TUBE SADDLE®
Foam Tire flap
US and Foreign Patents Pending
The Solution to Pinch Flats™
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TUBE SADDLE® *Tech Tips*

Flat Tire Forensics 101: Part 2

Tech Tips is a free publication intended to provide useful information to all riders and racers. We encourage you to pass it along to all your riding buddies. In this first *Tech Tips* edition we deal with all aspects of the dreaded flat tire, how to diagnose them and how to avoid them. In Part 1 we covered the "Pinch Flat" and "Puncture Flat". In Part 2 we will cover the "Rim Lock Failure Flat – Valve Stem Tear" and in Part 3 we will cover the "Friction and Heat Flat" and "Installation Failure Flat."

How to identify the "Rim Lock Failure Flat – Valve Stem Tear" and what you can do to prevent it

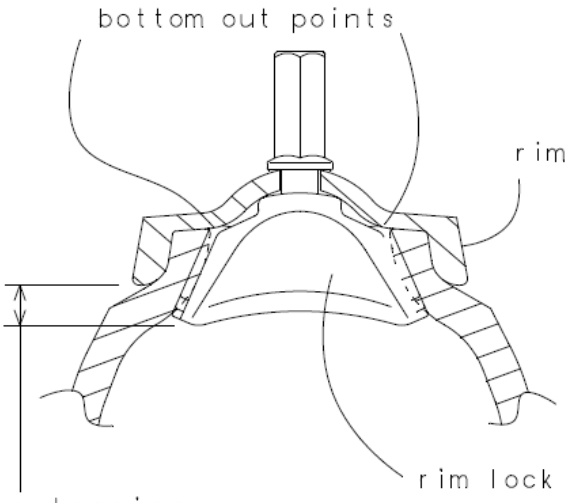
If we rode motorcycles at tire pressures around 30-60 psi like a car, there would be no need for a rim lock as the tire pressure would provide sufficient force to the bead of the tire to prevent the tire from spinning on the rim. Since we ride motorcycles at low pressure compared to a car (8-19 psi), the rim lock is necessary to provide sufficient force to the bead of the tire to prevent the tire from spinning on the rim. The lower the pressure, the greater the need for the rim lock to secure the tire to the rim.

When a rim lock fails to secure the tire to the rim, the valve stem is torn from the inner tube. A rim lock failure flat is immediate once the valve stem is torn and often happens when you have not hit any object as with the pinch flat. If you get a flat and find the valve stem torn, it is time to carefully inspect the rim lock, and possibly replace it.

A rim lock will fail for a number of reasons. First, check if the rim lock nut was tightened securely. It should be around 10-13 ft-lbs. Some riders under torque the rim lock nut, others over torque. Those that over torque the rim lock nut with certain OEM rim locks can actually rip the stud from the body of the rim lock.

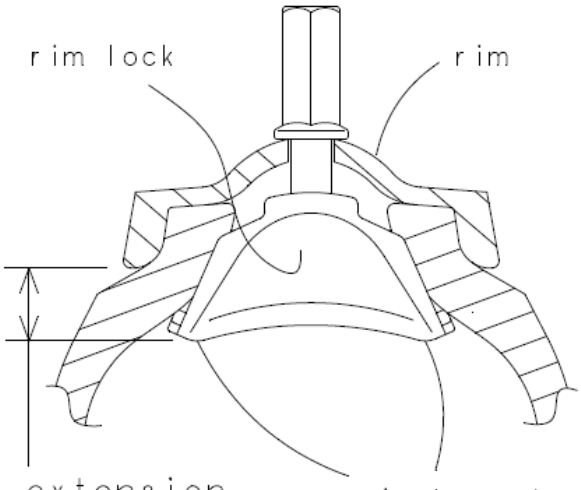
On the right is an example of an over torqued rim lock that has failed. The edge was ground down because it was not dropping deep enough in the rim to get any bite. Nonetheless, you can see the stud has separated from the body. The rim lock was junk and was replaced. Here is why it failed.

In our opinion, conventional rim locks are a poor design. The griping teeth are small, rather flat, encapsulated in rubber, and protrude above the edge of the rim as shown by item marked “extension” below. The thickness of the bead of a tire is critical to how well a conventional rim lock will work, and the bead thickness among the tire manufacturers varies substantially. For example, the bead thickness of Manufacturer “A” was measured as 0.264 inches, and Manufacturer “B” was 0.464 inches. That is a huge variance! FIG. 1 below represents a conventional rim lock mounted with a tire from Manufacturer “A” and FIG. 2 represents the same rim lock mounted with the tire of Manufacturer “B”. FIG. 1 shows where the rim lock bottoms out against the rim because the bead of Manufacturer “A” is thin.



Manufacturer "A"

FIG. 1



Manufacturer "B"

FIG. 2

FIG. 2 shows that with Manufacturer “B” the rim lock does not bottom out in the rim, but unnecessarily extends greater out from the edge of the rim which increases the chance for a straight impact pinch flat directly on the rim lock. The photos on the next page are a conventional rim lock with the tire of Manufacturer “A”.

