

All I needed was a clutch – Part one

By Wes Fleming #87301

ONCE UPON A TIME IN LATE 2015, my bike died while I rode north on US 29 near Gainesville, Virginia. It was a beautiful, sunny day and the world passed under my tires effortlessly at 60 miles per hour until – cough, cough, sputter, sputter – my 2005 R 1200 GS just shut off.

I was able to restart it, but at any speed above about 10 mph, the engine coughed, sputtered and quit. I found a safe place to pull off the highway and called for help. “Oh, well,” I figured, “I need an oil change anyway.”

Several weeks and a six-part series of articles (Owners News, March through August 2016) later, my GS not only got its oil change, but it had a new alternator belt, all sorts of carbon scoring scraped off the faces of the pistons, a rebuilt drive shaft, a new fuel pump controller (the problem causing the initial road failure) and enough cleaned components to choke a mule.

During that maintenance cycle, my boss (George Mangicaro of Beemers Uber Alles, who writes the answers to the questions you see in Nicht Uber Max) noticed the clutch slave cylinder was leaking oil. This is what mechanics commonly refer to as “bad,” so I replaced the unit and got on with my life.

In the following months, I rode and forgot all about the slave cylinder going bad. There are many reasons why the slave cylinder would fail, but since there wasn’t any fluid on the clutch pushrod, I wasn’t concerned the leakage had affected my clutch functions.

In June 2017, as I pulled up to a friend at the airport to deliver her car keys, I pulled in the clutch lever and applied the brakes only to have the bike buck, stutter and stall right in

front of her. Embarrassing to say the least, but it happens. I noticed as I rode home, though, that it was difficult to shift down through the gears, neutral got tricky to find and every time I came to a complete stop, the bike stalled.

The following weekend, I had my GS up on the lift at Beemers Uber Alles and, under George’s direction, removed the slave cylinder anyway.

City anyway.

In late September, gainfully employed full-time again, I dug into the bike to determine what parts I needed to replace the clutch. Examining the clutch master cylinder turned up a partially clogged port and what looked to be bits of rubber in the fluid – a sign the inside of the clutch fluid line was deteriorating – which meant I needed



My 2005 R 1200 GS up on the lift before disassembly.

front of her. Embarrassing to say the least, but it happens. I noticed as I rode home, though, that it was difficult to shift down through the gears, neutral got tricky to find and every time I came to a complete stop, the bike stalled. The following weekend, I had my GS up on the lift at Beemers Uber Alles and, under George’s direction, removed the slave cylinder – it was bad, even with fewer than 3,000 miles on it – and pulled the starter. Measuring the thickness of the clutch components showed them to be barely within specs, so my clutch problem seemed to be a simple matter of the friction material on the relevant disc wearing down over the course of the bike’s 83,045-mile life. Easy enough to solve, but I lacked a full-time job in June, and therefore didn’t have the money needed to buy the parts. I cancelled the insurance on the bike, turned the plate in to the DMV and headed to the MOA Rally in Salt Lake

to replace the costly handlebar unit and the line. I saved some money by purchasing a Spiegler braided stainless-steel-wrapped hose; we’re a Spiegler dealer and I regularly recommend their products to our customers, so I didn’t hesitate one bit to put one of their hoses on my bike. I even had them make it blue with black banjo bolts to match the color scheme of my bike and saved myself \$150 in the process.

(this would be a sweet spot for a photo set, before and after, if you have them)

