and Kohane's proximity is relatively relaxed. This is important to prevent skill gauge from being wasted if Fluffy or Nevia have enough skill gauge to cast but are prevented from doing so by proximity considerations.

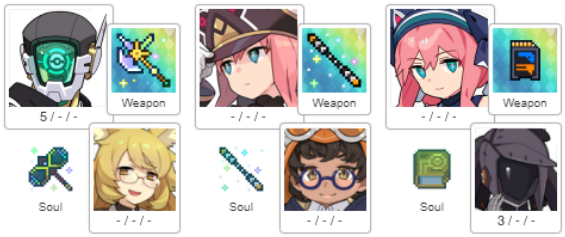


6-Wind Combo SD. No frills, no tricks; lots of damage with a stable 2, 1, 3 rotation for at least three rotations, courtesy of Death's Tomb.

Exercise: The first rotation actually goes 1, 2, 3. By looking at the skill gauges, explain why this is necessary to preserve subsequent skill order for the next three rotations. What replacement to weapons and souls may enable a stable rotation if you insist that the first rotation go 2, 1, 3?

This is a rare team that can make use of SSS but that doesn't do so because of Hartlief's exceptionally strong leader ability.

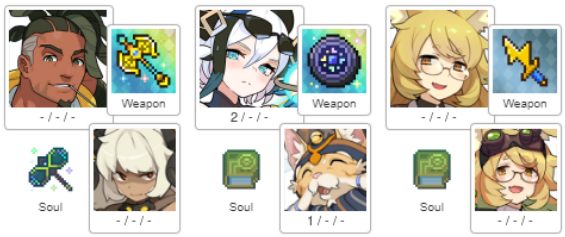
2.1.1.3. Thunder SD



Fever SD. Relatively stable 2, 1 rotation that focuses on fever generation and then burst damage during fever via gauge from ARegis A3, SSera A3, and Fever Rod. The third unit's skill cast provides no active buffs and does not need to be aligned with the other two units. The relative (rather than absolute) stability follows because ARegis and Sera are likely to both have full skill gauges upon fever activation, and the skill order is decided by whether Renoir is in range of the target. Notice that Renoir's 50% refund on skill cast may ordinarily be troublesome for skill rotations, but is countered by Sera's own 50% refund on skill cast.

Exercise: Check Renoir and Tink's skill activation ranges using Snack's tool. Compare the benefits and drawbacks of replacing Renoir with Tink. Then, check SSera and Rudy's skill activation ranges. Describe their combined range in terms of each unit's individual range.

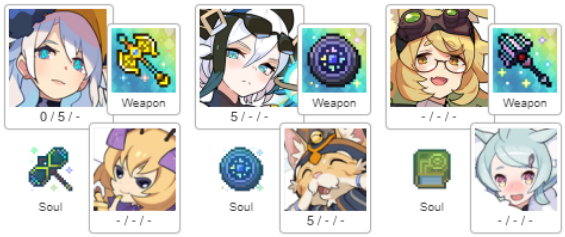
Note that fever SD teams may look quite different depending on whether there are gauge pots available on the map during fever activation.



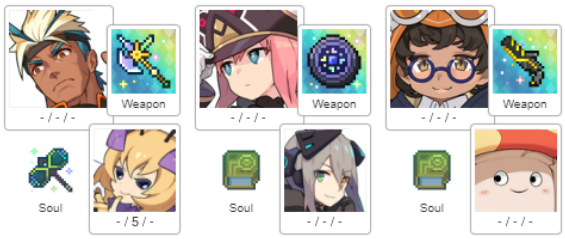
Enmity SD. Rotation goes 2, 3, 1, 1. Focuses on going below a certain HP threshold to activate weapons, souls, abilities, and skills. Aegaeon Axe's starting skill gauge and gauge refund, in addition to all the stats it offers, is extremely strong. Mino's skill looks good on paper but turns out to be horrible to land fully, since she dashes three times as part of her skill, and her dashes frequently bump her to the side and out of range of the boss if she isn't perfectly centered, so a tracker is essentially a necessity. Jay's float serves that purpose here to some extent, though it's slower (the tracking effect occurs because there's no gravity, so you dash straight toward the boss, but you have to wait for auto to dash) and less precise (if you knock into a mob, you can end up stuck). Electric Dagger provides enough HP cut that Marquis/Mino's first skill cast is within enmity range, as well as the second.

Solo vs Co-op

In solo content, multiple skills can be activated and take effect simultaneously. In co-op content, each skill must activate and take effect fully before the next skill can activate and take effect.



