

How to Fix Noisy Ducati Clutches (if you don't believe this is "character")



Recently I got to do a lap of the Oxley, NSW's best road!, where it was pretty obvious in mixed brand motorcycle company with a standard clutch ST4S along too that honestly these rattly clutches can be a bit of an embarrassment - and even more so to people who understand the engineering of what's going on. Of course, to many this racket is an integral and attractive part of owning a Ducati, I am not talking to you here, OK.....

For me having something flog itself to death just because enough attention to detail was not put in to the base design is pretty inexcusable. Fortunately, it can be fixed readily by those with only a moderate level of mechanical skill. You will also note that for the many aftermarket clutch kits available in different forms it is pretty normal to see that this issue has been addressed in amongst whatever the other features are provided. Unfortunately, not so with the otherwise brilliant STM Evoluzione 48T slipper clutch that I have fitted to my ST4S. However, because I have understood this issue well for a long time and it became topical again on the weekend I have now got an idea how to fix the noise from my slipper too, may put that up if it works. Check the www.hunterdog.org.au web site in a while and see if it turns up! (www.hunterdog.org.au/DiscussionBoard/index.php?topic=193).

Let me start out by saying that when I first bought a Ducati I asked if anything could be done about this noise and was told there was a standard fix to stick in a Paso plate and it only added \$34 to the first service costs, so of course I just said to do it. I then found that the bike was quiet for sure, but increasingly I found it would sometimes stall on takeoff just after moving off, not operator error, and typically in the 2-3m zone - which of course sometimes puts you smack in the middle of the traffic!

I really wasn't getting straight answers about this so I pulled the clutch to pieces and did the engineering analysis thing on it. The really short story it was a poor solution basically due to lack of attention to detail and it was designed to cause this fault. Rather than changing the procedure to make it a safe modification as I expected, what Frasers did was black banned the practice to all dealers in Australia. So blame me if you have been told these clutches cannot be quietened down any more! But in fairness this is the only administratively practical response

However, I have now realised this all happened back in mid 2004 and I know how to fix it properly and cheaply, but it is probably a bit of a secret to most. But not any more - please remember that it might be easy to do right, but it was being done very wrong and Frasers didn't ban the practice without good reason, so proceed at your peril. This is your choices, not any advice from me that is happening here, what you do with the info is up to you, and that includes ANY consequences. OK, disclaimer now done those of you who have some mechanical nous and are well capable of thinking for yourselves you will not find this hard, and it is comfortably done in an hour start to finish.

Oh yeah, there is another bonus too apart from the considerably greater clutch life - clutch lever effort reduces about 10%. I once worked out why this happens, it is OK - but can't remember what the reason was now to tell you! I do remember figuring out that it is sensible to adjust the clutch lever closer to the bar so it only just disengages, as this itself also changes the clutch lever effort - when you study the bits you can see that the mechanical advantage changes as the lever comes in, it is like a mini-power booster effect and is available to anyone to use purely by adjusting the lever a little closer to the bar. But please remember, if you are having ANY difficulty selecting neutral when stationary you have not got this set right, and it will change a bit too due to temperature of the day / how you operate the clutch etc so you need to keep a little clearance in reserve.

I am not going to write up a full technical description of the clutch de-rattle procedure, just what I think of for now. Please also note that this will only keep the clutch quiet when the clutch is out (ie neutral / riding along) but when the clutch is pulled in most of the noise returns, particularly if the clutch was already fairly worn. But that's OK as sitting at the lights in neutral and not rattling is a better practice than sitting there in gear and waking the tin tops from their slumber as they wait to see which part of your motorcycle falls off – as they expect it surely must explode soon and want to see it, but just not going through their duco!

What you need to do to start is to buy two standard steel clutch plates (used ones are just fine, as long as they are flat to 0.2mm) and a Paso end clutch plate. This is a steel clutch plate about 3mm thick (ie about double a standard one) and has friction material on one side. Maybe somebody will kindly find out and post the part number at the website above. Anyway, I would also note that, when I did this conversion to the M900 I was a slack tart and simply doubled up two standard old friction rings in lieu of the Paso plate and this has worked perfectly well for at least 10,000km now. I also had the Paso plate mod on the standard ST4S clutch for about 50,000km before swapping to the slipper, and that was to get the safety features of the slipper, not because there was any issue with the old clutch.

What happens with a standard clutch is the assembly of plates sits against a rim on the bottom of the inner hub. As you can see with the cover off it is easy to rattle the assembly through the clearance between the fingers of the friction plates and the slots in the basket, hence the noise - and the increasingly deep grooves / flattening of the mating parts. Ducati says the maximum slop here should be 0.6mm - but of course many let it get way beyond that. At least this mod will greatly slow the rate of further deterioration, but it won't eliminate it, after all these parts have to press pretty solidly on each other to generate our fun!