The picture on the left shows that the rim lock has bottomed out in the rim. The picture in the lower left shows a close up where the rim lock is bottoming out in the rim. The picture on the lower right shows five indentations on the rim lock edge that are caused because the rim lock was bottoming out in the rim. Any additional tightening of the rim lock nut provides no additional gripping force, and all additional tightening does is pull the stud out of the body of the rim lock as in the first photo above.

With the tire from Manufacturer “B”, the rim lock does not bottom out in the rim due to the thickness of the bead, but it protrudes substantially greater out from the edge of the rim. This protrusion (extension) is the most likely spot where a straight impact pinch flat can occur (pinch spots). Further, with a thick bead tire, less area of the teeth of the rim lock engage the bead of the tire, which can wear out the rubberized teeth of the rim lock.

How to inspect your rim lock: First, check that you have the proper size rim lock. Your rim should have a stamping on it such as: 21 x 1.60, 18 x 2.15, or 19 x 2.15. The first number refers to the rim diameter, the second number is the internal width of the rim where the bead of the tire seats, and this number must match the number on your rim lock. So, for the rim pictured on the right, it is an 18 inch diameter rim that requires a 2.15 inch rim lock to match it to the internal width of the rim. If you can’t find a stamping on your rim, you can do a quick measurement to determine what rim lock size it needs.

If you measure the inside seat of the rim as shown above, you can determine what size rim lock your rim needs. A 2.15” is common for rear wheels and a 1.60” is common for front wheels. There is a 1.85 rim lock, but it is for rear wheels for small bikes that run a 16 or 14 inch rear rim.

Now carefully inspect your rim lock to find the number stamped in it. The photo to the right is a stock KTM rear rim lock and is clearly marked with 2.15” on the bottom. The photo below to the left is a front rim lock faintly marked with 1.60” on the top. Sometimes you have to look very carefully to find the marking as it could be on either the bottom or the top. The most common mistake is to put a 1.60” or 1.85” rim lock in a rear rim that requires a 2.15” rim lock.

Ok, so you may have the right size rim lock, the second thing to check is whether the stud has not separated from the body of the rim lock. You need to flex the stud sideways to reveal if it is separating from the body. The front rim lock pictured on the next page on the left appears to be good. However in the center picture, flexing the stud reveals that it is separating from the body and needs to be replaced. In short, the separation might not be easily seen at first glance.

If the stud is good, inspect the teeth of the rim lock. Below on the right is an example of a rim lock that has bad teeth and needs to be replaced. You can see the rim lock was bottoming out in the rim as the rubber on the top edge is missing in four spots. Also, only the top half of the rubberized teeth were engaging the bead of the tire, and they are smashed and partially missing. The bottom half portion of the teeth “look good” but that is only because they had no engagement with the bead of the tire. This rim lock is junk.



So, if you decide your rim lock is still good, or if you decide to replace it, I suggest doing the following: Install and mark you tire and rim in a number of locations with a permanent marker as shown below. Make sure you have the proper torque on the rim lock, generally 10-13 ft-lbs. On your first ride of about 10 miles, check to see if the markings separate.


Installation


Good


Suspect

In the middle picture, the marks have separated by about 1/16 of an inch. This is typical settle in movement, and as long as it stays there your rim lock is doing its job. In the picture on the right, the marks have separated more, about 3/8 – 1/4 of an inch. This is suspect, and if it continues to separate with additional riding, you will need to replace the rim lock.

Further, do not rely on the tilt of your valve stem alone as an indication of whether your rim lock is functioning properly. The only time a valve stem will remain straight is when the rim lock is functioning properly and there is sufficient lubrication (like talc powder) in the tire. However, lower tire pressures (6-12 psi) cause a lot of flexing and twisting of the tire, which tends to naturally walk the inner tube inside the tire assembly and tilt the valve stem. An inner tube valve stem can handle this as long as the rim lock is functioning properly. Many riders look at their valve stem tilt, and then continue to tighten the rim lock nut to compensate. In so doing, their rim lock may have been functioning properly, but now they have over tightened the rim lock which can lead to rim lock failure. This is what happened to the failed rim lock where the stud separated from the body above.

A final point, if your inner tube has a cup washer and nut on the valve stem, do not remove the bottom washer and nut. The inner tube pictured on the left has a cup washer and two nuts on the valve stem. Not all inner tubes have this configuration, but there is a reason why it is there. The bottom nut and washer work to maintain the air tight seal of the valve stem to the inner tube, and removing it compromises this seal and can lead to a valve stem failure. The top nut is to help keep the valve stem from popping out of the rim during installation.

