

**This post has been archived. All updates to this post will stop at the end of 2020. Do refer to the [newer post](#) for post 2020 contents.**

**If you are a new player, please familiarize yourself with the basics by looking at new player/starting guides before proceeding.** There are numerous guides like [this](#) (maybe a bit outdated but some tips still apply), youtube videos or look around the subreddit and join the discord.

*This will be a long post of an in-depth look to PBAs (fake/inno or true) primarily for **main weapons** which is long overdue. For **secondary weapons**, refer to the respective section near the end. If reading is painful, scroll down to the end to minimize your pain. For charts/tables listed here, they are also available over at [bit.ly/msminfo](http://bit.ly/msminfo)*

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## PBA?

I suppose many of you active or lurking here have heard of "*inno PBA*" or "*true PBA*" before. There are plenty of posts or discussions on players getting equipment stats that are supposedly higher than what is possible. You might have considered them glitches/bugs or whatever, some say because there is decimal points etc. Clear your minds, forget about them for a moment and start afresh. This post will hopefully clear some misconceptions and or introduce the underlying calculations of getting them. For newcomers, you may be wondering what PBA is. If you are, continue on for a little primer. Others may skip to the next section.

PBA stands for Perfect Base Attack/Attribute, meaning the maximum stats you can get for a particular equipment. In MSM, almost all equipment that you can obtain have range of stats that it can take on that you can preview by clicking on the equipment given as rewards in Elite Dungeons/Expeditions. When getting a piece of equipment (be it looted/*forged*, more on forging later), its stats are set to a random value between that range. As you commit resources into it,

be it leveling or ranking them up, the gap between a PBA and non-PBA equipment will gradually increase. Knowing this, you would want to get your hands on a maximum stat equipment early before sinking resources into it, hence the chase for PBA equipment before actually playing the game. Now that you know what PBA is, let us move on.

## Min, Bases, and Max

By scrolling through the trade station, pulling treasure chests and loots you get from training, we will discover that for a certain piece and type of equipment, there exists different values for different pieces. Now that we know range of stats exists, what are the exacts of this range? We can discover it ourselves. Take a look at an example below.

<https://i.imgur.com/4KonoEm.png>

If you actually look in-game now, they do not display a range anymore. In fact, the indication of a range has since been "removed" but in actual fact, it is still being implemented. By some calculations, we discover that the maximum value is approximately 20% more than the minimum, making the max and min approximately  $\pm 10\%$  of a middle value. In the current version of the game, previewing an equipment now shows you the middle instead of the range it can possibly have.

<https://i.imgur.com/k3pVSct.png>

Not all equipment will have this range of values though. How do we tell if something is fixed/varied? You will have to get it or by basing on other players reports. Based on what we have seen and player reports over time, we can now set up some assumptions that:

1. There is a range of stat values for most equipment
2. This range has a max/min of about  $\pm 10\%$  of a middle value
3. In case of decimals (no one has seen any), they may be rounded visually

# Forging and PBA

In the game, there are plenty of ways we can improve our equipment. Leveling an equipment/Star Forcing them does not affect its base stats so we will not be covering this here. Getting an *emblemmed* equipment also boosts your stats by ~30% which will be touched upon later on. In this post, we will be focusing on ranking up of equipment as having a different base stat will affect your final stat after ranking up. The ranks in order are as follows: Normal>Rare>Epic>Unique>Legendary>Mythic>Ancient.

There are two ways of ranking up an equipment up to Mythic, by directly ranking up with stones or fusing two max level equipment of the category (weapon with weapon, armor with armor). When fusing, the resulting equipment will have its stats re-allocated randomly between the new range of the higher rank. Getting to Ancient rank is not done with the mentioned methods but by means of Mastercraft (Refer to the Ancients section). To make sure your PBA equipment stays PBA, you will have to rank them up with stones instead. What if you do not have enough gold leaves for the stones? There is a feature that enables you to reroll your base stats by using Innocence Scrolls (inno for short). There are 3 types available namely:

1. The "normal" one which rerolls your stats to a number between +-10% of the middle stat.
2. Advanced which rerolls from minimum of +1% to +10% of middle.
3. Perfect which will immediately give you +10% of middle.

