4 Bar Linkage Calculator v4.0

= Mess with these cells

Rear Suspension Data Entry & Results Summary

One or Two Upper Links?	2
None or One Panhard Bar?	0

Rear Wheel Travel	z
Up Travel (bump)	7.00"
Down Travel (droop)	-9.00"

Rear Upper Links	x	y	z
Frame End	26.60"	17.00"	26.00"
Axle End	0.00"	3.00"	26.00"
True Length (3-d)	30.06"	75.0%	of lower
2-d Length (side view)	26.60"	68.6%	of lower

Rear Upper Link Force if Forward Acceleration is 1.00 g g		
Force at 7.00" in Up Travel	5,836 lb	(Tension)
Force at 3.50" in Up Travel	4,710 lb	(Tension)
Force at Static Ride Height	3,852 lb	(Tension)
Force at -4.50" in Down Travel	2,823 lb	(Tension)
Force at -9.00" in Down Travel	1,666 lb	(Tension)

Rear Lower Links	x	y	z
Frame End	40.20"	15.00"	26.00"
Axle End	3.00"	25.00"	15.00"
True Length (3-d)	40.06"	133.3%	of upper
2-d Length (side view)	38.79"	145.8%	of upper

Rear Lower Link Force if Forward Acceleration is 1.00 g g		
Force at 7.00" in Up Travel	-7,500 lb	(Compression)
Force at 3.50" in Up Travel	-6,708 lb	(Compression)
Force at Static Ride Height	-5,889 lb	(Compression)
Force at -4.50" in Down Travel	-4,707 lb	(Compression)
Force at -9.00" in Down Travel	-3,392 lb	(Compression)

Rear Panhard Bar	x	y	z
Frame End	-8.00"	24.00"	23.00"
Axle End	-8.00"	-24.00"	23.00"
True Length (3-d)	0.00"		
2-d Length (rear view)	0.00"		

Panhard Bar Force if Transverse Acceleration is 1.00 g g		
Force at 7.00" in Up Travel	0 lb	(Tension or Comp)
Force at 3.50" in Up Travel	0 lb	(Tension or Comp)
Force at Static Ride Height	0 lb	(Tension or Comp)
Force at -4.50" in Down Travel	0 lb	(Tension or Comp)
Force at -9.00" in Down Travel	0 lb	(Tension or Comp)

Panhard Bar – Axle Transverse Displacement with Travel		
Displ. at 7.00" in Up Travel	-24.00"	(Shift to Left)
Displ. at 3.50" in Up Travel	-24.00"	(Shift to Left)
Displ. at Static Ride Height	0.00"	
Displ. at -4.50" in Down Travel	-24.00"	(Shift to Left)
Disp. at -9.00" in Down Travel	-24.00"	(Shift to Left)

Rear Roll Center Height	z
At 7.00" in Up Travel	34.84"
At 3.50" in Up Travel	30.90"
Static Ride Height	26.27"
At -4.50" in Down Travel	21.58"
At -9.00" in Down Travel	15.64"

Side View Instant Center	x	z
At 7.00" in Up Travel	30.19"	24.96"
At 3.50" in Up Travel	34.50"	24.88"
Static Ride Height	37.75"	26.00"
At -4.50" in Down Travel	50.44"	30.46"
At -9.00" in Down Travel	66.42"	41.78"

Rear Roll Axis Inclination		
At 7.00" in Up Travel	-1.66°	(Roll Understeer)
At 3.50" in Up Travel	3.73°	(Roll Oversteer)
Static Ride Height	2.87°	(Roll Oversteer)
At -4.50" in Down Travel	16.48°	(Roll Oversteer)
At -9.00" in Down Travel	24.14°	(Roll Oversteer)

Rear Anti-Squat (Accel)	
At 7.00" in Up Travel	155.5%
At 3.50" in Up Travel	135.6%
Static Ride Height	129.6%
At -4.50" in Down Travel	113.6%
At -9.00" in Down Travel	118.3%

Rear Anti-Lift (Braking)	
At 7.00" in Up Travel	109.9%
At 3.50" in Up Travel	95.8%
Static Ride Height	91.5%
At -4.50" in Down Travel	80.2%
At -9.00" in Down Travel	83.6%