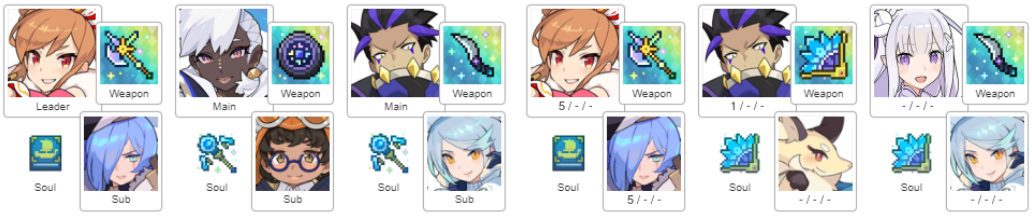
Solo-only "Enmity" SD. Rotation goes 2, 1, 1, 3 and falls apart thereafter. This only works in solo content because NYMew must track toward the boss to ensure that Bonnie's skill hits fully; in co-op, Bonnie's skill finishes casting before NYMew casts. This is "enmity" because SBelsidia herself doesn't do any damage with her casts; you simply make use of the enmity framework with SBelsidia, Beaucy, and Aegaeon's Axe to doublecast Bonnie with big stats.



Co-op only SDPF. Rotation goes 2, 3, 1 and then 3, 1 thereafter, with 2 desyncing from the others. This only works in co-op content because Shroombo doesn't finish its dash fully before Barrek casts in solo content.

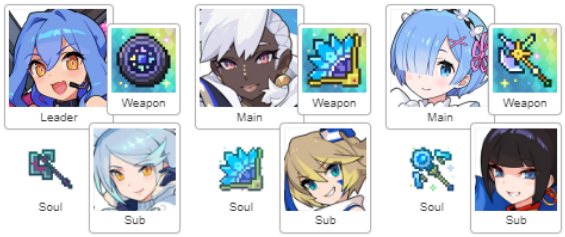
Exercise: Barrek and Sera need to get to 100 combo to get significant stat boosts from their abilities. How is this team built to achieve that? Further, how many mobs must there be on the map, beside the boss, for Barrek to get to 100 combo immediately after he casts? Assume that Shroombo only gets 20 hits in out of the 30 maximum hits from his skill.

2.1.1.4. Water SD

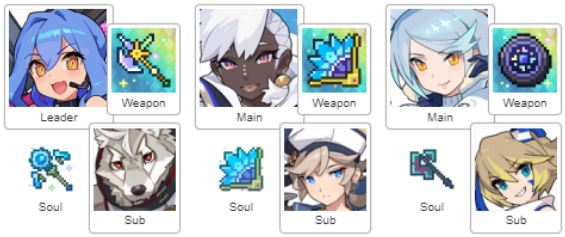


NYEliya doublecast. In both cases, the rotation goes 1, 2, 3, 1, then desyncs thereafter.

Exercise: Compare the two variants of this team. When might one be better than the other? Which does more damage on the second NYEliya cast, and by how much?



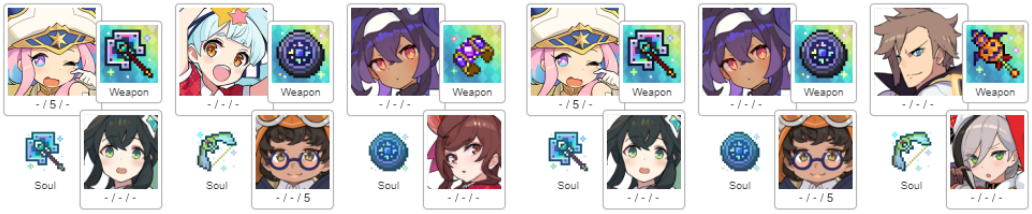
Rem/Shuilong Fever SD. How does the rotation go, and how does this team work? What kind of fights (long, short) is this team designed for? Also explain the use of Oxhead Axe in this team. Note that HAmelia, despite only having selfish abilities, is used here as a support.



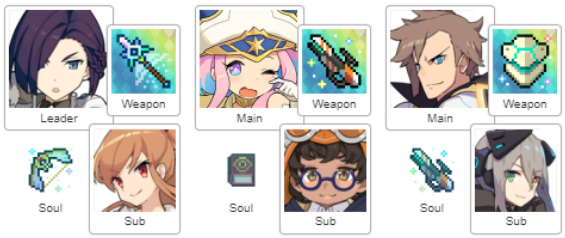
HAme/Klaus Fever SD. Klaus has an aura skill that does 12 hits over 10 seconds. It's difficult to get all his hits in, but he makes up for it with a 36× multiplier, independent slow multiplier, and impressively strong abilities, particularly A126. An important observation not obvious by any other means than in-game testing is that HAme holds Klaus stationary for the duration of her skill cast, and Klaus can get quite a number of skill hits in during this time—but only if penetration is active and a tracker is used prior to HAme's cast.