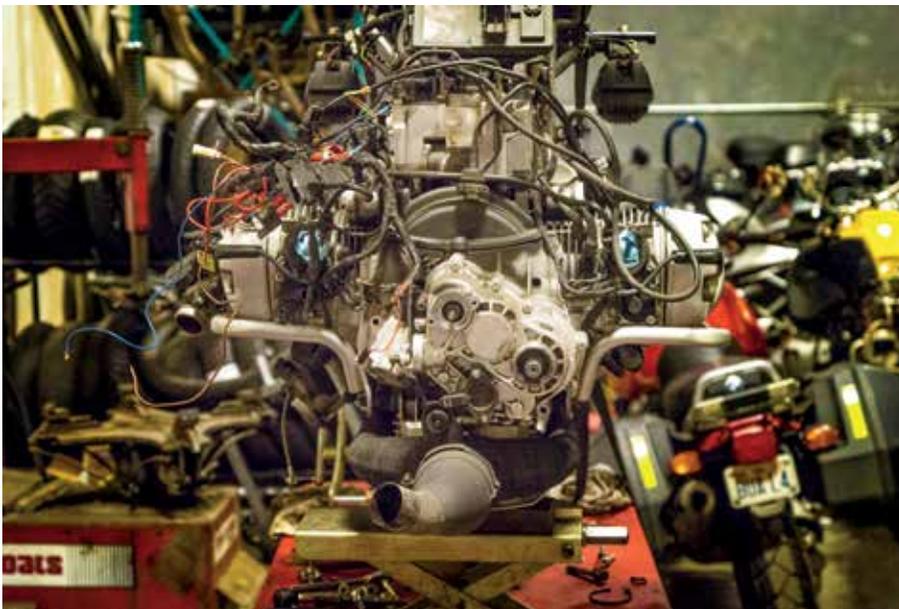
Of course the slave cylinder (\$232.88)



This rat's nest of wiring made things troublesome in the disassembly process. We disconnected, cleaned up and rerouted most of this during reassembly.



Leaving the rear wheel attached to the final drive allows for easy maneuvering of the entire rear section once it's disconnected.



With the back half of the bike removed, it's possible to get at the transmission mounting bolts.

would need replaced – standard practice for any clutch job as far as I'm concerned. Along with the clutch control assembly (\$450.58), the most expensive parts were the housing cover (\$248.29), friction disc (aka clutch plate, \$245.39) and pressure plate (\$446.04). I also needed a new push-rod (\$63.21) and some other various parts, bringing my bill for parts to just over \$1,700. That eye-watering figure forced me to evaluate the value of my motorcycle. A 12-year-old GS with 83,000 miles on it is not a collector's item. I've got it set up as a touring bike, so I don't force hard, off-road riding on it, but commuting on a motorcycle – as I did on this one nearly every work day for more than five years – is just as hard on the bike (and especially the clutch, what with stop-and-go traffic in the Washington, D.C. area, where I lived until last year) as dedicated off-road riding.

I decided the bike was worth enough to me to put the money, time and effort into it – but because of the expense of the parts, I was going to have to do the work myself as much as possible. George was amenable to coaching me through a clutch replacement, but his schedule was busy enough to delay my work for another month, until mid-November.

We chose a day when we were stuck waiting for parts to arrive for customers' bikes and got going. Not really having my head wrapped around what lay in front of me, I started disassembling the motorcycle according to BMW's instructions. I was fine until it got to be time to start undoing the wiring. Unfortunately, BMW didn't think to put something like a multi-pin connector under the seat, and wires run from the main wiring harness all the way back to the tail light. Throw my sloppy accessory wiring practices on top and just getting the fender and tail light assembly disconnected proved to be quite the hassle.

Taking an early hexhead apart far enough to get to the clutch isn't that difficult a job, it turns out. Sure, I had to pay attention, and being methodical never hurts, but all in all, it's straightforward. Remove (or at least disconnect) the crash bars (if present); get the body panels and fuel tank off; disconnect the wiring to the back of the bike; disconnect the throttle bodies; disconnect the rear brake line from the ABS pump; and finally, move everything out of the way.

With everything detached, it was just a

matter of removing seven bolts, popping the drive shaft off the transmission and rolling the back half of the motorcycle out of the way. It sounds a lot harder than it is, I know, but for the most part – wiring aside – I was able to accomplish the initial disassembly on my own, with just a bit of supervision and a few suggestions from the expert on hand.

