# Suspensionology

In this section we are attempting to bring you answers for the most frequently asked questions. Much of what you read will be our opinion, however it is an opinion based on years of listening to our customers and our own hands on real world experience. At WH you are in the drivers seat. If you want to discuss any of this in more depth, pick up the phone or send us an e-mail. That's what we're here for.

## WILD HORSES approach to ride quality

A balanced or unbalanced combination of the following items will directly effect the ride quality of your Bronco. The ride quality is subject to the drivers personal preferences which vary from one to the next. WH uses a balanced approach to suspension design to provide a ride quality compatible with most drivers. When we began driving Broncos all the lifted suspensions available at the time were stiff as a board. Now we have seen that pendulum swing completely in the other direction and produce some vehicles we would consider trailer only, not suitable for street use. WH has endeavored to maintain suspension systems and component designs compatible with street use that maintain a great overall ride quality. Let's look at the things which most effect the ride quality.

**1. Springs:** Stiff or soft there is no way to over look spring design when it comes to ride quality. Springs which are to stiff produce a harsh jolting ride. If they are to soft you get a bouncy unstable wave effect. WH uses springs which lean in the soft direction because you can control the bounce and wave effect with proper shocks. Springs which are to stiff override any dampening from the shock, except on bigger bumps in the road.

**2. Shocks:** It's the job of the shocks to control the springs. Just take the shocks off the front of your Bronco and push up and down on the front bumper. With the help of a friend and some reasonably soft front springs you could just about make the thing hop around like a low rider with hydraulics. Put the shocks back on and see how they control the bounce. That control is what you want your shocks to do.

**3. Tire size and air pressure:** Perhaps you have one of those camping air mattresses. If you blow the thing up to its full capacity things will bounce right off of it, but let half the air out and it will absorb the impact of an object and cushion it. Now imagine you're riding on a cushion of air, on second thought don't imagine it you are riding on a cushion of air every time you drive. It could be a big cushion (big tire) or a small cushion (small tire) and the cushion could have a lot of air or less just like the air mattress. The effect of tire size and air pressure can not be over looked in the discussion of ride quality. We are shocked to be wheeling with people who don't let any air out of their tires. We watch them get beat up clawing and crawling and bouncing. I can only remember that it took some convincing the first time we tried it but since then we have ridden in much more comfort. We are in no way suggesting you travel down the highway with ten lbs. of air pressure in your tires but as far as off road goes, "try it you'll like it". Not to mention the radical increase in traction from the bigger foot (tire) print.

**4. Seats:** We can attest to the fact that a set of good quality suspension seats will lesson the likelihood of a back ache after a road or wheeling trip. There's a reason the Baja racers use this stuff. Having suspension seats to help soak up some of the bumps has increased our comfort level during and after our trips.

## Travel, Travel and More Travel

Now that we have your attention, let's talk about suspension travel. First, for those of you new four-wheelers, travel, in simple terms, is the amount of movement your suspension allows your front and rearend to move up and down. Articulated travel is measured with one tire stuffed in the wheel well and the other dropped out from under the wheel well on the other side.

We have noticed over the last few years the proliferation of heimed, wristed, twisting, swiveling, rocking, well you name it, some one has welded it or modified it on their Bronco to provide more travel. While there are many great ideas out there, we have also seen some of these Broncos become completely un-streetable. You can make the suspension too loose and the springs too soft and this creates instability not only on the street but on the trail. If all you do is trailer your Bronco to and from the trail that may be fine if that's the ride you like. One of our goals with WH suspensions is to provide what we call controlled travel or stable travel. Our rigs fly down the highway at 70 mph do the trails and drive back home. So there you have another pitch for our suspensions, now on with travel school.

We want to bring your attention to the things that hinder travel on early Broncos. We'll start with the rearend. First, the emergency brake cables become too short on lifted Broncos, especially the driver's side cable. The easiest way to tell if this is a problem on your Bronco is to jack up the rear of the Bronco (at the frame to unload the suspension) while keeping an eye on the E-brake cable. You may notice that as you raise the Bronco, the cable becomes stretched. If this happens, your E-brake cable becomes a limiting strap. What does it limit? Travel! Next, you must consider the brake line which is installed between the frame and the rearend housing. If this stretches too far, you've got a serious problem on your hands. Now, let's look at the rear shock mounting position. We admit that we have run the trails with the standard dual shock setup without many problems, however, relocating your rear shock mounts to a long travel setup will allow you to install longer shocks which will ultimately provide more travel. If you want every inch of travel and all the performance available from your springs, this is the way to go.

The front end has similar considerations with the brake line. The factory shock mount does not allow for a long enough shock. Customers have called wondering why their front shocks fail. What happens on the Bronco front end is the shocks bottom out before the frame hits the bump stops on the front end, and this destroys the shocks. The least you should do to save your shocks on the front is to put on taller bump stops. A better way to go is to install a long travel system. These systems allow for mounting longer shocks which gives you more travel. Off-road travel is the name of the game, and if you need it we'll be glad to help.

Spring design is of great importance for good travel. The longest shocks you can get won't do a bit of good with stiff springs. We use springs specifically designed for the early Bronco and our long travel suspensions.