The clutch modification, whilst there are a couple of important details, is essentially as simple as taking the plates out, dropping the Paso plate in steel side first and then putting all the plates back and adding the steel ones to the top to make up the stack height so that the pressure plate doesn't bottom out on the hub. What happens is the Paso plate gets trapped in a fixed place relative to the basket and therefore in order for any of the rest of the plates to rattle they have to slip from wherever they happened to stop, and they won't be doing that as they are no longer bottoming out on the inside end of the hub! So the noise is totally eliminated, peace at last -now we can simply enjoy the exhaust note, ah bliss!

The really important detail that caused all the fracas in the first place is that the basket has milled round slots in it and the Paso plate has square ends. It's the old square peg in a round hole scenario – it never worked the first time and trying it out on a bunch of whinging particularly ST owners didn't make it any more successful!

What needs to happen is a bit of careful work on a grinder and finish with a file to very evenly make all the fingers on the Paso plate rounded so they fit snugly in the rounded basket slot. The simplest technique is to grind them all to an equal angle, say 70 degrees, and then grind half the angle off at say 55 degrees - and then round them all off with a file, which is what I did. But it would be best to make up a template with a 12mm (check) hole in a bit of 5mm plate to match the profile with a depth line scribed across it, probably this is the smartest choice! Do the same thing to all fingers at the same stage if you use the angled approach, rather than do them completely one by one which will only guarantee the last is not the same as the first. What you want is it sitting down evenly in the basket, you are not so fussy about the exact position it is in vertically, but don't overdo it as you still want the top face of the fingers to be the original width.

You should notice that the top friction surface of the Paso plate when sitting nicely in the basket is just

neatly proud of the adjacent end stop surface of the inner hub. It is this wonderful "coincidence" that allows the mod to work since the clutch plate pack is no longer able to land on the inner hub and therefore rattle. It is not impossible that end float / bearing wear / over enthusiastic grinding / filing may allow the Paso plate to go in a bit too far, in which case you would just need to throw in another friction plate. You need to check this to save the potential problem of a permanently rattling Paso plate and little / no change to the original noisy clutch problem - and spare yourself the inconvenience of dismantling it again to realise / rectify your howling blunder!

Please also note that it is really best to use the Paso plate rather than two friction plates, despite me saying I have done it on the Monster. This is because the Paso plate is stiffer and, while you may think it is pretty tough, even the Paso plate which is now supported at it's extremities will bend inward a little. This will have the effect of ever so slightly putting a radial taper on the friction pads, and this is in the opposite direction to that which the standard configuration tends to (slightly less) induce. It is not important, but it means a slightly increased wear rate will occur initially as the plates bed in to their new, slightly changed load profile. Probably this takes a 1,000km off the clutch plates' life all together while it simultaneously increases the basket life by much more and greatly improves your sanity in the process. I would expect the use of double friction plates might bump this number up to 2,000km less life, but I don't think it is that important as when I pulled the ST4S's clutch out after 54,000km of mostly pillion duty I reckoned it had at least another 20,000km to go on the original plates.