Rear Pinion Angle Change	
At 7.00" in Up Travel	12.40°
At 3.50" in Up Travel	5.79°
At -4.50" in Down Travel	-6.28°
At -9.00" in Down Travel	-11.26°

30	25	36.19
40	22.75	40.90
	34.50	36.19
	39.10	40.90

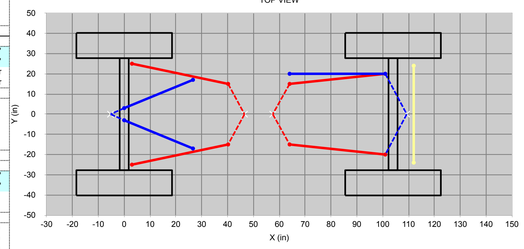
Vehicle Spec's Data Entry

Wheelbase	104.00"
Front Drive Bias	0.50
Front Brake Bias	0.65
Rear Track Width	68.00"
Front Track Width	68.00"
Tire Width	12.50"
Tire Diameter	37.00"
Tire Rolling Radius	17.00"
Axle Tube Diameter	3.50"
Vehicle Mass	5,000 lb
Rear Unsprung Mass	800 lb
Front Unsprung Mass	700 lb
Vehicle CG Height	25.94"
Acceleration	1.00 g
Transverse Acceleration	1.00 g

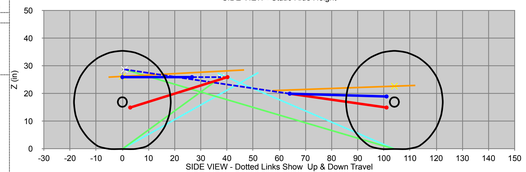
Vehicle Results Summary

Sprung Mass Center of Gravity	
Height (static ride height)	29.77"
Above Rear Roll Center	3.51"
Above Front Roll Center	7.05"
Anti-Squat CG Height	27.64"
Anti-Dive CG Height	27.40"
Body Roll Axis Angle	-1.95° (Roll Oversteer - loose)

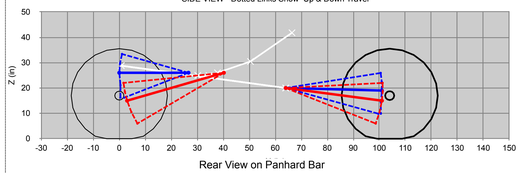
TOP VIEW



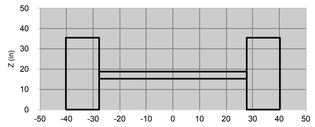
SIDE VIEW - Static Ride Height



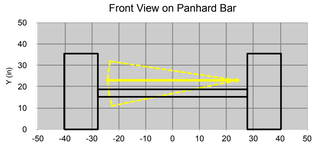
SIDE VIEW - Dotted Links Show Up & Down Travel



Rear View on Panhard Bar



Front View on Panhard Bar



Color Legend f...	
Solid Dark Blue Lines	Upper Links at static ride height in all views
Solid Red Lines	Lower Links at static ride height in all views
Solid Yellow Lines	Panhard Bar at static ride height in all views (if used)
Dashed Dark Blue Lines	Projection of Upper Links to Instant Center in Top/Side View – Static Ride Height Upper Links at travel limits in side view showing up and down travel
Dashed Red Lines	Projection of Lower Links to Instant Center in Top/Side View – Static Ride Height Lower Links at travel limits in side view showing up and down travel
Dashed Yellow Lines	Panhard Bar at travel limits in rear and front views (if used)
Thin Solid Black Lines	Rear or front tire and axle at static ride height in all views
Thin Solid Light Blue Lines	100% Anti-Squat (left), and 100% Anti-Dive (right) at static ride height
Thin Solid Green Lines	Resultant Force from tire patch to chassis at instant center, Accelerating (left) Braking (right). Compare slope of green to light blue for amount of anti-squat/dive
Thin Solid Orange Lines	Suspension Roll Axis – passes through roll center at vertical plane through axle
Yellow X	Roll Centre at static ride height in side view
White X	Top or Side View Instant Centre of suspension links at static ride height Side View Instant Centre of suspension links as wheels travel up (bump) and down (droop). Depending on link geometry, IC's may not fall in the area of view

Front Suspension Data Entry & Results Summary

One or Two Upper Links?	1
None or One Panhard Bar?	1

Front Wheel Travel	z
Up Travel (bump)	7.00"
Down Travel (droop)	-9.00"