They are usually obtained by paying for them be it with packages or gacha rolls but occasionally, the normal ones may be given/obtainable for free as login/event rewards.

For reference, the tables below list the middle value of weapons and their theoretical maximum of 10%.

## Middle stats

Class/Rank	Normal	Rare	Epic	Unique	Legendary	Mythic	Empires	Ancient (Inheritance)	Ancient (Necro)
Warriors (2H)	24	200	591	1196	2072	3443	3445	6590	8033
Warriors (1H + DA)	25	201	592	1197	2073	3444	3445	6590	8033
Archers	25	201	592	1197	2073	3444	3445	6589	8032
Thieves	26	202	593	1198	2074	3445	3445	6588	8031
Guns	25	201	592	1197	2073	3444	3445	6588	8031

Knucklers	26	202	593	1198	2074	3445	3445	6588	8031
Mages	27	203	594	1199	2075	3447	3445	6586	8029

Max theoretical/inno stats

Class/Rank	Normal	Rare	Epic	Unique	Legendary	Mythic	Empres s	Ancient (Inheritance)	Ancient (Necro)
Warriors (2H)	26	220	650	1316	2279	3787	3790	7249	8836
Warriors (1H + DA)	28	221	651	1317	2280	3788	3790	7249	8836
Archers	28	222	651	1317	2280	3788	3790	7248	8835
Thieves	29	222	652	1318	2281	3790	3790	7247	8834
Guns	28	222	651	1317	2280	3788	3790	7247	8834
Knucklers	29	223	652	1318	2281	3790	3790	7247	8834
Mages	30	224	653	1319	2283	3792	3790	7245	8832

## Over-exceeding, True PBA, Tinfoil Hats

Now we come to interesting bit. As mentioned before, ranking up equipment with different bases at a lower rank will result in a slightly growing gap up till the highest rank. Here, we have an example of a leveled up normal One-Handed Sword for a Paladin and the preview result of ranking up

<https://i.imgur.com/a3ru2C3.png>

<https://i.imgur.com/z06DaH1.png>

You may notice in the second image, the preview result shows a value that is higher than our theoretical value. This phenomenon has been discussed plenty over time as more players discover that they can "exceed" the limit, dubbed *true PBA* over time. Does this mean we have broken the game? Have we missed something? It is actually pretty simple to explain if we allow ourselves to make two more assumptions:

1. The base stat of your equipment is not just rounded visually but also stored as a rounded whole number in the database eg. 27.5 may be rounded up to 28 and replaced as such.
2. The difference in ratio of your previous base stat to the previous middle stat carries over during ranking up.

What do these assumptions have to do with exceeding limit? Referring to the previous two images in this section, from Assumption 1 we have a 28 (rounded up from 27.5) normal weapon with a middle stat of 25 that should give 221 at rare but we are getting 225. To explain this, we can apply Assumption 2 to this situation to carry over the ratio to the new rank:

$$28/25*201 = 225.12 \text{ rounded to } 225$$

If we applied these 2 assumptions, we will now see this *true PBA* can be explained and reproduced easily. Is it intended to be coded this way? Only Nexon can answer you on this. There is one notable instance that ranking up may not give the max possible stats. For warrior weapons with middle stat of 24 (other than paladins since they have different middle stat), you will find that ranking up in-game at epic rank to unique will give you the following:

$$650/591*1196 \approx 1315.397... \text{ which rounds off to } 1315 \text{ in-game}$$

Using an Innocence scroll will actually get 1316 instead. What this means is that to obtain a 1316 warrior weapon, you will have to use an innocence scroll instead of ranking up from epic as that will give you 1 off the max. We can also make more assumptions that:

1. Ranked up values are rounded down instead.
2. Resulting values from Innocence scrolls are rounded up.

The table below lists the highest stats each weapon can take (be it from Innocence/ranking up).

