

# Tuning Wheels

*If your spokes play different tunes,  
here's what to do.*

*by Bob Schleicher*

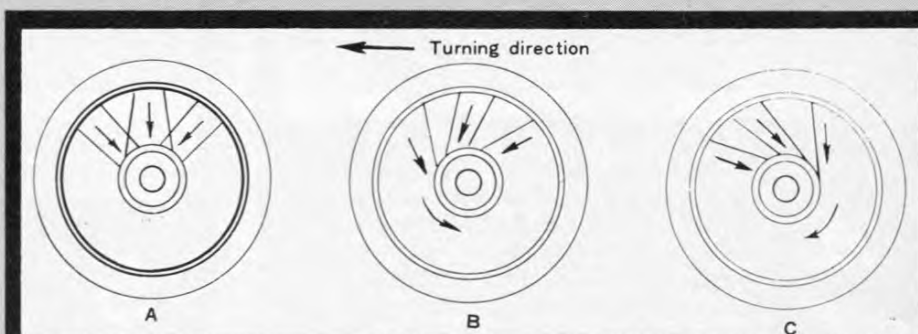
There's more to motorcycle maintenance than just an occasional spark plug change; more, even, than replacing pistons, rings, brake linings and tires. Total performance includes acceleration, stopping *and* handling. Acceleration is first in most of our minds when we buy bikes because they are, after all, one of the biggest horsepower-per-dollar bargains in the mechanical world. You usually don't overlook the stopping department more than once either. Handling, though, is the orphan in most motorcyclists' minds. If the shocks work and the fork seals hold up and the spokes don't break, many of us feel that all is well down there. Not true. The handling needs an occasional tuneup just like the rest of the motorcycle's performance functions.

Most owner's manuals describe the procedures for changing the fork oil, and the rear shocks are usually either perfectly acceptable or they've been discarded for an accessory replacement. It's necessary to lubricate the steering crown bearings, the axle bearings and the swinging arm bushing from time to time; all of the bolts and nuts that hold these bits in place

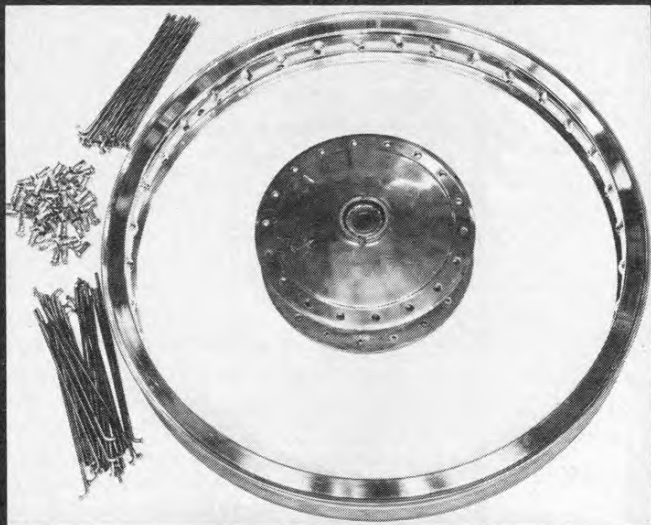
must also be tightened occasionally. Again, all that is pretty well outlined in your owner's manual. What most manuals and most owners ignore, though, is wheel and chassis alignment. These areas are as crucial to design-perfect handling as a proper spark plug is to engine perform-

ance. The weight of the front or the rear of the motorcycle is, quite literally, suspended from each of the wire spokes in the front and rear wheels. As each wheel revolves, the weight on that axle is transferred from one set of spokes to the next. If one spoke is loose or broken, this can cause the machine to swerve a bit to one side, giving a wobbly feeling through the seat or handlebars. If you hit a rock or a chuckhole just right, the entire weight of you and the machine is suspended for an instant from just one or two spokes. When this unusual load is carried by those thin wires, they often stretch or snap. In some ways, it's better if they snap; at least you know that a spoke is weakened. If the spoke just stretches, there's no visual indication that the wheel is now incapable of supporting the machine properly because the spoke is too loose. This is why you hear and read such frequent warnings to check the spokes for tightness every time you ride. A check of those 30 or 40 spokes sounds like unnecessary work, but with a little practice, it won't take much longer than tickling a carburetor float button.