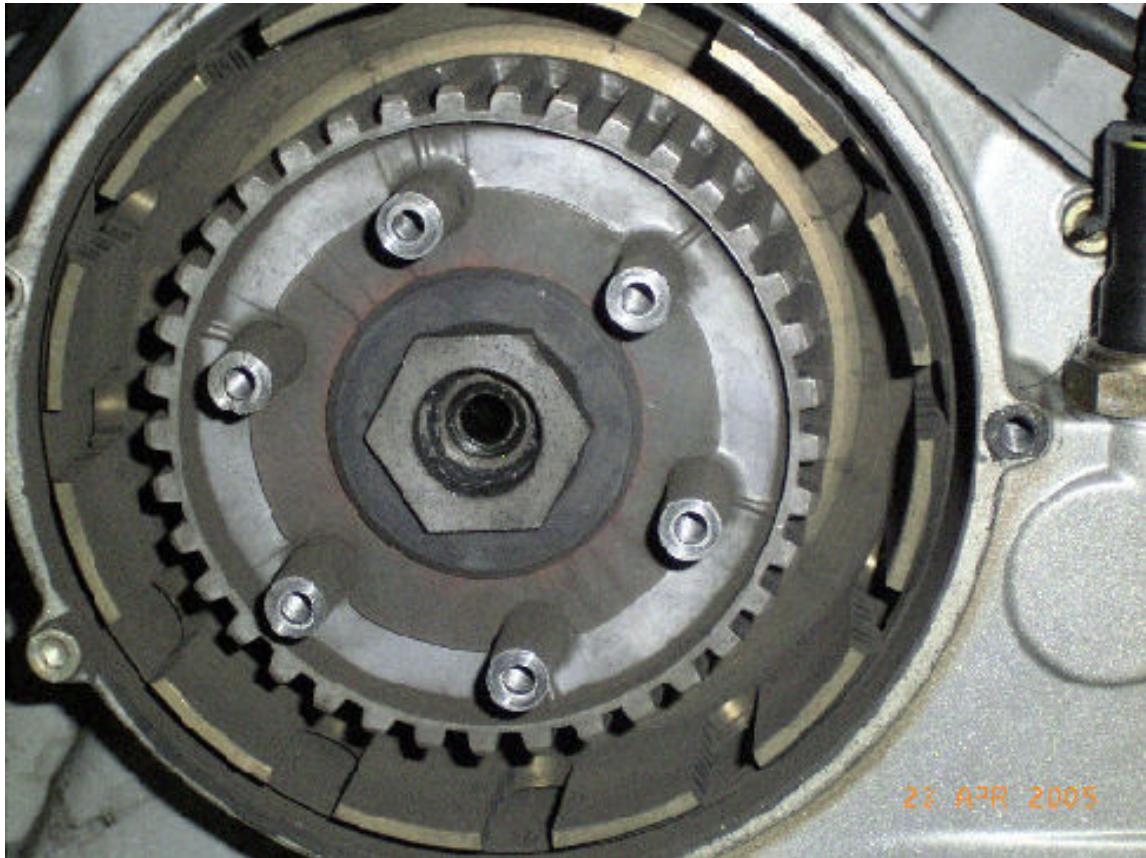
The problem with NOT doing the finger rounding off I discovered is that quickly very small steps form in the bottom of the slot in the basket where the square edged Paso plate fingers hit the rounded basket slot bottoms. Mostly the Paso plate settles in these steps and everything is fine, but sometimes it stops while sitting out of the steps a bit, maybe only on one side. Then when you take off it starts engaging fine until suddenly it slips properly into the steps with a momentary release / grab action which is greatly accentuated at the lever and it is hard to avoid the pitch forward and stall routine.

What I did on discovering this issue was initially to simply grind the fingers at an angle, about 70 degrees, figuring it was a temporary fix while something better was sorted at dealer level. After more than 30,000km of flawless operation with this "temporary" fix I pulled it to bits to see how it was all going and could see that there were still steps forming in the basket, but further in and not able to support the Paso plate in a stable way out of it's natural resting place. But to remove any possibility of this problem occurring as things wore further or whatever I settled for rounding the fingers off properly then. The photos below show various stages of this process and if you can't work out what they are from the titles etc then you shouldn't tackle this job!

Obviously this process is going to reduce the stack height, ie the whole assy of plates would go further into the basket and the pressure plate would hit the inner hub before it made proper contact with the clutch plate pack. This is what the two driven (steel) plates are for, they go in immediately under the pressure plate, ie. at the top of the stack. Check the depth the clutch plates stack up inside the basket and how far the outer pressure plate goes before it hits the inner hub. With the extra steel plates you should have about 2-3mm travel spare to allow for wear of clutch material, but just check this carefully to make sure you are not near the end relative to your clutch plate wear / whatever. The workshop manual dimensions for the friction drive plates is 2.8mm minimum and clutch free spring length is 36.5mm minimum - it is worth checking these while you are there too.

So, Please now enjoy your nice quiet clutch - and the new found roar of your slip-ons!