#### Upper Limit

Class/Rank	Normal	Rare	Epic	Unique	Legendary	Mythic/Empress	Ancient	Necro
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Warriors (2H)	26	220	650	1316	2279	3787/3790	7249	8836
Warriors (1H+ DA)	28	225	662	1338	2317	3849	7364	8977
Archers	28	225	662	1338	2317	3849	7363	8976
Thieves	29	225	660	1333	2307	3832	7328	8933
Guns	28	225	662	1338	2317	3849	7362	8975
Knucklers	29	225	660	1333	2307	3832	7328	8933
Mages	30	225	658	1328	2298	3817	7292	8890

## Emblems

An equipment with a colored background is called an Emblem/Elite Equipment officially. When an equipment is "emblimed", its base stats are increased by 30% which are then rounded down. When ranking up an emblem equipment, you use its emblimed stat for calculation eg embliming a unique claw then ranking up to legendary:

$1333 * 1.3 = 1732.9$  rounded to 1732

$1732 / 1198 * 2074 = 2998.4$  rounded to 2998

Emblems are not available for secondary weapons.

## Ancient Inheritance/Necro

The Mastercraft (MC) feature was introduced to improve your equipment to the new Ancient rank. There are two types of MC: Inheritance and Necro conversion. Inheritance will result in the Ancient equivalent of your current equipment aka Briser to Briser, Jaihin to Jaihin etc whereas Necro conversion will result in a Necro equipment. For more details on mastercrafting and its results, refer to the [official guide on Mastercraft](#).

You may have noticed in the previous Upper Limit table that the numbers for Ancients/Necro are cancelled out since there have been player reports that their PBA/True PBA Mythic weapons do not tally with the numbers. Since they do not tally, we can assume the calculations for ranking up to Ancient are probably slightly different than the usual methods. Before looking at the calculations, the table below lists the various results you will get for mastercrafting a TPBA Mythic (most of these results are based on player reports).

Mastercraft result from TPBA Mythic (player reports)

Class/Type	Mythic (reg)	Mythic (Emb)	Inheritance (reg)	Inheritance (Emb)	Necro (reg)	Necro (Emb)
Warriors (2H)	3787	4923	7249	9423	8836	11487
Warriors (1H + DA)	3849	5004	7381	9556	8997	11648
Archers	3849	5004	7380	9554	8996	11646
Thieves	3832	4981	7313	9553	8914	11645
Guns	3849	5004	7379	9553	8995	11645
Knucklers	3832	4981	7313	9553	8914	11645
Mages	3817	4962	7310	9484	8912	11562

We can work backwards to figure out the calculations required. In these calculations, we will use archer weapons as the test weapon.

Mythic middle = 3444

Ancient Inherit middle = 6589

Ancient Necro middle = 8032

To start off, we can go back to the initial two assumptions that was made previously ie. whole number = whole number and ratio of base stats carrying over to the new rank. If you take the ratio of the Ancient result to its middle stats of equivalent rank, you will find that it corresponds to ~1.45 for an embled and ~1.12 for a non-emblem. Applying this ratio calculation to the

other class weapons with their corresponding middle stats, you will find that the result is rounded up unlike the usual ranking up where it rounds down. From what we have seen, this leads us to the first two assumption of MC:

1. The stats result from MC are rounded up.
2. The ratio may be rounded and fixed to 2 decimal places.

To further highlight the ratio being rounded off, if the usual ranking up was used, an archer weapon would have obtained 11670 for a Necro emblem and 8977 for non-emblem but apparently that was not the case.

$$5004/3444=1.45296\dots$$

$$5004/3444*8032=11670.188\dots$$

$$3849/3444=1.1175\dots$$

$$3849/3444*8032=8976.529\dots$$

In addition, an MC-ed 5003/5004 bow gave the same result of 11646. We can now safely assume that the ratio is rounded up during the calculations and the final results is rounded up again. With this new discovery of a different calculation of using rounding, can we see even higher stats than the values in the previous table? We can take a theoretical look at getting the absolute highest base stats by taking archer weapon as an example again. This time we start off with a TPBA Mythic non-emblem. We can apply the calculations again:

$$3849/3444=1.1175\dots \text{ rounded to } 1.12$$

$$1.12*8032=8995.84 \text{ rounded to } 8996$$

By applying and succeeding an emblem scroll now, we get 30% more stats that pushes the weapon to:

$$8996*1.3=11694.8 \text{ rounded to } 11694$$

We have obtained a bow that has a higher base stat of 11694 compared to a bow that has 11646 just by applying an emblem scroll at a different rank! Applying these theoretical calculations to other weapons, we get the following results:

