

Simple, intuitive calibration

1. Determine your total speedometer error.
2. Set the YB switches to correct your speedo error.
3. Tweak, fine tune your correction if needed.

Handy hint

During speedo testing and calibration it is easiest to leave your Yellow Box in a handy location. Once you are happy with the adjustment you may want to mount your Yellow Box in a secure location. Please refer to Steps 5 and 6 in "Using the Yellow Box".

Determine your total speedometer error

There are two main methods to determine your total speedometer error;

- a. Using measurement, or
- b. Complex calculation.

Determine speedo error by measurement

Measurement methods include;

- Using GPS
- 5-mile highway markers
- Compare with a known distance or known accurate speed of another vehicle
- Police radar
- Radar speed signs which display your speed
- Using a stopwatch over a measured distance

The measurement formula, for all vehicles

The formula below is used to determine your total speedo error ratio from the measurements you have taken. This can be **any measurement, in any units.**

Vehicle speedo error calculation, using measurement	
$\begin{matrix} \text{Total} \\ \text{speedo} \\ \text{error} \\ \text{ratio} \end{matrix} = \left[\text{Indicated / Actual} \right]$	www.YELLR.com

Measurement example

Using freeway markers--signs showing 0 miles, 5 miles, 10 miles etc. These markers are laid by professional surveyors and are extremely accurate. If no freeway markers exist near you use a straight, level, long open road, minimum traffic is helpful too.

Measurement method;

First **set all** Yellow Box **switches set to OFF** (down), or use the supplied jumper plug. This returns the speed system to original total speedo error.

Step i. Stop at the first marker (0 miles) & reset your tripmeter

Step ii. Drive to the next marker (5 miles) & stop & make note of your tripmeter reading. This should be accurate to the nearest 0.1 miles.

Step iii. Now you have your indicated tripmeter reading over an actual 5 miles distance.

Note! For a more accurate reading, **drive slowly past** at 36 mph (60 kph) instead of stopping at the 5 mile marker. At 36mph, each second equals 0.01 miles. If you count (or time using stopwatch) the seconds from passing the marker to your tripmeter clocking the next 0.1 digit, this will allow you to work out the trip meter reading to within 0.01 miles accuracy. This may sound complicated but can be done quite easily.

Example 1a. The measurement formula

Toyota Landcruiser indicated a distance of 5.45 miles on your tripmeter, and you know the actual distance is 5 miles exact.

$$\begin{aligned} \text{Total speedo error ratio} &= (\text{indicated/actual}) \\ &= (5.45 \text{ miles} / 5 \text{ miles}) \\ &= \mathbf{1.09 \text{ (or 9\% fast)}} \end{aligned}$$

[eg. A second example: Kawasaki motorcycle has an indicated speed 45 mph, actual speed 40 mph.
Total speedo error = 45/40 = 1.125 (or 12.5% fast)]

2a. Set the Yellow Box switches

Our Toyota Landcruiser has a **measured speedo error of 9%** fast (ratio 1.09). The next step is to set the Yellow Box switches. Look-up the closest ratio to 1.09 in the "Correction Ratio Table". Closest is 1.09, set switches as shown to 0001 0010.

3a. Tweak, fine tune your correction if needed.

If you have measured correctly you can simply set switches as shown above and you will have no more speedo error. Go for a drive/ride to check your speedo accuracy once more and tweak if needed (ratio either side of 9%). Our Landcruiser now has an accurate speedo.

Remember to switch the Yellow Box off and then on again to activate the new switch settings.

Determine speedo error by calculation

If you cannot use the simpler measurement method (above) then you may use the below formulas to determine your theoretical total speedo error.

Enter your vehicle specific details into formula below;

- Stock speedo error ratio:
Motorcycles (often 5 to 8% fast = 1.05 to 1.08 ratio)
Cars & trucks (often 0 to 8% fast = 1.00 to 1.08 ratio)
- Gearing changes; sprocket, differential, gearbox
- Wheel changes (rolling circumference change)
- Tyre wear (new tyre ratio = 1.00, worn tyre = 1.02)
- Miscellaneous error ratios
- Faceplate swapping (eg. Hayabusa swap to older full speed range faceplate causes error ratio 1.13)

Motorcycles

Motorcycle speedo error calculation, no measurement

$$\text{Total speedo error ratio} = \left[\begin{array}{c} \text{front} \\ \text{sprocket} \\ \text{old/NEW} \end{array} \right] * \left[\begin{array}{c} \text{rear} \\ \text{sprocket} \\ \text{NEW/old} \end{array} \right] * \left[\begin{array}{c} \text{stock} \\ \text{speedo} \\ \text{error} \\ \text{ratio} \end{array} \right] * \left[\begin{array}{c} \text{tyre} \\ \text{wear} \\ \text{ratio} \end{array} \right] * \left[\begin{array}{c} \text{misc} \\ \text{error} \\ \text{ratio} \end{array} \right]$$

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Example 1a. Honda motorcycle changed final drive sprockets from 16/44 to 15/45, stock speedo error approx. 5% fast, half worn tyre, no other changes.

Total speedo error calculation using formula:

$$\begin{aligned} &= (16/15) * (45/44) * (1.050) * (1.01) \\ &= (1.067) * (1.023) * (1.050) * (1.01) \\ &= \mathbf{1.158} \quad (\text{or } \mathbf{15.8\% \text{ fast}}) \end{aligned}$$

2a. Set the Yellow Box switches

Our Honda motorcycle has a **theoretical speedo error of 15.8% fast** (ratio 1.158). Look-up the closest percentage to 15.8% in the "Correction Ratio Table". Closest is 16%, set switches as shown 0010 0000.

3a. Tweak, fine tune your correction if needed.

After setting your correction, go for a ride and check speedo accuracy once more and tweak the correction up or down (ratio either side of 16%) if needed. Our Honda motorcycle now has an accurate speedometer.

Remember to switch the Yellow Box off and then on again to activate the new switch settings.

Sportscars, cars and trucks

Cars & trucks speedo error calculation, no measurement

$$\text{Total speedo error ratio} = \left[\begin{array}{c} \text{diff ratio} \\ \text{NEW/old} \end{array} \right] * \left[\begin{array}{c} \text{wheel} \\ \text{rolling} \\ \text{circumference} \\ \text{old/NEW} \end{array} \right] * \left[\begin{array}{c} \text{stock} \\ \text{speedo} \\ \text{error} \\ \text{ratio} \end{array} \right] * \left[\begin{array}{c} \text{tyre} \\ \text{wear} \\ \text{ratio} \end{array} \right] * \left[\begin{array}{c} \text{misc} \\ \text{error} \\ \text{ratio} \end{array} \right]$$

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KPH-MPH or MPH-KPH Conversion

For imported vehicles or travelling in other countries, you may wish to convert your speedometer reading from KPH to MPH or vice versa.

Example. You want your KPH-speedo to read in MPH, and also correct your speedo error of 6% fast.

Find the highlighted KPH-MPH 1:1 conversion of 61%, switch setting 0110 1111. If you only wanted straight KPH-MPH 1:1 conversion you would set your switches to this setting (61%).

To also correct your 6% fast speedo error, add the 6% speedo error to the 61% 1:1 conversion, so your total correction needed is 67%, set switches as shown to 0111 0101.

Finishing off

Now you can enjoy the benefits of having an accurate speedometer and odometer, and/or other electronic vehicle systems.

From here you have a choice to either **set-and-forget** your Yellow Box, **or regularly fine tune/tweak** your Yellow Box correction settings throughout the life of your vehicles tyres.