If the machine has a center stand, prop the bike so that the wheel you wish to check just clears the ground. Tap the middle of each spoke lightly with the end of a wrench and listen to the sound the spokes make. Those that are tight enough will give off a crisp pinging sound; those that are too loose will sound more like a thud than a ping. Obviously, the broken spokes, even those whose ends are still held by nipples (the nuts at the wheel rim end) will be easy enough to detect. You may have to remove the tire to repair that rare broken spoke, but the loose ones can be quickly adjusted so their sound matches all the rest. We've gone a step further with the series of photographs on these pages,

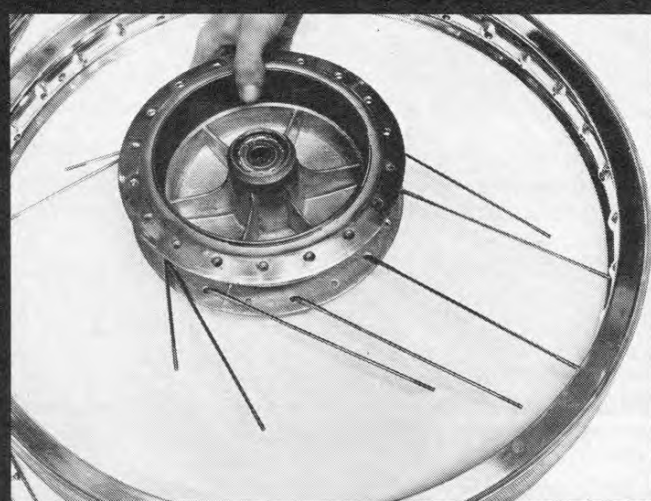


*A series of simplified views showing just how the spokes carry the weight (a) when the machine is at a standstill, (b) when it's rolling, and (c) when the brakes are applied. Note that the entire weight literally hangs from just four or six of the spokes at any given moment.*



2

*You can better understand the make-up of any wire wheel (and learn how to replace your own wheel, or replace a bent rim, or substitute an alloy and / or a larger rim on your hub) by following this sequence. If you are installing a larger diameter rim, you'll need longer spokes. Notice that the spokes at the top of the photo have their heads angled at approximately 70 degrees from the shank of the spoke, and the bottom spokes have their heads angled at approximately 110 degrees.*



4

*If each of the flared ends was inserted with the flare to the outside of the hub you should be able to turn the hub over and straighten each of the spokes into this pattern. It's almost a must to have a duplicate (or photo) of the original wheel for reference.*



3

*This particular wheel utilizes a full-width hub with a 2-inch wide, 21-inch alloy rim, and has 36 spokes. Start by inserting nine of the 110-degree spokes through every other hole from the outside.*



5

*You can add the threaded spoke nipples to the ends of the spokes to hold them into the rim. This first set of nine spokes is inserted into every fourth hole.*

which show you how to completely replace a wheel. On those occasions when a dozen or so spokes have been broken, the rim will usually be bent and require replacement anyway. Or, you may just want to replace the stock rim with a different size or type rim.

Chassis alignment is a difficult thing to see on a motorcycle, because the forks, shocks, and swingarm all angle in different directions. Easy enough to feel, though, is a wobble in the bars when banking over in a fast paved corner, or the side-to-side twitch of a

dirt machine as it touches back to earth after a jump.

The place to start checking for proper alignment is the steering crown area. First, be sure the handlebars themselves are not bent. A piece of string held from the tip of the bar





6

*The really trick part of relacing any wire wheel is getting the spokes in at the proper angle to match the angle of the holes that are dimpled and drilled in the rim. The spokes on this wheel must lay at about this angle when the nipples are threaded all the way on.*



8

*Block the hub up about six inches so you can insert the spokes and wiggle them around toward the rim, and thread the nipples on.*



7

*Nine 110-degree spokes on the opposite side of the hub go in next. These also go in from the outside, in the holes just clockwise from the first nine on the other side.*



9

*Start nine 70-degree spokes through the inside of the hub flange and bring them out in the direction shown until they seat in their bevelled holes.*

or, better yet, from one of the bends, down to the front axle, will help determine if both ends of the bars are equidistant from the axle. Most of the handlebar alignment checking can be done by sighting from the regular riding position or perhaps while standing on the pegs to get a better view.

The fork tubes are relatively easy to twist so that the top triple clamp is forced out of line with the bottom triple clamp. Usually, you can just hold the front wheel and tire between your knees while you give the handlebars a healthy yank. If necessary, loosen the clamp bolts that secure the fork tubes into the triple clamps, then twist the handlebars so that the two

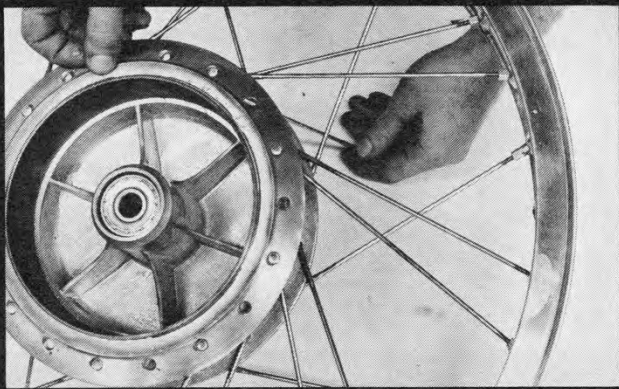
fork tubes are perfectly parallel as viewed from the side. The clamp bolts should be checked, from time to time, for tightness.

