

TRIM HEIGHT AND WHEEL ALIGNMENT ON ISUZU RODEO

All procedures based on a 99 Rodeo but might be of use to others. Trim height is Isuzu procedure.

FRONT TRIM HEIGHT

Need:-

- 16 mm x 1.5 mm pitch hex nut
- Disc magnet about 25 mm diameter
- Length of string
- Small spirit level with end hooks for suspending on string, called a 'line level'.
- Steel ruler

The trim height is measured vertically from the centre-line of the lower control arm pivot to the lowest point on the lower ball joint. On the Rodeo it is 119 mm +/- 5 mm.

- a) Mark a straight line across the middle of the disc magnet with felt pen or similar.
- b) Remove the engine bash plate.
- c) Screw the nut onto the threaded end of the lower control arm front pivot (hand tight).
- d) Attach the magnet to this nut as central as possible, with the line horizontal.
- e) Attach the steel ruler vertically to the magnet using the line as a reference point. You can zero the ruler on this line or use a short ruler and 'zero' the ruler at 119mm.
- f) Put a small loop in the end of the string and hook it on to the split pin that is very conveniently hanging on the end of the lower ball joint threaded section.
- g) Tension the string towards the ruler and hang the line level on it, midway between the ball joint and ruler.
- h) Move the string up and down beside the ruler until the line level is level. A small mirror is useful for seeing the bubble.
- i) Check your trim height.
- j) Crank the torsion bars to suit. Each time you adjust bounce the front of the car up and down a few times to settle.

CAMBER

You'll need a good carpenter's level, (or analogue angle gauge or digital level etc.)

This is not as critical as you might think. The Isuzu tolerance is +/- 0.5 degrees which is well within the ability of a spirit level. I have a level which has an extra line on the bubble signifying 0.5 degrees.

First you need to check the run-out of your wheels. If these are no good there is no point proceeding.

Jack each front wheel off the ground in turn and choose an area on the wheel you are going to use for alignment. This might be the wheel rim or other flat surface. On the Rodeo the hub cap is perfect for this purpose.

Locate a fixed 'pointer' as close as possible to the surface you are using. This might be a screwdriver clamped to an axle stand or something similar. With this pointer almost touching the wheel surface chosen, rotate the wheel and watch the gap. If the gap stays constant your wheels are good, if not you have a wheel or bearing problem to sort out first.

Now you have to make up whatever jig or fixture you need to allow you to hold the spirit level against the wheel. You will need this for toe as well so worth the effort. For the Rodeo nothing is needed as the hub cap on the standard wheel is suitable.

Firstly, inflate all tyres to manufacturer's recommendation.

Park on a flat surface and run the car back and forward a few times with the wheels pointing straight ahead, to relax the suspension.

Press your fixture/level vertically against the wheel and see what reading you get. The Rodeo is easy as standard camber is 0 degrees. For angles greater than 0.5 degrees using a spirit level, you might have to use a bit of shimming and some trigonometry as follows:-

Assuming you need positive camber, your shimming will be at the bottom.

Thickness of shim = Sine (camber angle) x diameter of wheel at the point you are contacting.

For example, if your camber needs to be 1 degree and your contacting the wheel at a diameter of 450 mm, the required shimming is $\text{Sine } 1^\circ \times 450 = 8 \text{ mm}$. So you would use 8 mm shim at the bottom contact point and your level can now be used to check camber. Please note we are shimming your spirit level here and not your suspension !

Any problems with trigonometry, get your kids to work it out !!

Once you have set up the spirit level correctly you can adjust your camber. Please note that I have not addressed caster as it is difficult to measure and least likely to change with use. If you do have concerns with caster get it corrected first as it will effect camber. Adjusting camber will not effect caster if you do it correctly, that is, shim the upper control arm evenly on both holding bolts.

The camber is adjusted using shims under the upper control arm pivot. To access the upper control arm pivot bolts on the Rodeo the control arm needs to be dropped by jacking the chassis up. A jack can be used under the lower control arm to take the weight off the bolts while you remove the shims. DO NOT take the holding bolts out completely.

1 degree of camber should equate to about 4mm of shims. Adding shims makes the camber go negative and taking shims out makes the camber go positive.

The upper control arm holding bolt torque is 152 N-m, 112 lb-ft.

TOE

Now you have your trim and camber set correctly. All you need to adjust toe is one of those spirit levels with a built in laser beam.

Park on flat surface and settle suspension as before.

Position a length of wood horizontally across the front of the car, on stands so it is level with the wheel centres. Check that the wood is close to perpendicular with the centre line of the car. The distance from the car is not important.

Hold your fixture and laser to the wheel, only this time with the laser level horizontal and in the centre of the wheel, laser pointing forward. Make sure laser is perfectly level. Of course you do not want any shimming. If you don't have an 'assistant' you will have to bungee the laser to the wheel.

Shine the laser on the wood and mark the point 'Position 1'. Repeat for the other wheel.

Move the wood as far from the car as you can (within reason). The further the better for accuracy, say 5 or 6 metres would be good. Set up perpendicular as before.

Note that you also need to measure the distance between the two positions used, call this 'Position Spacing'.

Repeat the laser marking and mark 'Position 2' for both wheels.

Measure the spacing of your laser marks on the wood and record for position 1 and 2.

Toe is specified in distance, not angle, probably because the angle is very small. It is usually the difference between the side to side wheel spacing measured on the front and rear of the tyre, at the outer diameter of the tyre. Sometimes it is measured at the fattest point of the tyre, but it won't make much difference.

For example, on the Rodeo it is 0 to 2mm toe-in.

Now for the calculation. You will need to know your tyre outer diameter.

Differential = 'Position 1' measurement minus 'Position 2' measurement

Correction Factor = Tyre Diameter / Position Spacing

Toe = Differential x Correction Factor (positive number = toe-in, negative number = toe-out).

Let's say your Position 1 measurement was 1750 mm, and your Position 2 measurement was 1730 mm. Say the spacing of your measurement positions was 6000 mm, and your tyre diameter is 730 mm.

The Differential would be $1750 - 1730 = 20$ mm.

The Correction Factor would be $730/6000 = 0.122$

The toe is therefore $20 \times 0.122 = 2.4$ mm (toe-in).

Adjust tie-rod ends accordingly. Adjust evenly to keep steering wheel centred.

Re-check.