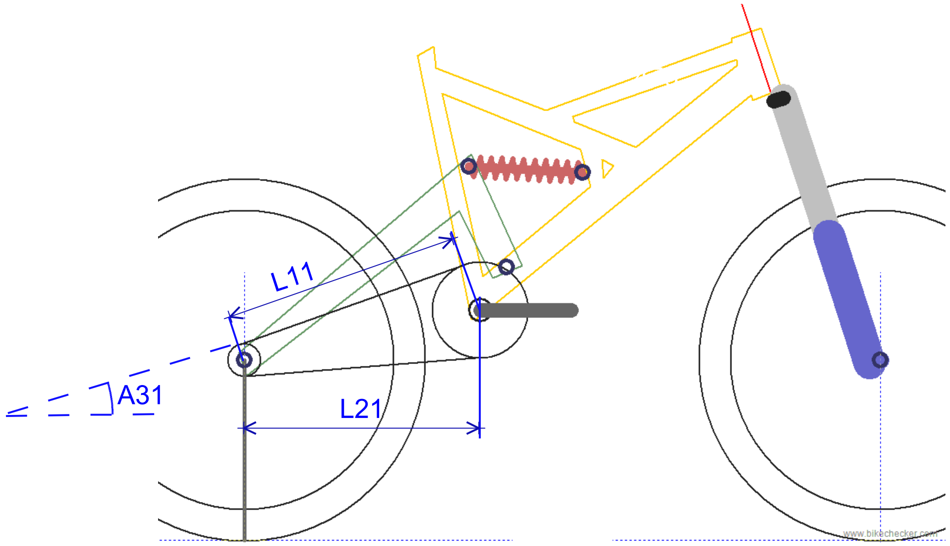
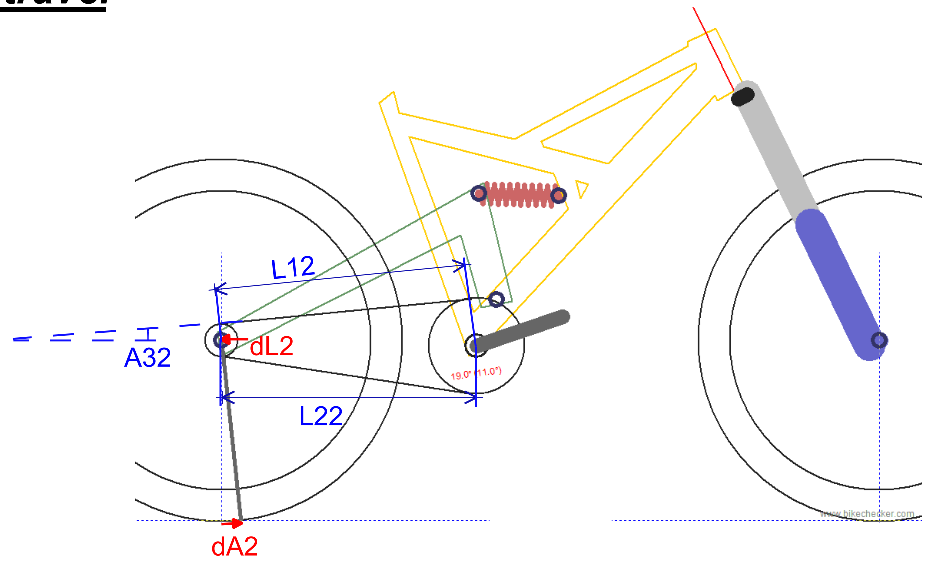
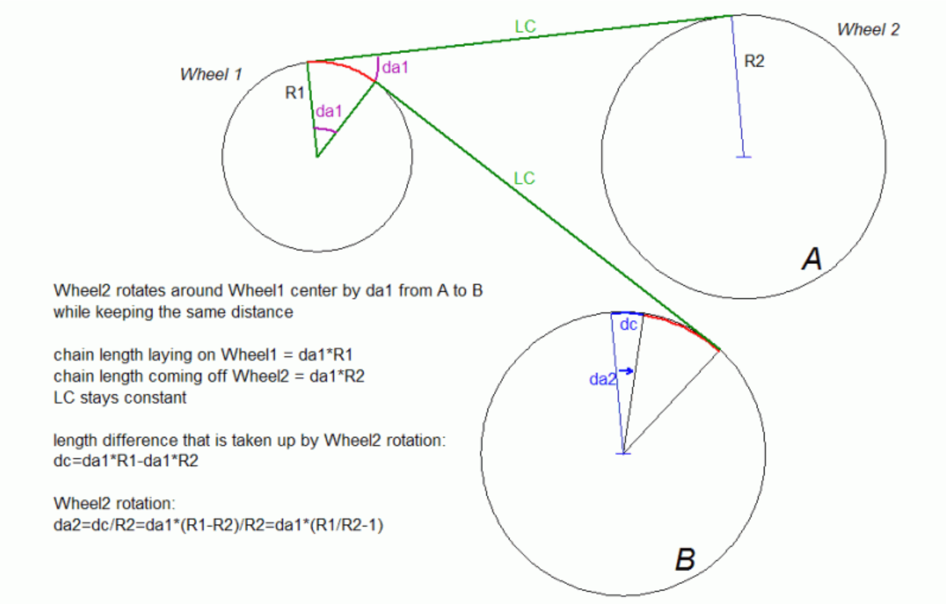
Zero travel



Full travel



Chain drive - wheel rotation calculation



The three components of chain induced "pedal-kickback"

1. Chain length change between cogwheels' upper contact points

L11 and L12 are given by suspension geometry calculations for two positions of travel

Rotation at the crank: (in radians):

$dB1 = dL1 / RF = (L12-L11) / RF$

where
RF = front cogwheel radius

2. Wheel moving backwards relative to the bottom bracket means rotation at the clutch too.

$dA2 = dL2 / R = (L22-L21) / R$

where
L21 and L22 = horizontal chainstay lengths for two positions of travel
R = rear wheel outer radius

Rotation at the crank:

$dB2 = dA2 * NR/NF$

where
NR = rear cogwheel count
NF = front cogwheel count

3. Rotation by upper chain coming off and laying on the cogs as this chain line rotates with suspension compression.
See figure on the left.
This causes crank feedback if rear/front cog numbers differ.

Rotation at the crank:

$dB3 = (A32-A31)*(NR/NF - 1)$

where
A32,A31 are the angles of the above mentioned chain line in a fixed coordinate system

The sum of these components (dB1 + dB2 + dB3) is the pedal kickback (or theoretically can be forward crank rotation too).
There is always less kickback for high gears or can even be negative.
Using chain guide mechanisms may involve more factors from type 1 and 3.

by Gergely Kovács (2006) www.bikechecker.com