

NoMar Tire Mounting and Balancing Machines

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Like many year round riders, I go through a lot of tires. With two bikes on the road it's usually six or eight tires over the course of a year. Many years ago I swore off the busted knuckles and scratched rims I got trying to swap tires myself, and settled on letting Fremont Cycle Salvage, who mounts and balances for free if you buy two tires, handle my tire work. Their prices seemed to be within ten bucks of the mail order places, and when there were problems with defective tires, they took care of it. The arrangement was good, but far from perfect. Fremont's a good forty-five minutes from my place, longer after work in rush hour traffic. To get the free mounting I had to buy two tires, and often found myself replacing skins that still had a third of their tread left. So when my buddy Tony sent me a link for NoMar Enterprises machine I quickly got very interested. The NoMar featured beveled nylon blocks that hold the rim without scratching, and a uniquely shaped tips on the mount/dismount bar that supposedly took all the work out of the process. A quick email to Jerry Findley, Pirate's Lair owner and K12RS bud showed the machine to be a winner, though Jerry did caution that mounting anything but pliable sport riding tires could be a challenge. More on that later.

The NoMar web site has a shopping cart, so I ordered up The Ultimate Package which included the changer, stand, mount/dismount bar, wheel balancer, "extra hands", lube, valve core tool, some weights, a tire spoon, and a floor mounting kit. It was on my door step in just one week.

First thing I noticed was one end of the Lock Assembly sticking out of a ruptured box. It was a little scratched up, but no mechanical damage was evident. The rest of the boxes arrived unscathed, so I started unpacking and taking inventory.

Everything seemed to be there, even the instruction sheet. I'd decided before ordering that I'd try to use my Handy Lift as a base to mount the tire changer, hoping that I could quickly bolt the changer to the table when it came time to change tires, then just as quickly unbolt it and shuffle it off to a corner of the garage for storage. The top of the table is pretty thick, but after the unit arrived I decided that a little reinforcement wouldn't hurt. I found a length of 2" angle iron in the scrap bin and welded a couple of foot long pieces to the underside of the table below the mounting holes on the tire machine base. Using the bolt pattern on the base for a template, I match drilled the holes, then installed the bolts and nuts. I finished up by welding the nuts to the angle iron so I wouldn't have to fool with a wrench on the back side when bolting down the machine. A sloppy coat of black paint (only color I had at the time) finished up the reinforcement. The welding did burn the paint on the top surface as well, so eventually I dug up some gray paint and retouched the top.

As seen in the top photo the machine sits at the head of the table so that when I'm mounting tires I stand at the foot of the table and add my weight to that of the base. It's pretty stable, and though there's some flex when using the mount/dismount bar, it's not enough to hamper operations.

The rest of the set up only took an hour or so, outside of a little trouble which I'll go into later. The instructions are complete and detailed enough to eliminate the guess work that sometimes accompanies projects like this.

Like any kid with a new toy I just had to try out this one as soon as possible. I've got an extra set of wheels for the

R100GS hanging over in a corner, and since the new tire for the R1200GS hadn't arrived yet, I reasoned it would be a good idea to get some practice in before it did. The back wheel was closest, and didn't feature a disc rotor to mess with, so that's what I started with.

The photo at left shows the wheel in place with the rim resting on top of the rear anchor block and the shoe of the bead breaker positioned next to the rim. Now I'm not a big guy and my usual bead breaking routine is to run the tire over with my 4x4. So when just a moderate push on the lever sent the bead down into the rim's well I was very happy indeed. It only took a few more moments to rotate the bead breaker out of the way, spin the tire a quarter turn, push that part of the bead down, and repeat around the rest of the tire. Flipping the wheel over and doing the other side was just as easy. The best part was no marks on the rim from tire irons, and no sweat in my eyes from wrestling with the bead.

With the bead broken the next job is to lock the rim into the machine and dismount the tire. That's where another bit of innovation comes in: the special locking blocks engage the rim while the cam holds it in place.

Each mounting block has four locking surfaces, positioned such that each provides a different distance from the center of the locking assembly. A steel tube extends down from the center of the block on the underside to mount it on the locking assembly, and the end of the tube features a groove to keep it from jumping out of the hole. By rotating the locking blocks by quarter turns and trying the different mounting holes, just the right distance can be found for a wide variety of wheel diameters. Here's a tip: set the blocks up by measuring the outside diameter of the rim (not the tire!) and then divide that measurement by two. Move the blocks between holes and rotate them until the distance from the locking rib and the center of the locking assembly (where the three welds come together) is equal to or slightly greater than that number. Measuring is a lot easier than trial and error, since you'll have to lift the wheel and tire onto and off the machine for each test.