Front Upper Links	x	x'	y	z
Frame End	64.00"	-40.00"	20.00"	20.00"
Axle End	101.00"	-3.00"	20.00"	19.00"
True Length (3-d)	37.01"	98.3%	of lower	
2-d Length (side view)	37.01"	99.1%	of lower	

Front Upper Link Force if Braking Accelleration is -1.00 g g		
At 7.00" in Up Travel	33,095 lb	(Tension)
At 3.50" in Up Travel	24,867 lb	(Tension)
Static Ride Height	18,384 lb	(Tension)
At -4.50" in Down Travel	11,536 lb	(Tension)
At -9.00" in Down Travel	6,084 lb	(Tension)

Front Lower Links	x	x'	y	z
Frame End	64.00"	-40.00"	15.00"	20.00"
Axle End	101.00"	-3.00"	20.00"	15.00"
True Length (3-d)	37.67"	101.8%	of upper	
2-d Length (side view)	37.34"	100.9%	of upper	

Front Lower Link Force if Braking Accelleration is -1.00 g g		
At 7.00" in Up Travel	-17,310 lb	(Compression)
At 3.50" in Up Travel	-13,874 lb	(Compression)
Static Ride Height	-10,977 lb	(Compression)
At -4.50" in Down Travel	-7,557 lb	(Compression)
At -9.00" in Down Travel	-4,438 lb	(Compression)

Front Panhard Bar	x	x'	y	z
Frame End	112.00"	8.00"	24.00"	23.00"
Axle End	112.00"	8.00"	-24.00"	23.00"
True Length (3-d)	48.00"			
2-d Length (front view)	48.00"			

Panhard Bar Force if Transverse Acceleration is 1.00 g g		
Force at 7.00" in Up Travel	5,091 lb	(Tension or Comp)
Force at 3.50" in Up Travel	5,022 lb	(Tension or Comp)
Force at Static Ride Height	5,000 lb	(Tension or Comp)
Force at -4.50" in Down Travel	5,038 lb	(Tension or Comp)
Force at -9.00" in Down Travel	5,164 lb	(Tension or Comp)

Panhard Bar – Axle Transverse Displacement with Travel		
Displ. at 7.00" in Up Travel	-24.00"	(Shift to Left)
Displ. at 3.50" in Up Travel	-24.00"	(Shift to Left)
Displ. at Static Ride Height	0.00"	
Displ. at -4.50" in Down Travel	-24.00"	(Shift to Left)
Disp. at -9.00" in Down Travel	-24.00"	(Shift to Left)

Front Roll Center Height	z
At 7.00" in Up Travel	26.36"
At 3.50" in Up Travel	24.74"
Static Ride Height	22.73"
At -4.50" in Down Travel	21.23"
At -9.00" in Down Travel	18.98"

Side View Instant Center	x	z
At 7.00" in Up Travel	64.00"	20.00"
At 3.50" in Up Travel	64.00"	20.00"
At Static Ride Height	0.75"	28.79"
At -4.50" in Down Travel	64.00"	20.00"
At -9.00" in Down Travel	64.00"	20.00"

Front Roll Axis Inclination		
At 7.00" inches Up Travel	9.22°	(Roll Oversteer)
At 3.50" in Up Travel	3.85°	(Roll Oversteer)
At Static Ride Height	1.97°	(Roll Oversteer)
At -4.50" in Down Travel	-8.59°	(Roll Understeer)
At -9.00" inches Down Travel	-15.87°	(Roll Understeer)

Front Anti-Dive (Braking)	
At 7.00" in Up Travel	123.4%
At 3.50" in Up Travel	123.4%
At Static Ride Height	68.8%
At -4.50" in Down Travel	123.4%
At -9.00" in Down Travel	123.4%

Front Anti-Lift (Accel)	
At 7.00" in Up Travel	94.1%
At 3.50" in Up Travel	94.1%
At Static Ride Height	52.5%
At -4.50" in Down Travel	94.1%
At -9.00" in Down Travel	94.1%

Front Pinion Angle Change	
At 7.00" inches Up Travel	26.02°
At 3.50" in Up Travel	20.65°
At -4.50" in Down Travel	8.21°
At -9.00" inches Down Travel	0.93°