Exercise: How does the rotation go? Compare this variant of the HAme Fever SD team to that above. Both teams are Water Fever SD, though the respective skeletons look quite different.

2.1.1.5. Light SD

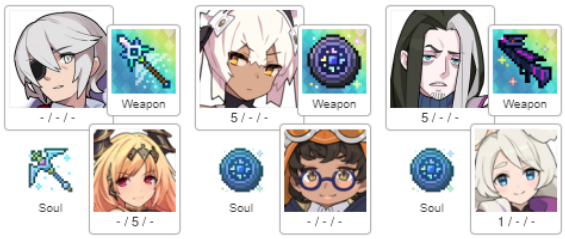


Orvelle doublecast. In both cases, the rotation goes 1, 2, 3, 1, then destabilizes. Compare the two variants of this team. When might one be better than the other?

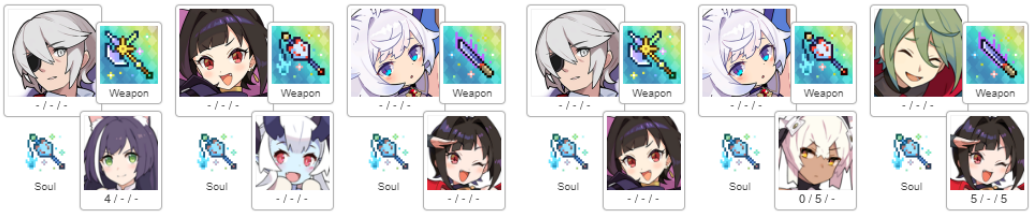


Keira SDPF. This is a very outdated team by now, but it's an excellent example of creativity in the form of familiar units used in an unfamiliar fashion. How does the rotation go, and how does this team work? In particular, what gives penetration for Maltet, and what is the purpose of using Nostalgia given its 6-light condition?

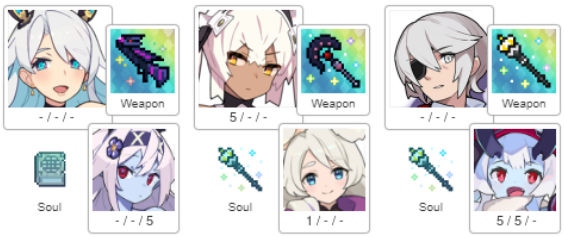
2.1.1.6. Dark SD



HSelgir doublecast. How does the rotation go? Compare the choice of Olivia as DPS unison to Karyl. What is the purpose of Darkbane Gun in this team? Note that the 'up to 3 times' in its description applies to each character individually, not 3 total activations.



Dark MBSD. Consider these two examples of MBSD teams, in which multiballs activate high-stat abilities and hence facilitate dealing damage. How does the rotation go in each case? Make sure to take proximity and Marianne A5 into account. What purpose does Arum serve in the former and Shion in the latter? Describe Shion/Denah's proximity in terms of their individual skill activation ranges. What better replacements might there be for Denah with regards to her proximity? Compare the damage dealt by both teams from the second HSelgir skill cast. Note that **not all skill effects or abilities will be fully active** in either case. Karyl A4 at 4/5 is superior to it at 5/5. Why?



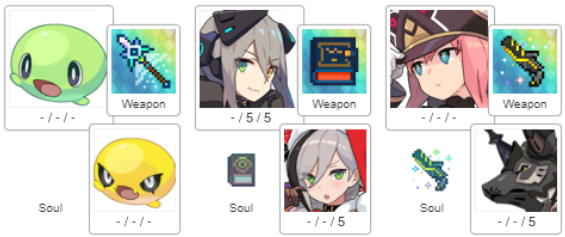
Enmity SD. How does the (relatively intricate) rotation go? Keep track of the HP of all units at the start after skill casts. Dark Enmity has the unfortunate issue of having to fit in XArum, AArly, and 24/7 mains and souls for HP cut—and none of these units or weapons have starting skill gauge. As a result, it's difficult to simultaneously get into enmity range and have skills ready at the start of the battle.

2.1.2. PF

The only possible skeleton is

because PF damage is based on leader ATK and element only, with all other units as support. Compared to SD teams, gauge manipulation and skill order is much less important, but combo generation—and penetration for sword-PF teams—becomes essential. In addition, instead of having full starting skill gauge on all units, you may want to stagger skills to maintain penetration and combo generation for prolonged periods.

