<u>NewArc™ Dial Indicator Information</u>

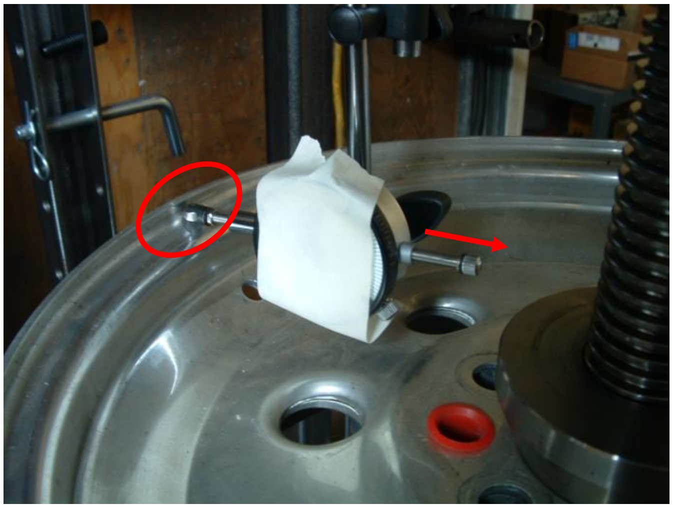
READING A DIAL INDICATOR

It is always important to concentrate when measuring runout. Reading a dial indicator is particularly confusing during wheel repair because, depending on how you measure a wheel, the readings can be exactly opposite. The most accurate way you can measure a wheel is in the machined beadseat, which is where the tire mounts on the wheel. However, it might sometimes be easier to take the readings from the surface opposite the bead seat on the inside of the wheel. Although the readings will essentially be the same, the needle movement on the dial will be the exact opposite of those taken from directly in the beadseat. For clarity in this explanation the indicator readings are being taken on the inside edge of the flange.

PROPER SETUP

This is the first thing you need to know. You cannot expect to get accurate readings on an indicator that is not set against the measuring surface properly. Attach the indicator to a stationary and solid surface. The most common surfaces are under the frame swing arm or on one of the vertical frame members. Position the indicator against the wheel in the area opposite the beadseat on the inside of the wheel. Make sure that about an eighth to a quarter of an inch of the indicator stem is sticking out the top of the gauge. Rotate the wheel and make sure that the end of the stem never bottoms out and the indicator tip remains in contact with the wheel during all 360 degrees of rotation. The stem on the indicators we use have a full inch of travel.

When you first use a dial indicator or, if you become confused, the easiest way to solve your problem is to ignore the dial. A simple exercise will help. Put tape over the face of the dial so that you cannot see the needle move. Now, as you rotate the wheel, you will be able to watch the up and down motion "plunging" motion of the stem but you will not be able to see which way the needle on the dial is turning.



The photo on the left shows the contact point of the indicator against the raised bead of the wheel. You can see a slight bend in the bead circled just above the valve stem hole to the left of the indicator. From the way the indictor is set up, the plunger shows about ½" of travel is still available. If the knurled end of the stem bottoms out on the top of the dial, the point of the indicator cannot touch the wheel surface and inaccurate readings will result. In the right photo the wheel has been turned clockwise and the contact point of the indicator is now riding on top of the bend. Notice that the plunger has moved noticeably inward, toward the center of the wheel. If you measured the difference between those two points with a scale, you would be able to tell the plunger moved about 1/8". When you get to the highest point of the bend, the plunger will move inward no matter which way you rotate the wheel.

ACCURACY READINGS
When reading a 1/8$^{th\ inch}$ measurement on a scale, a variation between .100" and .150" would not be easily distinguishable. However, the variation of .050" would easily be enough to result in an unbalanceable condition.

IDENTIFYING TOTAL RUNOUT
Even limiting yourself to watching the stem only, you should be able to identify two significant locations on the wheel. You should be able to see the point the stem goes in the farthest and the point where it comes out the farthest. The measured difference between those two locations represents the total runout of the wheel. The plunger could only remain steady if the wheel was perfectly round. The most accurate way to measure the runout is by watching the needle on the indicator. When you take the tape off the face of the dial, you will see that, as the plunger moves outward, the needle rotates counter clockwise. When the plunger moves inward, the needle turns clockwise. The graduations on the dial are .001" and one complete turn of the needle registers .100" on the dial.

