SUSPENSION CALCULATIONS:
For the more technically minded- helpful calculations to check suspension spring rates.

STEP 1: MOTION RATIO

A-arm suspension:
(see diagram 1)

$$MR = \left(\frac{d1}{d2}\right)^2$$

MR - Motion Ratio
d1 - Distance from spring centreline to control arm inner pivot centre (in)
d2 - Distance from outer ball joint centre to control arm inner pivot centre (in)

Beam axle suspension:
(see diagram 1)

$$MR = \frac{(d3)}{(d4)}$$

MR - Motion Ratio
d3 - Distance between spring centrelines (in)
d4 - Distance between tyre centrelines (in)

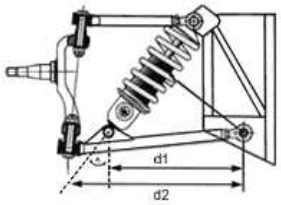

DIAGRAM 1 (A-arm suspension)

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Angle Correction Factor:

$$ACF = (\text{Cosine} \angle A)(C)$$

AFC - Angle Correction Factor
A - Spring Angle from Verticle (see diagram 1)
C - Spring Rate (lbs/in)

The motion ratio is a lever arm effect of the control arm acting on the spring. If the spring is mounted at an angle, the reduced motion of the spring must also be taken into account.

STEP 2: WHEEL RATE

Wheel Rate:

$$WR = (C)(MR)(AFC)$$

WR - Wheel Rate (lbs/in)
C - Spring Rate (lbs/in)
MR - Motion Rate
AFC - Angle Correction Factor

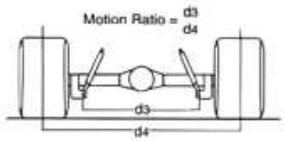

DIAGRAM 2 (beam axle suspension)

The motion ratio of a live axle setup is shown here. Over two-wheel bumps, the motion ratio is 1:1. Over single wheel bumps and during body roll, the motion ratio is calculated as above. The motion ratio is only used for calculating roll resistance, not for suspension frequencies.

STEP 3: SUSPENSION FREQUENCY

Suspension Frequency:

$$SF = (187.8)\left(\sqrt{\frac{WR}{\text{sprung weight}}}\right)$$

SF - Suspension Frequency (cpm)
WR - Wheel Rate (lbs/in) (see Step 2)
SPRUNG WEIGHT - Vehicle corner weight less unsprung weight

STEP 4: WHEEL AND SPRING RATE CALCULATIONS

tip 1 **Calculation of Wheel Rate for a given frequency:**

WR - Wheel Rate (lbs/in) (see step 2)
SF - Suspension Frequency (cpm) (see step 3)
SPRUNG WEIGHT - Vehicle corner weight less unsprung weight

Calculation of Spring Rate needed for a given Wheel Rate:

$$C = \frac{WR}{(MR)(AFC)}$$

C - Spring Rate (lbs/in)
WR - Wheel Rate (lbs/in) (see step 2)
MR - Motion Ratio (see step 1)
ACF - Angle Correction Factor(see step 1)

In combination with these calculations look at our Suspension noteslation **page for notes on the method used by us to get a better solution for your car.**