Disconnecting the transmission isn't a huge deal, either. I already had the starter off (two bolts and some electrical connections, plus one screw for the plastic cover). The clutch cover is heavy-duty plastic and comes off after removing three small bolts. The transmission is held on with just three bolts as well – though they are much sturdier than the clutch cover bolts.

This is where things started to go a bit sideways. Coming off the engine is the flywheel – which BMW calls a "clutch housing." It's secured to the engine with five sturdy bolts. Six smaller bolts attach the actual clutch components to the flywheel; those are the pressure plate, clutch plate/friction disc and housing cover. The splines on the clutch plate marry up to the splines on the transmission's input shaft, which BMW calls the drive shaft – although, confusingly, one of the seals protecting it is called an input shaft seal.

The pushrod goes through the input shaft, effectively connecting the "output cylinder, clutch" (aka clutch slave cylinder) to the pressure plate. Squeezing the clutch lever forces fluid through the line and into the slave cylinder. The piston inside the slave cylinder moves the pushrod against the pressure plate, compressing the springs on the pressure plate and allowing the clutch plate to spin freely. This is what enables shifting the transmission into another gear. Release the clutch lever and the strength of those springs on the pressure plate moves the pushrod back towards the slave cylinder, forcing the fluid back up through the line and off you go down the road.

My problem – which we didn't know until we finally wiggled the



The transmission is dirt – dirtier than it should be, especially on top of the housing. This is an early indicator there may be problems inside the case. Note the pushrod extending from the top left of the transmission. The splined shaft at the bottom right of the housing is where the drive shaft connects to the final drive.



My first look at the rusted clutch components. While a certain amount of corrosion and wear – and possibly a bit of rust as well – is to be expected, this much rust is indicative of some hard water crossings during the bike's life.



The rusty splines of the old clutch plate (aka friction disc).



Rust on the transmission input shaft splines.



The rusty clutch spring plate that's part of the pressure plate assembly, which engages with the teeth of the starter motor. The protruding pins near the teeth are rivets that hold flat springs onto the other side of the assembly.



Engine oil being forced past the counterbalance shaft seal created a slimy, gloppy mess inside the space between the engine and the transmission.

transmission off – was rusty, stuck together splines. It shouldn't take much force to separate the transmission from the clutch assembly, but in my case it took two grown men wiggling the transmission and grunting with effort to separate them.

At this point, we realized it wasn't the clutch components being worn to the bottom of the spec range destroying my slave cylinders – it was the rusty splines making the slave cylinder work harder than it's supposed to. I could have kept replacing those \$232 slave cylinders until the clutch components really were too thin and it wouldn't have fixed the problem.

Since I had to replace the clutch plate anyway, there was no point in cleaning the splines on the female end of the assembly. We did, however, have to take a wire brush to the splines on the input shaft and make sure we got off as much rust as possible.

Why they were rusty escapes us both. I have, on occasion, stored the motorcycle outdoors for extended periods of time, but that shouldn't matter. The only thing either of us could come up with is that one of the bike's two previous owners must have undertaken a water crossing, somehow allowing water to get in there. Since I've had the bike since January 2011, I've never taken it through more than a couple of inches of water, so I'm sure it wasn't me. Standing in the shop with the transmission on the lift, it didn't matter what started the rust. We identified the source of my clutch woes and had the parts to address the problem...

...sort of. As we inspected the transmission and the back of the engine, George grimaced and said, "Well, that doesn't look right."

Such a pronouncement from my friend, mentor and occasional boss is something I've heard a number of times in the shop. Usually it means somebody is going to have a higher repair bill than anticipated. Hearing it Thursday morning caught my breath and drove an icicle into my heart.