#### Highest possible TPBA Ancient Emblem

Class/Type	TPBA Mythic (reg)	TPBA Inheritance (from Mythic Emb)	TPBA Inheritance (Ancient Emb)	TPBA Necro (from Mythic Emb)	TPBA Necro (Ancient Emb)



Warriors (2H)	3787	9423	9423	11487	11487
Warriors (1H + DA)	3849	9556	<b>9595</b>	11648	<b>11696</b>
Archers	3849	9554	<b>9594</b>	11646	<b>11694</b>
Thieves	3832	<b>9553</b>	9506	<b>11645</b>	11588
Guns	3849	9553	<b>9592</b>	11645	<b>11693</b>
Knucklers	3832	<b>9553</b>	9506	<b>11645</b>	11588
Mages	3817	9484	<b>9503</b>	11562	<b>11585</b>

As these values are more theoretical than actual for now, whether it is worth the time and effort to remake a weapon is up to your discretion.

## Best of the best of the best

This section will contain information on how to get the best stats for main weapons if money is not a problem.

### Best mythic weapon

Class	Todo
Warriors (2H)	Inno and Emblem at Mythic
Warriors (1H + DA)	Rank up PBA normal to Legendary>emblem>rank up to Mythic
Archers	Rank up PBA normal to Legendary>emblem>rank up to Mythic
Thieves	Rank up PBA normal to Legendary/Mythic>emblem>rank up to Mythic
Guns	Rank up PBA normal to Legendary>emblem>rank up to Mythic
Knucklers	Rank up PBA normal to Legendary/Mythic>emblem>rank up to Mythic

Mages	Rank up PBA normal to at least Unique>emblem at Unique/Legendary/Mythic>rank up to Mythic
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### Best Ancient weapon

Class	Todo
Warriors (2H)	Inno and Emblem at Mythic>MC to Ancient
Warriors (1H + DA)	TPBA Mythic non-emblem>MC to Ancient>emblem
Archers	TPBA Mythic non-emblem>MC to Ancient>emblem
Thieves	TPBA Mythic emblem>MC to Ancient
Guns	TPBA Mythic non-emblem>MC to Ancient>emblem
Knucklers	TPBA Mythic emblem>MC to Ancient
Mages	TPBA Mythic non-emblem>MC to Ancient>emblem

## Secondary Weapons

Currently, you can only obtain secondary weapons by opening treasure chests. The meso chests may contain secondary weapons from Normal up to Epic rank and crystal chests from Epic up to Mythic rank. You can refer to the in-game probability information on individual drop chances for crystal chests. The main difference between the two different weapon slots is that **secondary weapons cannot be ranked up/fused to obtain the next higher rank**. Once obtained, it will be stuck at that rank, so bear that in mind before purchasing/investing in one. Stats for secondary weapons do also have a range but it is different from main weapons. They have a min range of -33% up to a max of +10%. All classes' secondary weapons have the same min/max range which is listed below.

### Secondary Weapons Stats

Range	Normal	Rare	Epic	Unique	Legendary	Mythic
Min	24	77	167	301	498	906

Base	37	117	253	456	755	1373
Max	41	129	278	502	831	1510

## Longinus Secondary

A new refining technic similar to main weapons' Empress refinement has been introduced for secondary weapons of Epic rank and higher. These new Longinus Spears cannot be ranked up/fused but are not class-locked and can be traded. These spears or refinement materials can be obtained by participating in the Guild PvP content [Sharenian's Culvert](#). The min/max range is as follows.

### Longinus Spears Stats

Range	Epic	Unique	Legendary	Mythic
Min	196	301	498	906
Base	297	456	755	1373
Max	327	502	831	1510

## Extras

Here, we have some issues that may be raised by players and some additional information. To start with, some may remember the fabled 27 base for warrior spears. Obtaining one now is highly unlikely, not to say they did not exist before. Yes, they did exist, keyword **did** and yes they are now very valuable if any still even exist in someone's storage or inventory. Applying the theoretical calculations mentioned above to a 27 spear will push it to an approximate of 3866 at mythic and a whopping 5025 emblmed, making it potentially the highest base attack weapon in the game. Players report that 27 spears act the same as 26 when ranking up.