So, remove the cap and top nut, as shown in the left picture. Then make sure the lower nut is tight on the casher washer. Install as shown in the right picture below. Lightly screw on the top nut just to hold the valve stem in place during installation, and tighten as needed to get enough extension of the valve stem to air up the tube. Once finished, we recommend tightening the top nut against the valve stem cap, not against the rim, as shown below. We prefer allowing the valve stem a little room to give as needed to reduce the stress during flexing and twisting forces that try to “walk” or spin the inner tube inside the tire.

Tube Saddle® has developed a new patent pending rim lock to eliminate the problems inherent in the conventional rim lock design. The rim lock has curved teeth, a curved body and will not bottom out in the rim regardless of the bead thickness of a tire. It does not protrude above the edge of the rim and is lighter than any other rim lock on the market. Also, the stud cannot be pulled out of the body of the rim lock. Below is a quick look at the new design that will be available this year. We are working with Group 6, formerly Matrix Concepts, to have this rim lock available internationally and through our website www.tubesaddle.com

For additional *Tech Tips* and information about Tube Saddle® visit our website

www.tubesaddle.com

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Reduce arm pump

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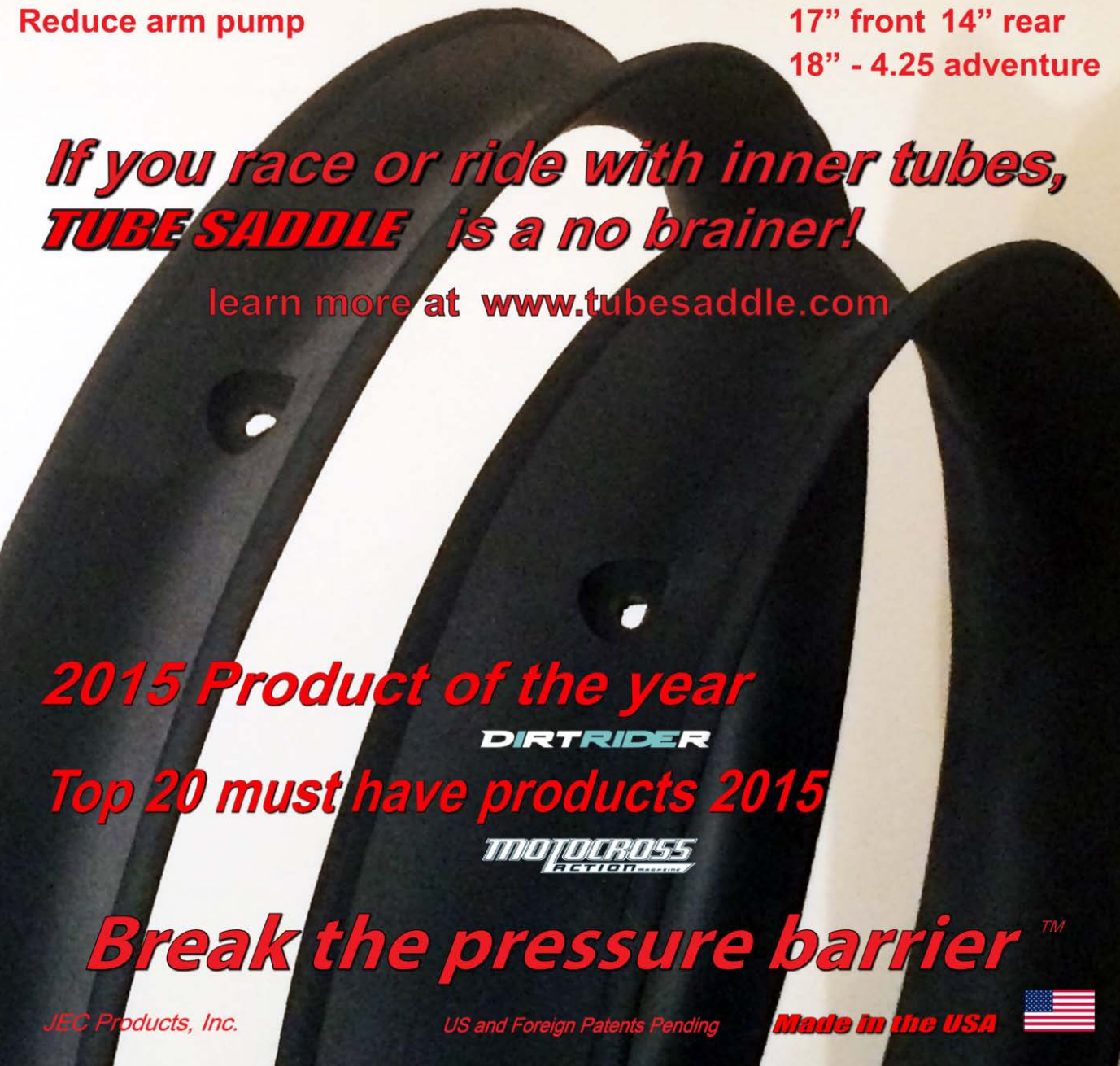
21” front	18” rear	19” rear
	19” front	16” rear
	17” front	14” rear
	18” - 4.25 adventure	



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