Because of the nature of PF damage, we can in fact form a **universal sword-PF** (or **uniflip**) skeleton composed of units of various elements, changing only the leader as necessary:



The Green Blobble here denotes a sword-PF type leader of an arbitrary element, and the Yellow Blobble denotes either Vyron or Carla, depending on which is more suitable for the team at large. Vyron has lots of ATK% and no gauge, whereas Carla has a strong punisher and 50% gauge. The leader soul will be element-dependent. Sera/Rolf has significant gauge refund via Sera A1 and Rolf A6, which keeps penetration uptime high in conjunction with penetration from the Yellow Blobble position.

What makes for a strong PF DPS? PF type, **combo generation**, **penetration** (if relevant), good abilities (stats, buffs, punishers), good base ATK. Generally, selfish stats are preferred on the DPS, but even units with party-wide stats in their abilities can be very strong DPS units.

What makes for a strong PF support? Combo generation, **starting skill gauge**, **res. down**, **damage multipliers**, good abilities (stats, buffs, punishers), good skill (stats, buffs, punishers).

Just as SSS was of generic utility and extraordinary importance in SD teams, so too is **Bulleta** for PF teams. Bulleta has strong combo generation on her skill and through her abilities (A5), extremely strong PF stats that can be triggered without a skill cast (A23), and free PF3s (A6).

From left to right, top to bottom, we have: fire **MBPF** (multiball, sword, 1), fire universal PF (fist, 2), fire **CRPF** (combo-reduction, sword, 3), wind **DTPF** (damage taken, sword, 4), wind **CBPF** (combo-boost, sword, 5), thunder PF (fist, 6), water **fever PF** (fever, bow, 7), light PF (fist, 8), dark MBPF (multiball, sword, 9).

Because PF teams generally are much more flexible with regards to skill rotations, are significantly less diverse than SD teams, and element-specific PF teams are much less developed, we present all PF teams simultaneously and perform a comparative analysis on them all in one go. The numbers that follow refer to the numbering of the PF teams in the image above.

At this point, the only viable leads are sword, fist, and bow. Refer to Sec. 1.3 for an overview of

the PF types. Sword (1, 3, 4, 5, 9) and fist (2, 6, 8) PFs are auto-friendly, though the latter is most effective on stages with limited adds. Bow (7) PFs are decidedly not auto-friendly. We highlight in particular the manifold ways in which penetration uptime is maintained in sword (1, 3, 4, 5, 9) PF comps—via Marina A3 and multiballs (1, 3), via Saki A3 or SShywe A3 and combo generation (4, 5), or by staggered skills that grant penetration (9).

Of these possibilities, only (1, 2, 3, 7) actually see use with any frequency at all; fire (1, 2, 3) PF in its various forms is extremely well developed. Fire sword PF (1, 3) is boosted by Marina's essentially permanent penetration and combo generation from Marina and Kikuno's multiballs, whereas fist PF (2) is boosted by NYLuluca's essentially permanent multihit. Water fever PF (7) is very well supported in terms of units and weapons, and can do extreme burst damage.

While two of the wind PF archetypes—damage taken (4) and combo boost (5)—are relatively well supported, they are largely eclipsed by the superior strength of wind SD and even by wind universal PF (with NYSuzuka, DSonia, or Murakumo lead; not shown). DTPF is highly dependent on the boss doing lots of damage ticks, and DSonia in CBPF takes a very long time to scale; no content at the moment particularly favors either.

The same is true for 6-light 'upgrade' (8) PF, whose functionality is dependent on upgrading low-level PFs into high-level ones via combo generation from SInaho A3, Lyra A3, Katyusha A3, and Bulleta's ridiculously overpowered A6. Though decently well supported, it has no content in which to shine; light SD is oppressively dominant.

Meanwhile, what would otherwise form 6-thunder (6) and 6-dark (9) PF is woefully undersupported, without enough units or weapons to be worth running. Both are outshone by their far stronger universal PF equivalents with Tink and Vyron leads respectively.

