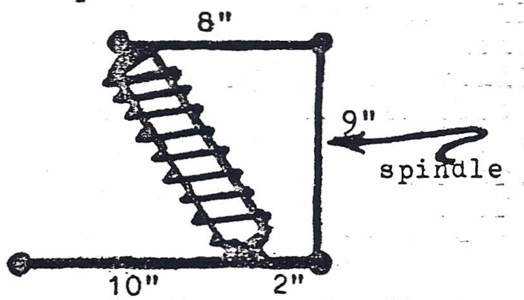
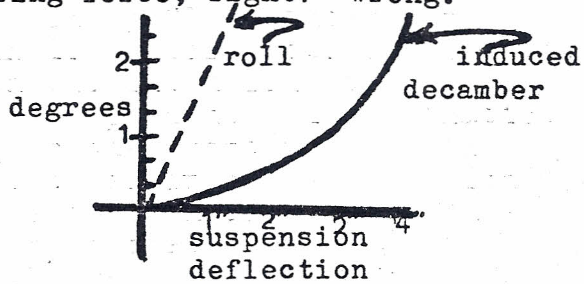
"AS YE PLOW, SO SHALL YE REAP"

Slalomers, stop your plowing and start reaping that brass. It's time to get those front wheels back to the vertical and corner like a Lotus should. Let's take a closer look at the problem of plowing.

In a turn, body roll is present in varying degrees on any car. As the body rolls, the outside front tires tuck under or increase their camber. Camber is defined as the angle in degrees that the wheel is inclined out at the top. As the body roll and camber increase, the front tire begins to roll on it's sidewall, loses adhesion, and makes the car plow straight ahead.

Colin's solution to keeping the front tire upright in turns is to use unequal length suspension arms to decamber the outside wheel in turns and thus keep the tire tread squarely on the ground. Each degree of body roll induces one degree of negative camber and keeps the wheel vertical under any cornering force, right? Wrong!





In this simple diagram of the Lotus Seven suspension we can see the general layout of the parallel, unequal length arms. One inch of suspension deflection produces in a turn $2^\circ 18'$ body roll but only $0^\circ 08'$ of negative camber. This gives a grand total of $2^\circ 10'$ additional positive camber or tuck-under. The graph shows that induced decamber increases geometrically with suspension deflection, but never quite catches up with body roll.

Cornering at the limits of adhesion gives 1-2" suspension deflection, 3-4° body roll, and $\frac{1}{2}^\circ$ induced decamber. To get our tire back to the vertical and back on its tread, we need to "find" 3° of negative camber somewhere. There are two solutions:

1. Redesign the entire front end with unequal length unparallel arms as Colin has on his formula cars, or
2. Set in 3° initial or static camber.

The second solution seems simple enough, but Colin didn't see fit to include a camber adjustment device on his passenger cars. Reluctance to using a torch haphazardly on the front suspension led to the design of decamber brackets for the Seven. See p. 2.

By refering to the suspension diagram it can be seen that each inch added to the lower suspension arm will give 6° negative camber and, by virtue of the spring placement, a 10% reduction in effective spring rate. The illustrated brackets lengthen the arm ½", give 3° negative camber, and raise the front end ½" for a little extra ground clearance. They can be installed or removed in an hour.

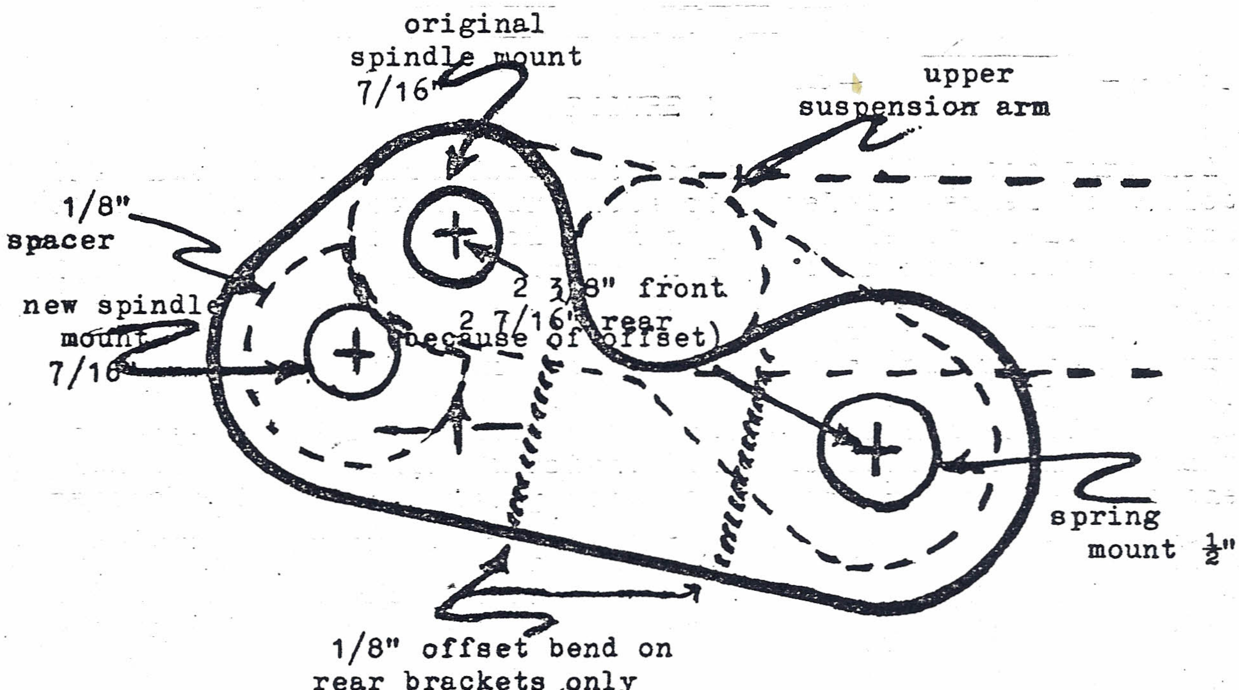
Now that the Lotus is decambered it has that awkward, pigeon-toed look and some strange tire wear patterns. This is because decambering gives about 3" of toe-in which must be adjusted out. And that's not all. A wheel tends to turn in the direction in which it is cambered. It is toe-in which corrects for the turning tendency. Cars with positive camber need positive toe-in. Cars with negative camber need zero toe-in or even toe-out. At any rate the factory toe-in specifications will be strictly non-applicable. A local garage with a "feet per mile" toe-in machine should be able to ascertain the proper toe-in setting for each individual car.

All the numbers so far have been approximations which would be influenced by other suspension factors. Koni's, for example, would reduce the amount of body roll and the need for decambering. Racing tires, on the other hand, cause more body roll by their greater bite and would make the car require more initial decamber. Three degrees is a good start on the Seven though, so go to it, good luck, and good slaloming.

Jim Gallagher

MATERIALS:

2-$\frac{1}{2}$x2 3/4 NF Hex bolts
2-$\frac{1}{2}$ NF self locking Hex nuts
4-7/16 NF Hex bolts
4-7/16 NF self Locking Hex nuts
4-1$\frac{1}{4}$x1/8 steel or plastic washers with 7/16 hole cut to clear old bracket
1 pc 1/8x4x8 mild steel



ACTUAL SIZE