I should also mention here that the NoMar web site has a series of videos that can be downloaded and viewed. The videos explain how to use the machine very well. They do a little too good a job, however, because the example shown is a flexible sport bike tire that comes off and goes back onto the rim with very little effort. Turns out that dual sport knobbies are a whole 'nuther story, as their stiff sidewalls and protruding knobs make engaging the bevel with the rim quite a challenge, 'specially if you've never done it before.

The photos above show what's going on. The knobs rest on top of the blocks, holding the rim up and away from the bevel. The goal is to force the rim down and into the bevel, as shown in the photo at right. Keep in mind that there are two stationary blocks, and the locking cam, each with a bevel that must engage the rim. My first tries were not too successful, but eventually I found that by engaging the rear block first by pushing down on the rim, then pushing back with my hip against the tire, I could then shift my downward push to the left block. While still pushing back with my hip on the tire, I also pushed to the left to swing the rim into engagement with the next block. While still maintaining pressure on the tire with my hip, I could then shift my hand to the part of the rim above the cam and push down while rotating the cam to engage the rim. The tricky part is that sometimes the knobs catch on the top of the blocks and prevent the tire from rotating into the second block. When this happens, sometimes I can overcome the resistance by pushing harder, but usually I'd have to reposition the tire so that the knob was on top of the block. It's worth noting that the video shows how to use the "third hand" devices to hold the tire up and away from the rim to make locking it in easier. Only problem is I haven't been strong enough to force the third hand between the rim and the tire with these tires (Dunlop 606). I did get it to work later with a Metzler Tourance. Of course a willing buddy would greatly simplify this procedure, but I didn't have the heart to wake one up at close to midnight!

Now the last bit of locking innovation on the NoMar is the cammed surface of the last locking block. Note that the distance from the raised bevel to the outer edge of the block decreases as you work your way clockwise around the block. To lock the rim in, you position the block so that the rim sits on the wide flat spot (at about four o'clock in the picture) and then use the handle to rotate the block counter clockwise and force the rim under the bevel. This action also pushes the rim firmly into the other two blocks, and the flats on the cam surface keep it from backing off by itself. So I'd be ready for the next time, I used a vibro tool to mark the blocks with the diameter of the wheel, then took a picture of the setup in the locking arms. This is the one for the seventeen inch rear rim on the R100GS and R1200GS:

Here's what it looks like for the nineteen inch front wheel on the R1200GS:

I'll post another pic for the twenty-one incher on the front of the R100GS when it comes time to do that one.

Here's the front wheel from the R1200GS in the locking assembly. I found it much easier to perfect the locking block placement after the tire was removed.

With the wheel held firmly in place, next step is to remove the tire. NoMar provides a mount/dismount bar for just this purpose, and again, specially formed nylon plays a key role.

The bar itself is a little over thirty-nine inches long which provides plenty of leverage. The tube is hollow so there's not a lot of weight to wear you out. The dismount tip shown at left is designed to slip down between the bead and rim, and then rotate ninety degrees so that the lobes at the end hook the underside of the bead. Once hooked, you lift up on the tire until the tapered portion of the tip is above the top surface of the rim, then rock the bar into the center of the wheel. This levers the bead up and over the rim.

In use, the tire and rim are first given a good spritz with the tire lube included with the kit, then the dismount end of the bar is inserted at the eight o'clock position, lifted, and rocked over. The pivot post is then lowered so that the small dowel in the end engages the wheel center or other nook in the hub. The bar needs to be on the far side of the post at this point. Pulling the outer end of the bar forces the dismount tip around the rim, lifting the bead up and off the wheel. After it goes a little more than half way around the bead can be lifted with fingers the rest of the way. The video shows the other bead being lifted off without the use of the dismount bar, but I haven't been able to accomplish that feat with either of the dual sport tires I've tried. Instead, I've either used the dismount bar, or resorted to rim protectors and old fashioned tire irons. Fortunately, the last bead is much easier than the first, and even when tire irons are needed, it doesn't take much force to get it off.

