

Homemade Measuring Wheel

Materials

We will need a cheap plastic wheel, an old umbrella, a cheap and very simple electronic calculator, actually you can use anyone, just be sure your calculator can make "constant calculations". We will also need a door-reed switch and magnet (it HAS to be a normally open type). Moreover we will need an L-shaped bracket, bolts, nuts, washers, some electric wire, electrical tape, plastic glue and cable ties.



[See Instructional Video](#)

Setting-up Calculator

Open the calculator. Before removing the keyboard PCB glue all movable parts with silicone glue, so they will not start popping out when you manipulate the keyboard PCB. Remove the PCB and locate the keyboard contacts corresponding to the equal sign. Find an adequate place and solder two wires, one for each contact. May be, it will be necessary to remove some of the solder mask with a hobby knife to make a place for soldering.

Make four holes on the calculator's back enclosure and pass two cable ties throughout then so their tips will stay outside when the calculator is closed again, they will be used to hold the calculator on the L-shaped bracket.

Close the calculator's enclosure and test it. If everything is OK, closing the wires circuit will act as pressing the equal button.

After preparing the calculator, we must get rid of all the umbrella things. We will need the rod and the handler only.

Calculating the Wheel Perimeter Constant

Measure the wheel diameter with a scale and calculate its circumference. I will do it in centimeters because I want to measure distances in meters, but you can do in feet, yards or whatever measuring system you want, the procedure will be the same.

As my wheel diameter is 0.157 centimeters, its perimeter in meters will be:
 $0.157 \times 3.14159 = 0.493$ meters, about half a meter.

We call that value the wheel constant and we will need it afterwards.

Preparing the Rod and Wheel

Flatten the rod's extremity and make a hole to mount the plastic wheel. Be sure to use a jam nut to ensure the nuts will not unscrew.

Glue the magnet side of the door reed switch on the plastic wheel in a way it will be close to the rod but allowing the wheel turns freely. Check it.

Fasten the reed side of the door switch to the rod, place it close to the magnet side, the magnet will make a pass on each wheel's turn. The positioning of these door switch parts CANNOT interfere the wheel free spin.

Using bolts, place and fasten the L-shape bracket to the rod handler in a way the bracket free arm will be positioned opposing the handler.

Using cable ties, fasten the calculator to the bracket, connect the wires to the reed switch wires and fasten the wire on the rod.

Now we are ready to try our measuring wheel.

Testing and Calibrating

Press the calculator "All Clear" button, enter the wheel constant and press plus sign twice, this will make the wheel constant an addition constant to the calculator and each time the reed closes its contacts (or the equal sign button is pressed), the wheel constant will be added to the sum.

Start walking and you will see the calculator's display showing the distance measurement.

If you know a given distance precisely, you can calibrate your wheel. Just enter number one as the calculator addition constant and it will count the wheel's turns as you walk. At the end, to calculate the calibrated wheel constant, divide the route length by the number of turns.

Example:

If I know a 100 meters distance and my wheel spins 205 times, my wheel constant will be 0.489. Calibration may be necessary periodically due to wheel wearing.

Troubleshooting

If the calculator is missing turns, try going slower, or try to make the magnet closer to the reed switch or use a stronger magnet.

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