It is almost impossible to get a wheel perfectly round. The goal in wheel straightening is to achieve a total indicated runout (TIR) of less than .030". The indicator will easily monitor any change to the shape of a wheel.

INDICATING A WHEEL
Slowly spin the wheel and watch the indicator. The dial will spin both clockwise and counter-clockwise. As previously noted the plunger will move outward, as the dial spins counter-clockwise. Conversely, as the plunger moves in toward the center of the wheel, you will see that the dial will be spinning clockwise. No matter how many times the indicator changes directions, there is a point where the needle will stop at the ***most counter-clockwise*** position, which will also be the farthest ***outward*** travel of the plunger. That point can also be referred to as the spot, which is the greatest distance from the true centerline of the wheel. Once identified, that spot should be marked on the wheel as ZERO. Move the dial so that the zero hand on the indicator is pointed at the zero on the dial.

From that point, all indicator movements will be clockwise. No matter which way you turn the wheel, the pointer will never go below the zero point you have found. This means that, as you rotate the wheel, you will be measuring all of the surfaces on the wheel, which have been forced inward. As you gather this data, it is a good practice to mark the bent areas with the readout dimensions. Proceed as follows:

Slowly spin the wheel and read the indicator. Every time the pointer changes directions, record the readout dimension and mark it on the wheel at that point.

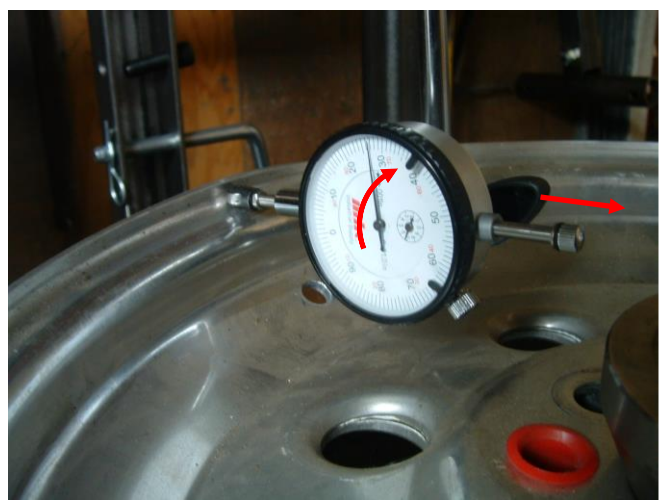
> *For example: As you slowly spin the wheel from the zero spot, the pointer on the dial rotates clockwise to .065" at which point it begins to change direction. At the exact point of direction change, mark that spot on the wheel with the .065" dimension. Next, watch*

the pointer as it goes counter-clockwise back to .010", where it again changes direction. At that point on the wheel, you mark the .010" dimension. You continue spinning the wheel further and the indicator again changes direction, going clockwise up to .195" where it changes again. At that point you mark the .195" dimension. Next, the pointer goes counter-clockwise and it continues turning until it gradually ends up back at the starting zero point.

Fluctuation in indicator readings is common and there can be many back-and-forth variations in one 360-degree rotation of the wheel. Make sure to double check your readings so that the ***counter-clockwise most spot*** *is the same spot that you had originally marked as zero. It is also important to remember that the difference between zero and the* ***largest clockwise reading*** *is what determines the total runout.*

In this example, even though there are some variations in the indicator readings, the maximum dimension between the zero setting and the spot of the most severe bend is .195", which also represents the TIR (Total Indicated Runout) of the wheel.

Some wheels are bent in many spots and can be an indicating nightmare. Wheels with multiple bends are usually much more difficult to get round. It is always a goal to get a wheel to less than .030". However, sometimes you will be lucky to get a wheel with many bends under .040".



The photo on the left shows the indicator zeroed out. Notice the position of the plunger. In the right photo, the wheel has been rotated so that the bend is right under the contact tip of the indicator. Notice that the stem has moved inward about $1/8^{\text{th inch}}$. The dial reading shows that the needle has traveled almost .130" from the original zero position. It moved clockwise all the way around once, plus another .030".