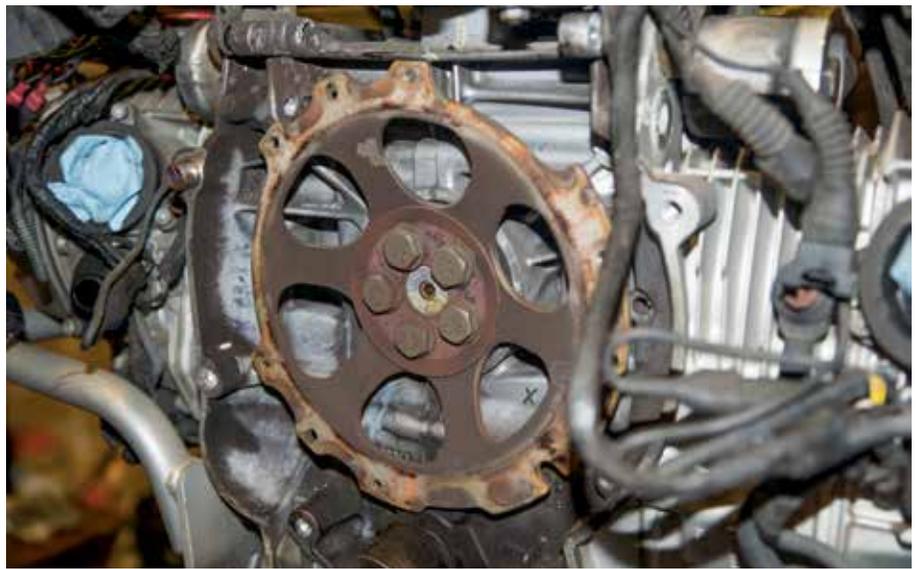
"Is it supposed to be that dirty in there?" I asked, after noting the grimy oil built up on both the back of the engine and inside the front of the transmission housing.

"No," George said, "No, it's not. I think you have a weepy seal."

I grabbed a rag and started wiping away as much of the grime as I could without resorting to any kind of chemical cleaner. A weepy seal isn't as bad as a seeping seal, and

both are quite a bit less concerning than a leaking seal, but when the weepy seal in question requires cracking the bike in half to repair, the prudent course of action is to replace it before moving any further.

That particular seal is what keeps the oil inside the engine from getting out around what BMW calls the compensating shaft. Most of us would refer to it as the counterbalance shaft, because the counterbalance weight is bolted onto the end of it. After noting the failing seal on the counterbalance shaft, we studied the transmission more closely, wiping away a bit of the grime. George decided he didn't like the looks of the seals on either end of the input shaft (aka drive shaft), and those would have to be replaced as well. The problem was, we didn't have any of those three seals in stock. Transmission input shaft seals are a common item to replace during a clutch job, so normally we would have them, but George had done a clutch on a customer's R 1200 RT a few days before and hadn't had a chance to replace them yet. The seal on the counterbalance shaft doesn't commonly fail, so that was simply an unexpected thing



The flywheel – which BMW calls the clutch housing. It doesn't generally need replacement when installing a new clutch.

to find.

A quick call to the dealer closest to my house, Morton's BMW in Fredericksburg, Virginia, got the counterbalance seal on order with an overnight delivery. They had it waiting for me, along with the other two seals, as soon as they opened on Friday morning. I returned to the shop, faced

down my freshly scrubbed transmission, and set back to fixing my bike after the nearly 24-hour delay.

The work continues next month in Part Two!

Visit the MOA's YouTube channel to watch a video of this clutch job – the link is tinyurl.com/R1200GSclutch. ©

An advertisement for Cardo Scala Rider communication systems. The background is a scenic view of a mountain range with a lake in the foreground. In the foreground, there are two motorcycles: a white one on the left and a blue and red one on the right. Two communication systems are shown: a black and white 'PackTalk' system on the left and a black and white 'SmartPack' system on the right. The text 'For the Ultimate Riding Experience' is at the top. Below it, 'Featuring DMC™ Technology Seamless & Unchained Group Communication'. The 'PackTalk' system is described as 'Group Communication from 2 to 15 riders' and the 'SmartPack' system as 'Group Communication from 2 to 4 riders'. The Cardo logo and website 'cardosystems.com' are in the bottom right corner.