Another issue players have raised is that their emblem PBA weapons are off by 1 or 2 at mythic even though they were ranked up as a PBA of a lower rank. We can refer back to the example

listed in the Emblem section of this post. If we reverse the order of that example ie. ranking up to legendary first then embleming it:

$$1333/1198*2074 = 2307.7 \text{ rounded to } 2307$$

$$2307*1.3 = 2999$$

We find that this order actually gives you 1 more attack than the other order (Spoiler: you will still get 4981 at mythic emblem). Another example below compares the difference between embleming bows at different ranks.

Embleming at unique:

$$1338*1.3 = 1739 \text{ rounded at unique emblem}$$

$$1739/1197*2073 = 3011 \text{ rounded at legendary emblem}$$

$$3011/2073*3444 = 5003 \text{ rounded at mythic emblem}$$

Embleming at legendary:

$$1338/1197*2073 = 2317 \text{ rounded at legendary. Applying emblem gets it to } 3012.$$

$$3012/2073*3444 = 5004 \text{ rounded at mythic emblem}$$

This actually presents us with something interesting that we can experiment with which hopefully some of you out there will have the zeal to do it ;)

Extending this topic on being off 1 or 2 points, fuse results, chests pulls and loot drops have been mentioned to be allocated to a random value within the given range. These random values can be any of the whole numbers between this range ie. a range of 270 to 330 can literally allocate you any whole number encompassed within and inclusive. Meanwhile, Innocence scrolls will only roll results that give you a whole number percentage. An example of using Innocence scrolls on a 270 to 330 range equipment may net you 300 or 303 corresponding to 0% and 1% of middle value but you will never get a value in-between them (in this case, 301 and 302 are impossible) from using innocence scrolls.

## TLDR

Based on the lengthy explanations above, we can do a summary of it here:

1. There is a range of stat values for most equipment

2. This range has a max/min of about  $\pm 10\%$  of a middle value, whole numbers only unless it results in decimals at the min/max which will be rounded up when first obtained. Secondary weapons are an exception which has a max of  $+10\%$  and a min of  $-33\%$ .
3. Stats are stored as whole numbers, meaning my 650 spear is literally the same as your 650 base spear, no hidden decimals regardless of whether mine was 649.9 rounded up or yours was 650.1 rounded down.
4. The difference in ratio of your previous base stat to the previous middle stat carries over during ranking up, ignoring the  $\pm 10\%$  range, leading to certain situations like true PBA exceeding the 10% limit. Fusing and loots will follow the  $\pm 10\%$  range and rounded up.
5. Ranked up/emblemmed values are rounded down, Innocence scroll results are rounded up like fusing and looting.
6. Mastercraft requires a slightly different calculation for the end result but still ignoring the  $\pm 10\%$  range.
7. Secondary weapons **cannot** be ranked/fused for the next higher rank.
8. For warriors that use 2H weapons, **do not** use the ranking method for PBA from scratch but rather, just use innocence scrolls at Mythic.

There are no decimals stored on your equipment, every whole number stat **is** a whole number. Decimal results from regular forge operations/loots/Innocence scrolls are rounded up/down depending on operation then saved as such. Obtaining the highest possible stats of the various mythic weapons may be done differently by the order of how you do things, be it emblem first then ranked or the other way round. Obtaining the highest possible stats of an Ancient weapon may differ from the regular methods for Mythic and below.

*Thanks to all who have contributed and responded to my questions on discord/other communities these few days, also RIP to some of my gold leaves used for testing. Leave a comment if numbers are wrong, you want to share your experiment results etc.*

Edit: Updated for Ancient and added secondary weapons

2nd Edit: Added a section for Ancient

3rd Edit: Filled Ancient section

Nov 2020 Edit: Update for Desperado and Longinus

2024 Edit: Changed some links