2.1.3. DA

DA is a reasonably interesting archetype to build because of the fact that its damage is tied to physical movement, which incentivizes different team-building priorities relative to the previous two archetypes. A generic skeleton might be

where the Green Blobble denotes a support-type PF leader. Support PF is particularly useful for DA because support PFs generate penetration and float buffs, both of which contribute to faster DA generation. Alternatively, if a support-type PF leader is not available or unfavorable, or if there are other constraints that require that the DPS be in the leader position, the usual skeleton

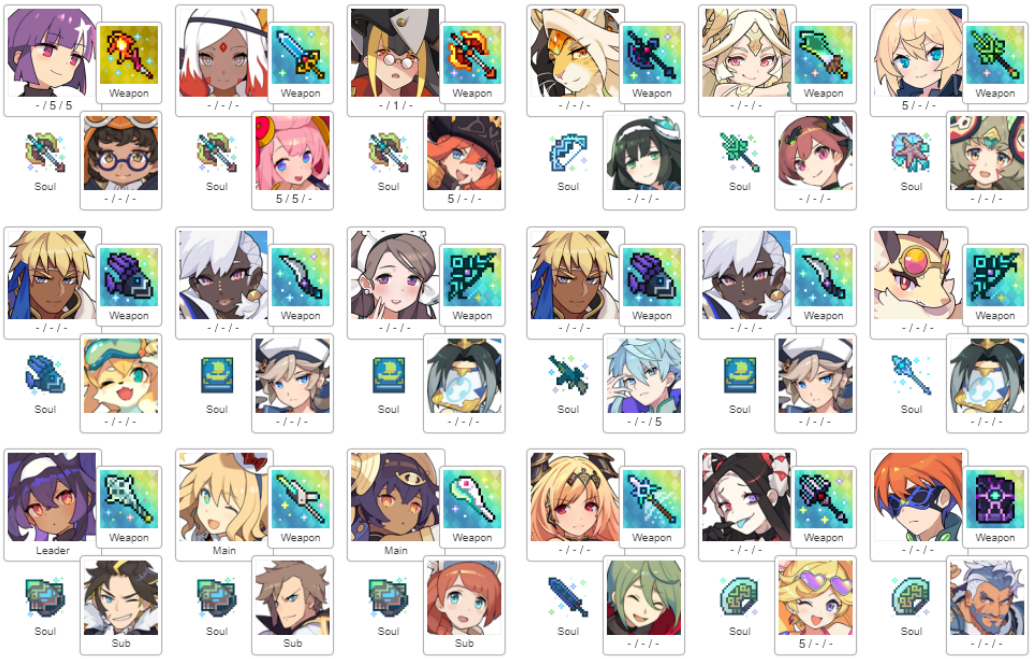
may also work. Multiple DPS slots can also be reasonable.

What makes for a strong DA DPS? Penetration, **float**, **multi-hit**, good abilities (stats, buffs, punishers), good base ATK. Generally, selfish stats are preferred on the DPS, but even units with party-wide stats in their abilities can be very strong DPS units.

What makes for a strong DA support? Penetration, **float**, **starting skill gauge**, **res. down**, **damage multipliers**, good abilities (stats, buffs, punishers), good skill (stats, buffs, punishers).

Just like with sword PF, we generally want to maintain high penetration—and now also float—buff uptime. This can be achieved to some degree with a support lead, but is usually supplemented by penetration and float buffs from skills.

As before, we present all DA teams simultaneously in anticipation of a comparative analysis.



From left to right, top to bottom, we have: fire **MBDA** (multiball, 1), wind DA (2), water **ATK DA** (attack-buff, 3), water **debuff DA** (debuff, 4), light **fever DA** (fever, 5), dark DA (6).

Notably, thunder does not have a DA archetype and water has two, though its debuff DA archetype doesn't yet have much support; the team (4) shown splices both archetypes together.

Two of these leads (1, 2) are support PF, three (3, 4, 6) are sword PF, and one (5) is special PF, a notable exception that arises from the fact that fever DA focuses on downing the boss during fever. The use of a sword PF lead in water (3, 4) arises from Haridal's extremely strong leader ability, in contrast to those of other mains, as well as Mizuchi's leader-buffing abilities. The use of a sword PF lead in dark (6) arises from limited support PF lead options being available (Zelma and HDia), neither of which is particularly strong compared to the alternatives.

All DA archetypes need a way to generate DAs efficiently. Fire MBDA (1) does so by having multiballs with penetration, float, and multi-hit, along with a support PF leader. Wind DA (2) does so by having multi-hit on its units and staggered float on all three skill casts, along with speed up buffs and a support PF leader. Water DA (3, 4) makes use of Rain's penetration and float buffs. Light fever DA (5) has neither penetration or float, but instead uses fever bumpers to repeatedly do DAs. If necessary, Bulleta can also be substituted in for permanent penetration. Dark DA (6) also has multi-hit on its units, staggered penetration on all three skill casts, and float from SAlice.