The new tire is mounted with the wheel still chucked into the machine. First step is again a good spritz of lubricant, then the first bead of the new tire is forced over the rim, making sure you get the arrows on the sidewalls pointing in the right direction. Again the video shows this being done without the use of either the mounting bar or tire irons, but I had to resort to rim protectors and my long irons to get it to go. The knobs I was mounting needed tubes, so that went in next. I used a valve cap to keep the stem from dropping back inside the rim, and made sure that the tube around the valve was up inside the tire. I was able to get about half the bead over the rim with just my hands, then used one of the third hands to keep the end at about one o'clock from walking (on the Tourance at least; on the D606 I couldn't force the third hand between rim and bead, so I used a tire iron instead). Next I forced the mount end of the bar down between the bead and rim so that the bead was above the lobes at the end of each of the tips. I used one hand to guide and push on the mount head while I pulled on the end of the bar to pivot it around the post. I found that I had to remove the third hand before the last foot or so of bead would pop over the rim, and that plenty of lube was necessary to keep the bead from grabbing on the rim. It was a bit tricky to get the lube onto the underside of the bead using the spray bottle, but a little sprayed onto a rag let me rub it on easily. Of course I found this out after I'd already got the bead mostly on, so I had to push it back off to get enough clearance to reach inside the tire. It also helped to keep an eye on the opposite side of the tire to make sure that the bead stayed down in the central well of the rim, and as tension built around the tire I'd stop and force it down. I also made the mistake of not getting the lobes seated below the bead, which works just fine until the head meets some resistance, at which point it comes popping up out of the tire.

I repeated the dismount/mount cycle another time to get a better feel for what I'd learned and it went much smoother the

second time. When the new Tourance arrived I felt like an old pro, and once the right setup was determined for the clamping blocks the tire swap went very well indeed.

With the tire mounted it was time to turn attention to getting it balanced. The Ultimate Package includes a balancer, a simple device that uses gravity to locate the heavy spot of the tire/wheel combination. Instead of relying on the bearings that may or may not be present in the wheel (there are none on modern BMW rear wheels), the NoMar balancer uses a shaft and a pair of cones to clamp the wheel in place while the outer end of the shaft rides on low friction bearings. It's a simple but effective design, and the friction fit of the cones on the shaft makes adjustment quick and easy. The balancer comes with three sets of cones to accommodate a wide variety of hole sizes, and I found that one of the small cones worked well on the left side of the R100GS rear wheel, while a medium cone fit the right side.

As innovative as the balancer design is, its execution was somewhat flawed by the sloppy fabrication of the cones.

It may not seem like a lot, but as shown in the photo above, the hole through the center of the cones wasn't centered. It was especially evident in the smallest diameter. At first I didn't think it would have much effect, but after finding the heavy spot on the wheel, I rotated one cone by one hundred eighty degrees on the shaft. This caused the heavy spot to shift by about a hundred twenty degrees. The fix was as simple as chucking the shaft in a lathe, pushing on a cone, and re-cutting the surface. Unfortunately, there wasn't enough material to do this on the smallest cones, so I substituted some one inch Delrin I had laying around and made up a new set.

With the centered cones in place I was able to balance the wheels to within one eighth of an ounce, and on one wheel, remove over three ounces of weight that had been added when the shop used a spin balancer.

Some BMW wheels have a very thin hub center, and the R1200GS is one of them. With a little Googling I stumbled upon an adaptor made by Marc Parnes for his wheel balancer, and used it as the inspiration for an adaptor of my own design. Pictures on Marc's site show a cast rear wheel mounted on an adaptor, but I reasoned that the same configuration would work for the wire wheels as well. I couldn't use what appeared to be a two piece set up though, because the small diameter shaft couldn't be counted on to center itself where it met the large diameter plate when used with the cones of the NoMar balancer (the Handy balancer works the same way). And I wasn't wild about trying to make the hole in the pieces a tight tolerance fit directly on the shaft. So I settled on a one piece design, and resigned myself to hogging out a lot of material to create the smaller diameter. What I didn't count on was my flaky memory of that picture, and I mistakenly purchased material large enough in diameter to cover the outer diameter of the spoked hub, which at 7.5" is much larger than the one on the cast wheels. With material in hand and the wheel off the bike it became apparent the adaptor would need to mate to the flats on the 4.71" bolt circle, resulting in an overall outer diameter of only 5.5". That meant a lot of shavings on the floor, especially since I'd bought enough material for two adaptors. To add even more excitement, the three jaw chuck I'd originally intended to use wouldn't accommodate the 7.5 inch material, but the four jaw would. That meant centering the piece each time it went into the chuck, at least until it got small enough to fit into the smaller chuck.

