

INDEPENDENT FRONT SUSPENSION.

Independent suspension can be very simple and very complicated at the same time. Success in making it simple is learning the rules. **And it has it's own set of rules.** Important, **Rule#1.** Unlearn everything (almost) you know about steering and suspending a car with a solid axle and 4-link suspension. That would be like trying to play football using baseball rules.

The first thing to relearn is the action of the front axle and spindle during suspension travel. There are three things to control in the front wheel: camber, caster and toe angle.

CAMBER AND CASTER

In a solid axle the camber is built into the axle and the caster built into the 4-Link design. Both are constant (they don't change during suspension travel). A solid axle moves basically straight up and down therefore, so does the spindle.

On an IFS System, the upper and lower control arms, as well as the spindle and car chassis, form an uneven parallelogram, as viewed from the front (see fig. 1 & 2). The spindle moves up and down in an arc-or radius-which is determined by the length and placement of the two control arms. Their placement also determines the amount of caster and camber change.

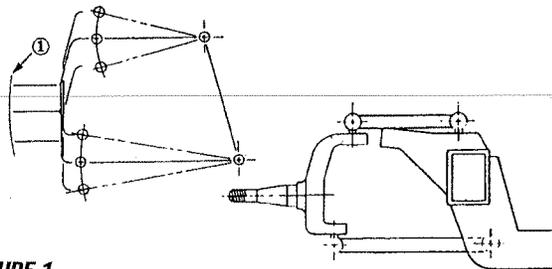


FIGURE 1
This is a correct Mustang II front suspension in a street rod, when the stock Mustang II suspension locations are used. Notice the parallel upper and lower arms. Also notice there is minimal camber change and almost flat radius (1) in the movement of the spindle during suspension travel.

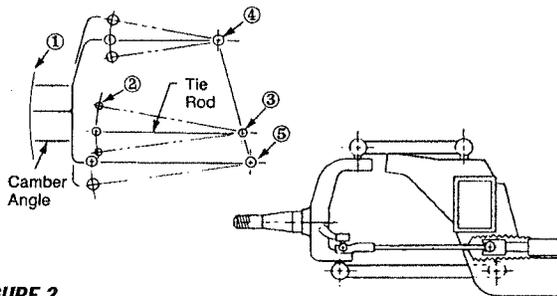


FIGURE 2
Now we have added the stock Mustang II steering rack in the stock Mustang II location using the stock Mustang II tie rod ends. Notice the radius of the rod ends (2) matches the radius of the spindle. Also, more importantly, see that the inner tie rod pivot (3) is IN LINE with the inner pivots (4) & (5) of the upper and lower arms. This is absolutely necessary. Ford Motor Co. did their homework.

Important **Rule #2.** If any of the four pivot points are moved in any direction, for any reasons, the spindle swings in a new, unique arc which is different from the old radius. Usually at the inner pivot of the upper arm on the Mustang suspension is the one to be moved. The control arm is usually shortened and the pivot shaft lowered to clear fenders on some cars (see Fig. #3). As you can see, the spindle will now swing in a new tighter radius. That in itself is not a problem. But, Please read on, as it is about to get real interesting.

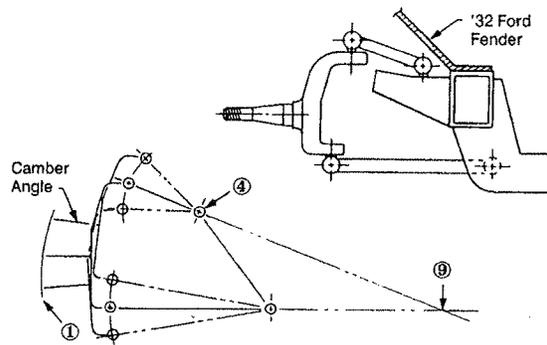


FIGURE 3
This is a typical "modified" Mustang II installation in a '32 Ford type car. The first change is to shorten and drop the upper arm pivot (4) to clear the fender. This causes the much sharper radius (1) of the spindle and resulting increased camber change. Also notice that the two arms now intersect at a theoretical point (9). But this alone is not the bad part. The next step will show you why.

TOE ANGLE

The paragraphs that follow explain why **HEIDTS HOT ROD & MUSCLE CAR PARTS** does not make Mustang Kits for certain cars.

As we mentioned, there are three things to control in the front wheel. Camber and caster we've already covered. The third is the toe, or steering angle at which the wheel is pointed, which determines where your car goes.

You can see that this means the spindle must always remain in the direction you have pointed no matter where the spindle is in the suspension travel. This is the job of the "Tie Rod". As you can see, the exact length and location of the inner pivot of the tie rod must be very carefully selected so the outer ends of the rod, which are attached to the spindles, swing in a radius which matches the spindle radius exactly. When designing a brand new suspension system on the drawing board this determination is very easy to make, since the tie rods on the rack are actually designed to match the control arm and spindle radius. But on your conversion, this is where the problems start. So this is the next thing to unlearn.

When mounting a steering box in a solid axle installation, motor mounts, etc. usually dictate the location of the box and the pitman arm is modified to align the drag link with the tie rod. Selecting and installing a rack-and-pinion is nowhere near that simple or forgiving. **When adapting an existing suspension design, such as the Mustang design, it is very important to keep every single mounting location and pivot point, including the rack, in their original designed places.** As you have just seen, the Mustang rack, with a specific tie rod length, was designed by Ford to match the swing radius of the Mustang spindle using stock length Mustang control arms **in the locations which were selected when the Mustang was originally designed.**