The six DA archetypes here are all reasonably well supported, though the sustained nature of DA damage makes it unsuitable to the burst damage that can be dealt with SD or even PF teams. By triggering lots of temporary buffs and debuffs and hence increasing the magnitude of the factors in the damage formula, you have a small window of opportunity within which to deal exceptional damage. SD, with skill multipliers between 20× and 40×, and PF, with PF multipliers between 15×

and 25×, can take advantage of this window. DA, which reaches maybe 5×—considering there are 3 units dealing DA, and adding a bit to account for multi-hit—has a far harder time doing so. As a result, unless DA is specifically favored, none of these DA archetypes see much use.

Fire MBDA (1) is a very interesting archetype, since its primary damage output arises from multiballs with access to penetration, float, and multihit. Because these multiballs are generated only by skill casts, MBDA is essentially an SD archetype. However, because these multiballs deal damage over a prolonged duration, skill order and rotation don't really matter; you just want to cast as many skills as possible. These two factors combined leads to what would, at first glance, look like a bastardization of team-building principles.

Multiball Guide

Multiball mechanics are surprisingly intricate. For precise, detailed information, please see the Multiball Mechanics Guide (links to Discord) made by patch and me.

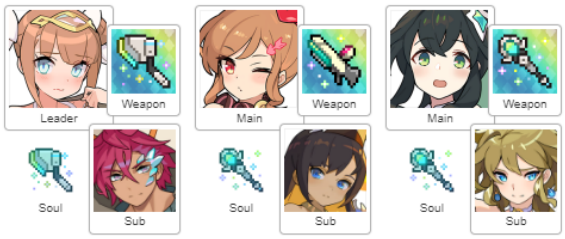
Wind DA (2) uses relatively standard mechanics as teams go, though note the use of an Aeolian Bow soul to stagger gauges with respect to float, an idea repeated with both water DA teams using Pirate's Life souls. Water ATK-buff DA (3) gives stats based on the number of ATK buffs present on units, whereas water debuff DA (4) gives stats based on the number of debuffs on enemies. Water debuff DA (4) also tends to have access to essentially permanent stacking debuffs, which can be very strong support in longer fights.

The idea behind light fever DA (5) is to get into fever quickly and then never leave it by means of fever generation from regeneration buffs and fever extension. Because of the nature of fever (see Sec. 1.2), this can be impractical for maps with larger fever gauges, and light fever has largely been left behind by the times.

Dark DA (6) also uses standard mechanics, and essentially mirrors Wind DA (2) but with penetration buffs instead of float ones.

2.1.4. AD

The final archetype, AD, appears in essentially only one element and with just enough units to make it work. It has a singular best team,



and a singular piece of content, Fox Godly, and there are no signs that this stagnation will end. The emphasis is on repeatedly activating AD abilities to stack weapons, abilities, and buffs.

2.2. Which units are good?

In lieu of providing a list of strong units, I reiterate the criteria described in Sec. 2.1.

What makes for a strong SD DPS? Strong skill multiplier, **strong skill** (in relation to proximity, AoE, timing, ...), **starting skill gauge**, good abilities (stats, buffs, punishers), good base ATK. Generally, selfish stats are preferred on the DPS, but even units with party-wide stats in their abilities can be very strong DPS units.

What makes for a strong SD support? Starting skill gauge, **gauge manipulation**, **res. down**, **damage multipliers**, good abilities (stats, buffs, punishers), good skill (in relation to proximity, tracking, gauge and rotation). Starting skill gauge is paramount; it speeds up all rotations by one rotation and allows immediate damage.

What makes for a strong PF DPS? PF type, **combo generation**, **penetration** (if relevant), good abilities (stats, buffs, punishers), good base ATK. Generally, selfish stats are preferred on the DPS, but even units with party-wide stats in their abilities can be very strong DPS units.

What makes for a strong PF support? Combo generation, **starting skill gauge**, **res. down**, **damage multipliers**, good abilities (stats, buffs, punishers), good skill (stats, buffs, punishers).

What makes for a strong DA DPS? Penetration, **float**, **multi-hit**, good abilities (stats, buffs, punishers), good base ATK. Generally, selfish stats are preferred on the DPS, but even units with party-wide stats in their abilities can be very strong DPS units.

What makes for a strong DA support? Penetration, **float**, **starting skill gauge**, **res. down**, **damage multipliers**, good abilities (stats, buffs, punishers), good skill (stats, buffs, punishers).

Have a look through the Discord resources, guides, and teams to identify commonly used units.

> "I wasn't going to eat Kino, I was just going to taste Kino."
>
> *Kino-the-Pooh*, A. A. Milne

3. Concrete team-building

The previous chapter was titled "Team-building **in the abstract**" because teams presented there are incomplete—there is no context as to the content for which they are used. WF's bosses have specific, distinct mechanics which necessitates team-building for specific bosses rather than general teams; these mechanics may favor otherwise uncommon units or disfavor common units.

