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IH: Wheels, Brakes & Tires - Sub-02A

Rear Drum Fitting Issues with a Rigid Frame

(How the drum indexes to the hub)

Article by Dr Dick of the XLFORUM ¹⁾

- None of the things here were problematic on any stock brake swing arm bikes. They were known but not intrusive. It wasn't until I started building rigid frames that I started having bearing problems. Switching to metric Timkens solved that.
- All parts discussed here refer to OEM equipment.
- I had many cases of the drum friction surface and the sprocket not being concentric to the axle centerline. In other words, when you spin the wheel the drum doesn't spin true. This results in brakes that "lope" or have excessive pedal travel (due to needing to be adjusted overly loose because of a tight spot existing in a certain place of wheel rotation).
- Another symptom is chains that run tight and loose during rotation. The hub forcing the drum from true is a factor in the tight / loose chain problems. The most run-out on an assembled drum is usually less than .015. So, it does affect the chain but usually there are other component problems, that when added in, have as much or even a larger affect.
- Most often of the others including:
 - A worn out chain.
 - Using standard bolts rather than the lug bolts.
 - Sprockets welded to drum (this warps everything).
 - Previous loose sprockets that got bolted instead of riveted. In this case, because the bolts don't 'pin' the sprocket, they allow the sprocket to move slightly rotary in respect to the drum. So, the major diameter of the drum wears against the minor diameter of the sprocket (allowing the sprocket to lose concentricity).
- For the brake, it's more clear cut. If you bolt the drum to the hub and the drum isn't spinning true then:
 - The drum isn't true or the hub isn't true.
- When the drum goes on the hub, it would make sense that the center bore of the drum registers on the hub neck and sets the drum true to the hub.
- Instead the tight fit of the lug bolts (in both the hub and the drum) pin the drum to the hub and sets location.





- It's the lug hole circle that does the locating.
- On the hubs, I have found this (hub hole circle) to be out of location many times.
- The drums usually aren't too bad.
- So, to determine if you have this problem and which part is faulty:
 1. Assemble the drum to the hub with all lugs in and tight.
 2. Put the axle in a vise and slip the wheel on.
 3. Put a dial indicator on drum surf and spin it.
 4. Mark the hub and the drum at the 'high spot'.
 5. Remove the drum and index it at 180° on the hub.
 - If the high spot stays with drum, the drum is the problem.
 - If the high spot stays with hub, the hub is the problem (I see this more often than drum problem).
- To rectify this, you need to decide what parts are the culprit and then figure where to go from there. It's easier said than done and messing with the lug holes and not losing the lug pin fit is a

serious undertaking even with a machine shop at your disposal.

- Remember this:
- All acceleration and braking forces are passing thru those 8 soft lug bolts and their fits in holes.
- Is it possible that the factory made the locating function of the hub the shoulder bolts instead of a snap fit on the drum/hub because of the large offset the rear sprocket has? ²⁾
 - Possibly. I think that they knew the drum needed to be pinned to the hub so that the pins take the torque without letting the drum move on the hub flange. I also think the soft material goes to the offset (stretch instead of fracture).
- Did the designers want the strength of the shoulder bolts and decided, from a machining aspect, that having both the drum pattern tight tolerance and locating bore were out of the question? ³⁾
- I'm not sure. I know the earlier the hubs have a better hole position. It seems like they just let things get sloppy once the hubs didn't break any more.
- Any possibility of re-machining the hub bearing bore for oversized outer races? ⁴⁾
 - I nixed that route. The center tube is already too thin.
- As motor size and chain length increased, rigid frame chain problems became an issue. Guides and careful chain selection made this an acceptable remedy.
- It was the acquisition of a few KRTT rear brake set ups that made the hub run-out a problem too much to ignore. Not only were these a "you get 1 set. don't screw it up, there are no extras" affair, you knew you needed to keep these in top order, since you will be using this one and only this one till you die.
- Combined with the high friction resin free woven linings (these don't tear up the drum but they wear out fast), any drum run-out showed as a heavy loping when gently slowing to a stop. Lots of brake power from a small amount of pedal pressure.
- The hub was the source of these 'only if your on the fringe' headaches. So, this may never be a problem for the regular stock bike with a swingarm.
- All these long rigids were 84" or bigger. They have long legs and need long gearing. Any bigger than 23T under a big inch kick only dry clutch kicker cover wasn't gonna work. So you searched for a 49T -54 rear. It's the most you can do. So you gotta treat the 49 like the KRTT parts. You may never get a 2nd one of these either.
- When you put very rare hi-performance parts, that are intolerant of less than top shelf fitment, on bikes that rip any parts fitted less than top shelf quality you have no choice but 'to do what ever it takes'.
- Unlace the wheel. Try all 8 positions to find least run-out at the sprocket mounting diameter of the drum. Mark the drum and the hub so they can be assembled in the same position later. Without the drum mounted on the hub, chuck hub true-ness on the bearing bores in a lathe. Skim the face of the hub flange for flat & true at the drum mounting surface.
- Install the drum and re-chuck the hub and drum as before. Skim friction surface true. If needed, open up the minor diameter of the 49T and screw it to drum. True the sprocket pitch diameter for run-out and tighten the screws. Drill the drum and sprocket for .187" rivets.
- Assemble the bike and don't let the sprocket, drum or hub get damaged.
- This is a ton of work and the result is indescribable as well as irreplaceable.
- This obsession with blueprinting each part on a bike pays off with a 100% familiar machine. You know every thing about it. That is a bike in that you're 100% secure in its performance, reliability and longevity. And, you don't need many replacement parts because you won't allow yourself to

abuse all your masterpiece work from neglect.

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<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/ironhead-sportster-motorcycle-talk-1957-1985/140736-rear-hub-thread/page2?t=1525902&page=2>

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