## Caster Angle

The caster angle is defined as the number of degrees backward (positive) or forward (negative) of the tilt of the king pins (Dana 30) or ball joints (Dana 44) in relation to a vertical line through the center of the front end.

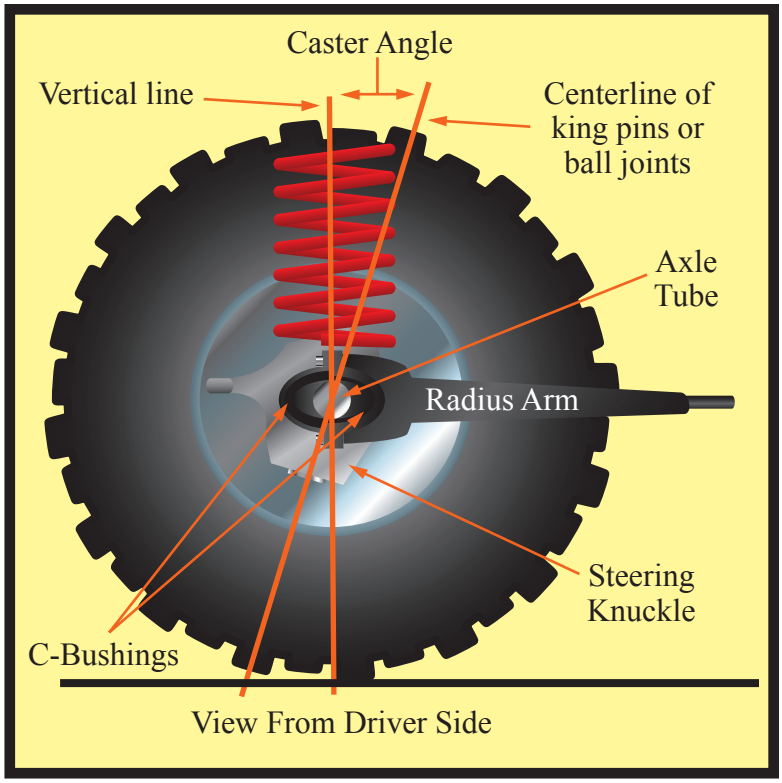
## Caster correction on lifts over 3.5"

These are our observations from years of building early Broncos. We know there are always exceptions to the rules, but we have noticed about 90% of Broncos with wandering problems are the result of incorrect caster. The specification for Bronco caster is +4 to +9 . When the Bronco is lifted the caster will move in the negative direction. Properly installed degreed C-bushings will move the caster back in the positive direction. Because of the caster issue about 50% of Broncos going to a 4.5" lift and most Broncos going to a 5.5" lift will need more caster correction than the standard 7 degree C-bushing. The additional correction can be addressed in a number of ways. These three are the most common.

**1. Radius arm drop brackets:** Only drawback with this method is the unavoidable loss of ground clearance.

**2. Long radius arms:** This is the most common method of correcting caster on taller lifts. Advantages include maintaining ground clearance, additional articulation off-road and improved handling.

**3. Bending the stock radius arms:** We know this is old school, but long before degreed C-bushings people were lifting Broncos and bending the stock arms to achieve good caster.




## Tire size guide

The following is our **recommended** tire and suspension size. We've included pictures in the suspension section to help you decide what look you're after.

**Up to 31 x 8" tire-stock suspension**
**Up to 32" tire-stock suspension + rear flares**
**30-32" tire-2.5" suspension + rear flares**
**31-33" tire-3.5" suspension + rear flares**
**33-36" tire-3.5" suspension + body lift + rear flares**
**33-36" tire-4.5"-5.5" suspension + front and rear flares**

Keep in mind actual tire heights will vary because of different wheel widths, different brands, etc.. We have found that it may be necessary to trim the very front edge on the under side of the front fenders (this will not be visible from the side of the Bronco) for clearance even if you follow the conditions above. These recommendations are by no means "the law". You need to consider the use you intend for the Bronco. For example, if you want it to just look big and bad use a 5.5" suspension, 3" body lift and fender flares front and back. Add some 40" tires and away you go. Take the same Bronco with a good articulating suspension and go rock crawling and you just tore up a set of 40" tires on the Bronco's own inner sheet metal. For tire sizes above 36" and while running a long travel suspension, remember you only have a 33" rear inner wheel well openings and the front inner fender wells may rub the tires as well. Test, cut and modify as necessary. Bump stops and limiting straps can be used to control wheel travel and prevent tire damage if necessary.

## More Suspension Tech

1. Driveshaft angles and length are effected by all suspension lifts. You may need new driveshafts or you may not. Variables such as existing suspension and drivetrain will need to be factored in when making a decision whether or not to purchase driveshafts at the same time as your suspension system. See driveshaft section for additional information.

2. Tires have a big effect on the looks, ride quality and overall outcome of your suspension lift. As you can see from the photos in our suspension section, people use a wide variety of systems and tire sizes. If you are trying to "do it right the first time", we will only add that it has been our observation that people tend to wish they had gone bigger. On the Nightmare we have done it right the first time at least 4 or 5 times now. The 33s, 35s, 36s, 37s and 39s. We found we over did it at the 39" stage but it looks cool. We could limit the travel, but instead, when we take the Mare wheeling the 37s go back on.

**Lucy Allen's 1970 at SOB 4**

**3.5" suspension with 32s**