We consider three leading questions:

- ☞ **Composition.** Do the units fit each other?
- ☞ **Compatibility.** Do the units fit the boss?
- ☞ **Collaboration.** Do the units fit other people's units?

These questions naturally suggest the following:

- ☞ **Composition—Composition.** Do the units activate important abilities in combination?
- ☞ **Composition—Gauge.** Do the units have (or want) full starting skill gauges?
- ☞ **Composition—Gauge.** Do the skills align appropriately with each other or with the boss's mechanics?
- ☞ **Composition—Proximity.** Do the units cast in the right order given how their skills interact?
- ☞ **Compatibility—Archetype.** Can the units take advantage of or are they disadvantaged by the boss's unique mechanics?
- ☞ **Compatibility—Buffs.** Can the units strip buffs from the boss? Do they need to?
- ☞ **Compatibility—Debuffs.** Can the units counter the boss's debuffs? Do they need to?
- ☞ **Compatibility—Proximity.** Can the units hit the boss easily?
- ☞ **Compatibility—Sustain.** Can the units survive a prolonged fight? Do they need to?
- ☞ **Collaboration—Gauge.** Is an initial skill chain valuable for the fight?
- ☞ **Collaboration—Interaction.** Do the units have any positive or negative interactions with other people's units?
- ☞ **Collaboration—Proximity.** Do the units cast quickly enough to allow for an immediate skill chain or slowly enough to delay the skill chain? Is either option appropriate?

Refer to the Discord for teams for various bosses and consider them in light of these questions.

3.1. Regitare Godly

Mechanics: Kill the adds at the beginning to remove the boss's defense buffs. Very straightforward with the mapwide skills of AHanabi, Rolf, Nicola, Bianca, or XBianca.

Strategy: Perhaps the easiest Godly-difficulty boss; expect a bell wanpan. As such, prioritize burst damage and run a 3C SD team.

Terminology:

- ☞ **wanpan**—onomatopoeic from English *one punch*, referring to killing the boss on the initial rotation of skills at the beginning of the match.
- ☞ **3C**—three units with 100+% starting skill gauge that can cast without any delay, contributing to an initial skill chain.

Skeleton (AHanabi doublecast):

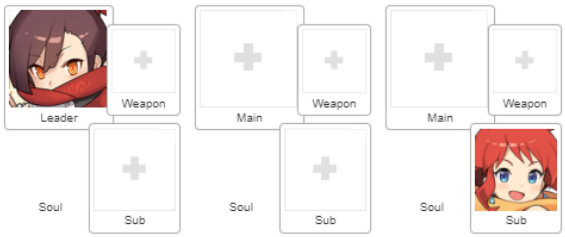
Easy 3C doublecast set-up.

- ☞ AHanabi 4 and Nasir 4 account for 65% gauge for a second cast, so you just need to acquire 35% more from another source—Nicola, Yugiri, SSS, Deimos' Bangle, Kadoma-II, or even gauge books. Yugiri and Deimos are the best choice statswise; Nicola has no stats and her gauge generation is unnecessary, and SSS prevents the use of Deimos.
- ☞ Throw in a dasher on account of Nasir's proximity—Rolf, fastest and with mapwide damage to help kill skulls; Zeta, who can serve as a secondary DPS; Melmyna, slower but with more party-wide stats; and fan favorite Shroombo, who is slowest but cutest. Speed is a matter of personal preference: the faster you are, the more time you save, but there's a chance you skill before the chain break and don't do enough damage.
- ☞ Note that Nasir's proximity is very important here for establishing proper skill order. You don't want AHanabi to cast first and waste her skill before the supports have cast and the adds are dead.
- ☞ Fill remaining slots with support units. XBianca and Bianca are the best generic choices and should always be prioritized where possible.

Note that AHanabi is a rare example of a support DPS: she does little damage on her own, but enables her unison to do a lot thanks to her starting gauge, max gauge, and gauge refund.

Alternatively, using Hanabi lead as a support or secondary DPS is an economical option.

Skeleton (Hanabi support):



Easy 3C set-up.

