The question has been posed.....

"I'm replacing my upper a-arm bushings ('70 Chevelle). When reassembling, should I go back with the original shafts (has the type with the large nut securing the bushings) or should I use a new set of offset shafts? For what it's worth, there were no shims under two of the bolts, one shim under one bolt, and two shims under the other bolt."

To answer this question you need to know what the shims do. They are used to adjust both caster and camber. Ok, what is caster and camber?

## **CASTER**

Caster is the angle to which the steering pivot axis (a line drawn through the upper and lower ball joints) is tilted forward or rearward from vertical, <u>as viewed from the side</u>.

If the pivot axis is tilted backward (that is, the top pivot is positioned farther rearward than the bottom pivot), then the caster is positive; if it's tilted forward, then the caster is negative.

This is adjusted by either adding shims to the front or rear mounting point of the upper control arm pivot shaft. If you remove shims from the front and add shims to the rear you tilt the pivot axis to the rear or you add positive caster.

## **CAMBER**

Camber is the angle of the wheel relative to vertical (a line that passes through the center of the spindle), as viewed from the front or the rear of the car.

If the wheel leans in towards the chassis, it has negative camber; if it leans away from the car, it has positive camber.

So by adding or removing an equal number of shims on both the front and rear mounting points of the upper control arm pivot shaft you can adjust camber. By adding shims you are adding more negative camber. By taking away shims you are adding positive camber.

## <u>S0</u>

If you have no shims you can see that you cannot adjust the frontend alignment unless you do something so that you can play with the caster and camber angles. You can go to a frame shop and have the frame twisted so that you can add shims (twist the frame horn towards the outside of the chassis or use an offset shaft in the upper control arm to give you back some adjustment. Both do the same thing.

I hope this helps.