I also had to figure out a way of locating the threaded holes for the wheel mounting bolts without using a dividing head, an expensive tool I don't have access to. I settled on making the small adaptor diameter a tight slip fit in the hub center hole, then match drilled the mounting holes one at a time. I used a transfer punch machined to a close slip fit in the hub bolt holes to locate the center of each hole on the adaptor. It was a little tedious marking a hole, drilling and tapping, mounting it on the hub, then repeating the process for the next hole, but the fit of the hub on the adaptor is exact.

In use with the new small diameter cones I had a very true running hub, but was somewhat dismayed by the amount of run out visible at the rim! Not the fault of the tooling at all, but rather the hard knocks the wheels had taken over the last 14000 miles.

NoMar Nits:

Aside from the trouble with the cones I mentioned earlier, I also ran into some weld quality problems with the NoMar changer. When I tried to tighten the two bolts securing the upright arm of the mounting head to the lock assembly the welds attaching the nuts to the lock assembly broke.

I have a nice Miller welding machine, so rather than mess around shipping the broken part back for a replacement, I elected to cut the broken weld off and repair it. The repair went well, but when torquing the upper bolt on the lock assembly, that weld broke, too. Of course I'd already put away the tools and cables, so I had to drag it all out again for the second repair.

Later that evening I sent off an email to NoMar to let them know of my troubles, and asking for some advise in using the machine. I was on a trip the next day (a Sunday!) when Sue, owner of the company, left voice mail offering to replace the lock assembly. I returned her call the next day and took her up on the offer. I also got an email from Steve at NoMar with some tips to help mount the stiff walled dirt bike tires I'd been wrestling with. The replacement arrived a week later, but unfortunately on installation the same weld broke! The photo on the upper right shows why it broke: There's no penetration of the weld into the tube of the lock assembly. I'm a degreed welding engineer (go Bucks!) and I've seen many instances where welds made with wire welders (what most folks call Gas Metal Arc Welding) were so cold that melting occurs on only one of the pieces being joined. The other surface acts as a mold, and the weld metal ends up cast against it without bonding. Sure, it looks welded, but when a little load hits it it'll pop right off. As a young intern I helped investigate the weld failure of a TV tower. It has been assembled with GMA welding, and sectioning of the welds showed the same problem. That tower came down in a wind storm, scattering its several hundred foot height over most of an acre. The photo above shows the smooth surface of the weld underside where it met the tube (note how well it preserves the arc of the tube exterior). Sue included a return shipping label so she could get the broken part back, but instead of returning the one I'd already repaired, I put the new one back in the box and sent her an email explaining what had happened. I'd just as soon trust my own welding on something that will be loaded like this thing will be. Besides, I was able to find a Rustoleum rattle can paint finish that closely matched the original powder coat. Sue did forward a new NoMar sticker to replace the one damaged by welding heat, but I haven't heard anything more from her about fixing the problem on the other machines that are out there. Hopefully the two parts I saw were the only ones effected.

All Fixed...

Given the futzing I've had to do to get the NoMar equipment up to speed, would I make the same purchase again? Knowing what I do now, probably. Though I have no first hand experience with the Coates changers, I've seen them in use at almost every motorcycle shop I've poked around in. Sure they cost a little more, and the jaws that grip the rim need to be faced with plastic (more futzing!) to keep them from leaving marks. Many Coates users rave about the NoMar mount/dismount bar, and some have replaced the wheel mount with NoMar's as well. By the time the modifications and NoMar parts are made/added to the Coates there's a large sum of money involved, especially for a manual tire changer. I'm fortunate to have access to the shop equipment needed to fix the NoMar niggles I experienced, and hopefully new machines will have these bugs worked out soon (my bud Tony took delivery of a NoMar changer at the same time I did and has had no weld problems). My sense is that NoMar is a very caring business and wants to get it right, and if I hadn't been able to take care of myself, they would have eventually worked it out.

The larger question is am I happy being able to change my own tires? That answer is a resounding yes! Even with shipping, I'm saving between ten and fifteen dollars a tire, and the two hour trip to get them mounted. I have complete

control over the mounting and balancing process, and am free to take the time to get the balance just right, even if it means moving the tire around on the rim. I'm also toying with the idea of installing a set of tire pressure monitors on the R1200GS, and knowing that I'll be doing the tire mounting gives me some confidence that the sensors survive the first tire change.