- ☞ Kannon and Nasir are both very strong DPS options. Kannon requires more set-up but has a higher damage cap; both are viable.
- ☞ Kannon requires a dasher (Asukirimaru, SMia, Zeta, Melmyna, ...) or a unit with a long skill animation (Toria, SEclair, Vagner, ...) to ensure that her skill lands; Nasir requires a dasher for proximity. Note that Rolf is not a particularly good pairing with either unit: his dash causes Kannon to overshoot and miss much of her skill, and his penetration has a slight delay and applies only after Nasir's skill cast. Neither interaction is obvious and both must be identified in actual testing.
- ☞ Owlbert is an interesting choice as "dasher", which works because dashing while floating brings you toward the nearest priority target. However, this is not entirely reliable if there are adds around that are prioritized over the boss.
- ☞ Fill the other slots with generic support units. XBianca and Bianca are still good choices for their fire res. down, and you can take advantage of their leader support by making Hanabi a secondary DPS.

3.2. Whitetail Godly

Mechanics: You can break the urn at the top of the stage to strip Whitetail's attack and defense up buffs, though this is rarely feasible or necessary. WT tends to teleport and dodge your skills (bad kitty!), but the slow debuff stops him in his tracks. The adds near the top of the stage can be killed instantly by poison. If this fight drags out long enough, WT uses wide-range high-damage claw attacks at the bottom half of the field, at which point everyone tends to die. Don't drag the fight out.

Strategy: Usually a bell wanpan. Prioritize burst damage and run a 3C or delayed 3C SD team. Everyone should run Melsele. Hartlief is very strong, but don't let her cast immediately if used. She instantly kills the adds that combo SD teams use to generate combo, and she can fail to land her debuffs because WT teleports at the start of the match. Have her cast second, then follow up with your DPS.

3.3. Crab Godly

Mechanics: Starts off with a barrier and three buffs, the last of which is debuff immunity (!). These can either be removed by stripping all three buffs or by breaking the barrier, though there is a delay between the latter and the removal of the buffs. The barrier reapplies itself after some time.

Strategy: Occasionally a bell wanpan, mostly because the stringent mechanics mean that others must carry a larger share of their own weight. The usual strategy is to strip the crab's buffs with HRenoir and Jay, and then burst it down with 3C enmity or fever SD teams. Breaking the barrier is also possible with an Edita doublecast, which can accommodate the delay. Do not, not, not use Cagliostro, Fuku, or Fiora in your team, or you'll be worse than deadweight by healing enmity teams out of enmity.

3.4. Golem Godly

Mechanics: Starts off with an attack buff, which can be ignored at this point since water teams can do significantly more burst damage relative to the initial release of this boss.

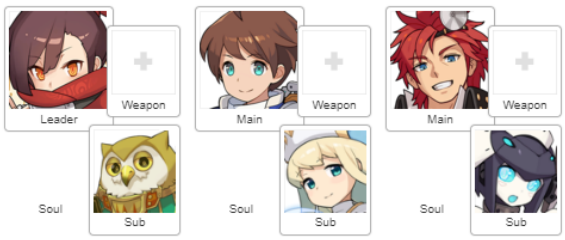
Strategy: Expect a bell wanpan since water SD units are very strong. As such, prioritize burst damage and run a 3C SD team.

3.5. Support Teams

A **support team** is a relatively low-investment team that emphasizes helping other players do damage rather than dealing damage itself, and is designed for newer or less fortunate players who do not have the appropriate units or investment to build a strong standalone team in co-op content.

Support teams generally operate by providing an initial skill chain, raidwide buffs to allies, and debuffs to enemies. Depending on the stage mechanics, they may also be used to generate fever, cleanse debuffs from allies, strip debuffs from enemies, and clear trials.

A good support team is far superior to a bad damage-dealing team, though building a good support generally requires a keen understanding of your units and the enemies' mechanics. Even so, a basic support team can already be very effective, especially for easier content. We examine one such team below:



Hanabi gives teamwide gauge so that all units can cast immediately. **Owlbert** is an exceptionally strong generic support, providing a raidwide ATK and a raidwide SD buff to all combatants, and can be obtained for free near the start of the game. Alk, Jin, Liesel, and Dia all provide raidwide ATK buffs to all combatants, and Jin and Liesel also provide raidwide healing. (If other players are playing Enmity SD in some form, this healing may be disadvantageous, and different units would

have to be chosen in that case.) ATK buffs are generically useful because they apply to damage from all sources.

A more specialized team would apply element-specific resistance down debuffs and potentially the slow and paralysis debuffs, which provide exceptional control against some bosses. In other cases, it may be useful to bring one or two units that can strip a boss's buffs. These modifications are boss-dependent and should be tailor-made to each boss.

4. Acknowledgments

I'm grateful to those who have given their time and energy to make resources for the community, many of which are linked to in this guide—patch, Marcus, Snack, Exa, Pecan, and Echo among others. I extend further thanks to the active participants of Peppa's thread, who lend a certain *joie de vivre* to the server, and with whom I have had the pleasure of many fruitful conversations.

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