Put the machine on its center stand or shove a milk crate under the crankcase to lift the front wheel a few inches off the ground. Grab the forks down near the axle, and wiggle them back and forth to check for excessive play in the steering head bearings. If you detect any play, adjust the bearings as outlined in your owner's manual.

While the front wheel is up, you can clamp a pointer so its tip is in line with the exact center of the front tire and about 1/32 inch away from the tire

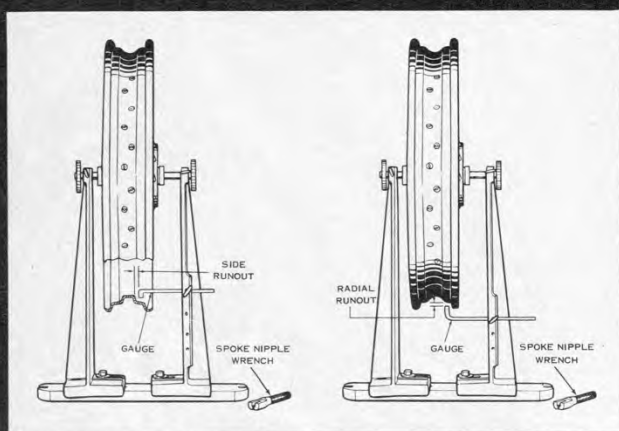
tread. Slowly rotate the wheel to see how much the tire wobbles from side-to-side and up-and-down; if there's less than 1/16 inch of wobble in either direction, all is well. If there's more side-to-side or up-and-down wobble than plus-or-minus 1/16 inch, check again (it should have been done when you were tightening the spokes) for wheel rim runout by holding the pointer near the rim itself. Rim wobble can be corrected by tightening the spokes as shown in the photos and drawings, but if the rim is running true, tire wobble can only be corrected by replacing the tire with another.

Finally, hold a perfectly straight CYCLE GUIDE / DECEMBER 1973 61



# 10

*The final row of nine 70-degree spokes should be easy if you have the first three positioned correctly.*



# 11

*Most dealers can order a wheel truing jig but you can make your own from two upright 2x4 boards and an old axle.*



# 12

*The initial spoke tightening can be done with a screwdriver so that an equal amount of threaded area is still visible outside the spoke nipple on the hub side.*

board against the sides of the front and rear tires, as close to the axle as you can get it without interfering with the sprocket or brake hubs and linkage (see drawing). If the front wheel is pointed straight ahead, and if the front and rear tires are the same brand, model, and size, the board should touch both tires in two places as shown in the drawing. If it doesn't, the rear wheel is probably cocked in its mounts due to improper chain adjustment. Loosen the rear axle nuts and align the rear wheel so it touches the straight edge at the same time that you are adjusting the chain. (See your owner's manual for "proper slack." It's usually about a half to three-quarters of an inch of up-and-down chain movement as measured at the bottom run, halfway between the rear axle and the countershaft sprocket.) Tighten the rear axle nuts and recheck the alignment (with the board straight edge) to be sure the rear wheel is in line with the front.

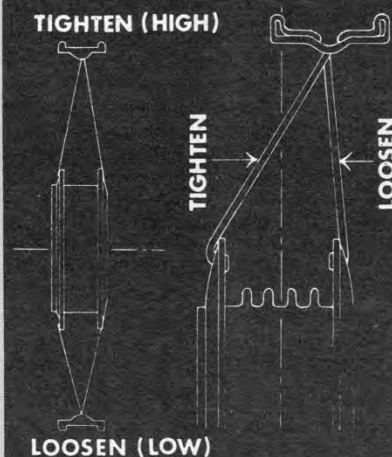
If your machine has a narrower tire

on the front, or if the front and rear tires are different in any other way, you'll need *two* perfectly straight boards. Place one on each side of the tires, as high up as the frame, exhaust, sprockets and brake linkage will allow. In most cases, the rear tire is wider than the front, so, each board should touch the rear tire at two points: near the back of the tire, and near the front of the tire. The boards should not touch either side of the front tire when the rear wheel is properly aligned. The distance between the sides of the front tire and the boards should be the same on both sides of the tire.

Keep the boards in place so you're sure the wheels and tires are set in a perfectly straight ahead position, and sight down the edge of the rear wheel to see if the front and rear wheels are in vertical alignment. Sometimes, particularly on a dirt machine, the swing arm gets twisted so that the sides are no longer parallel. This tilts the rear

**continued on page 93**

**TIGHTEN (HIGH)**



*Use the screwdriver and the spoke wrench to tighten and loosen the spokes around the rim. The drawings show which spokes to loosen to correct for up-and-down or side-to-side wobble. If any of the spoke ends protrude past the nipple they must be ground flush.*