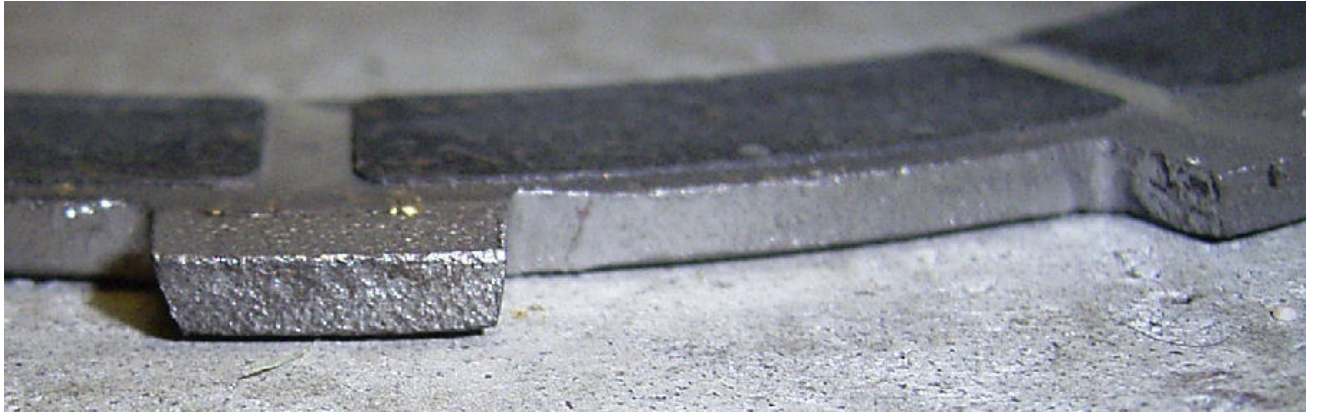
Kindest regards,
Vince Sunter



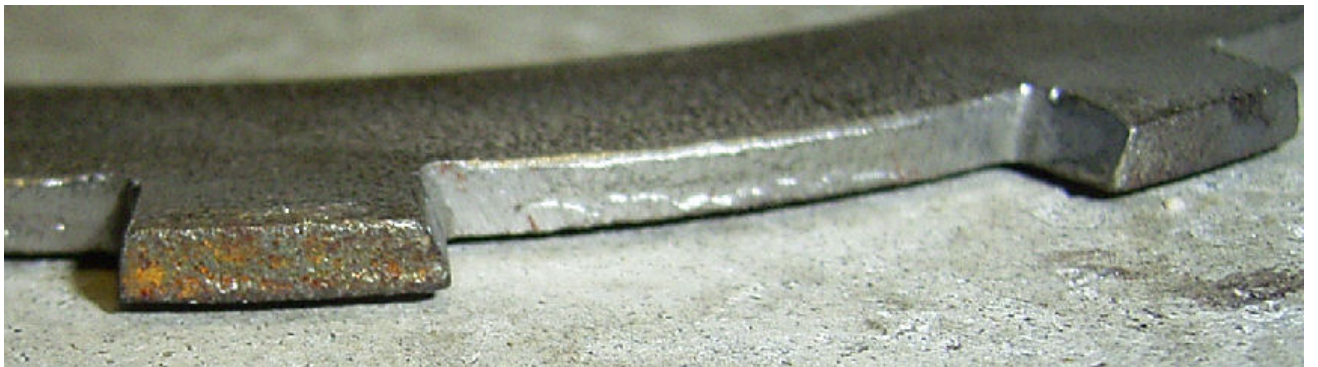
Clutch Basket ST4S – 2003



Clutch Plates, ST4S – 2003, Paso plate is on top of the pile. Note burrs removed from pressure plate



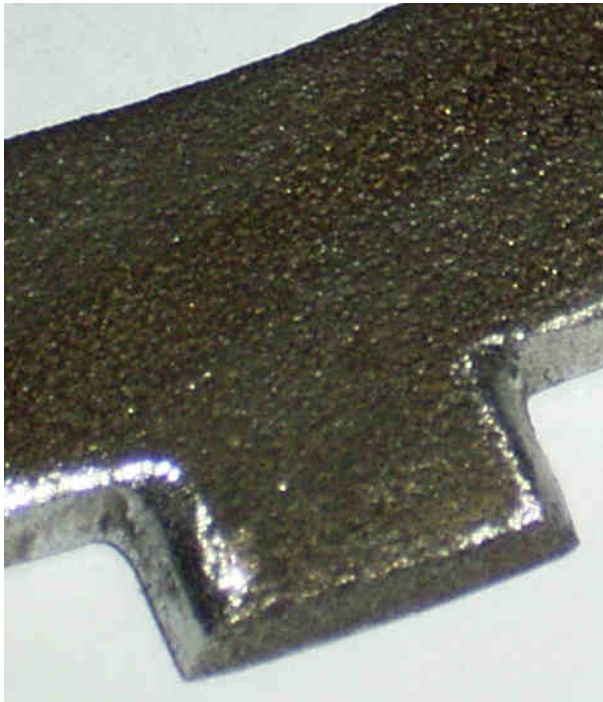
Paso Plate – Friction Side after initial modification. Note optical illusion, the angles are the same!!!



Paso Plate – Steel Side after initial modification. Note optical illusion, the angles are the same!!! (and if they weren't when the photo was taken they certainly were on assembly as I made a template up)



Paso Plate After 30,000km on "temporary" mod, note slight burring has started



Paso Plate rounded off and ready to go in again



Basket Condition, note dent in bottom of slot (top of pic) where original square end dug in compared to the scrubbing marks of the “temporary” angled version a little higher up.



Driven hub - as you can see wear will still occur due to all the abrasive crap still getting in the gap! I have been wondering if a variation of plate assembly around half life would get a greater total life, please let me know if you experiment further with this.