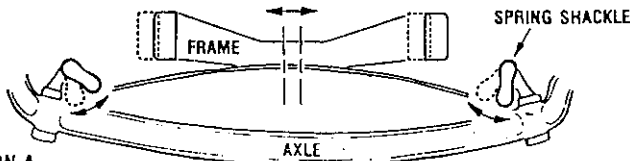
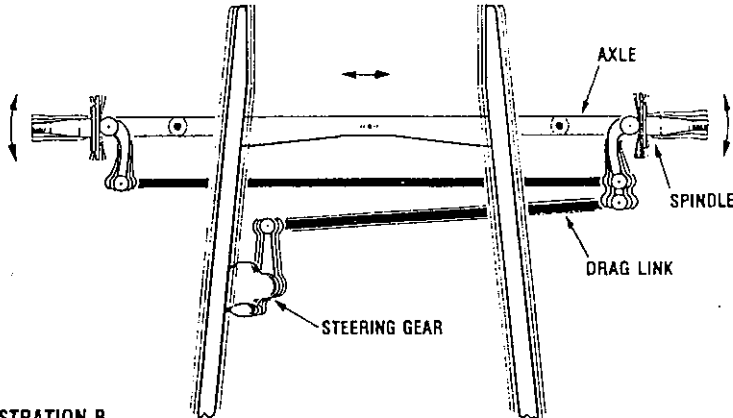


# Facts about cross steering



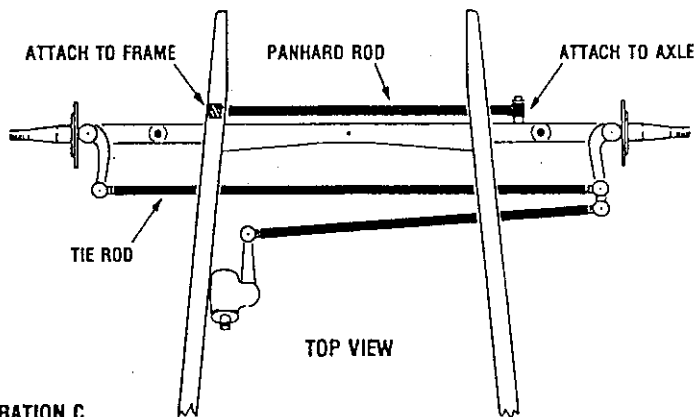
**ILLUSTRATION A**

A frame mounted with a transverse spring moves freely side to side on the shackles. This lateral movement not only occurs from bumps and cornering but is a continuous action resulting from any suspension movement. There are cases where lateral movement is restricted by stiff working shackles, or shackles that don't swing at all because the spring main leaf is too short.



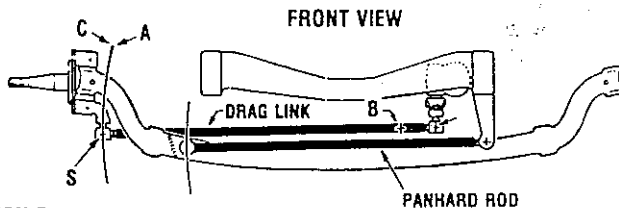
**ILLUSTRATION B**

Lateral frame movement results in drag link movement relative to the axle. This causes the spindles to turn changing the direction of the car even though the steering wheel was not turned. Oversteer is also a major problem which becomes most obvious during hard, fast cornering. Take a left turn for example: The steering wheel is turned to the left an amount adequate to make the turn. The drag link moves to the right which turns the spindles a corresponding amount to the left. As the car responds going into the turn, the centrifugal force causes the weight of the car to shift to the right moving the frame to the right on the shackles. The steering gear and drag link being relative to the frame also move to the right. This additional drag link movement then causes the spindles to turn more than desired, which depending on the car's speed, can easily cause the car to spin-out.



**ILLUSTRATION C**

A Panhard rod is used to control lateral movement between the frame and axle. It can be mounted either in front of, or behind the axle. If mounting it behind the axle be sure it does not interfere with the tie rod as the tie rod moves close to the axle when the spindles are turned to extreme right or left.



**ILLUSTRATION D**

Lateral control of the axle must be relative to the drag link for correct steering geometry during vertical suspension movement. Because the Panhard rod pivots at both ends, like the radius rods of a 4-Bar set-up, correct geometry is based on the parallelogram in that the drag link and Panhard rod should be parallel and as close to the same length as possible. As part of the axle/spindle assembly the steering ball on the spindle arm (point S) travels an arc (A) equal to the length of the Panhard rod, centered at a point (B) parallel to the Panhard rod. Point S also travels an arc (C) centered at the other end of the drag link (point D). If the drag link and Panhard rod are parallel the arcs will be very close within the limited amount of vertical travel and steering will not be affected. If they are not parallel the arcs will not be as close and the resulting bumpsteer will depend on the degree of angle difference between the two.

Cross steering is not a recent innovation, in fact Ford cars used cross steering from '09 thru '27 (Model T) and again from '35 thru '48. It has only been in the past few years, however, that this style of steering has become a widely accepted alternative to the traditional hot rod type steering used on '28 thru '34 Fords. The recent surge of cross steering installations is due mainly to compact size, strength, and adaptability of the unique steering box found in the '71-'77 Chevy Vega. Cross steering is also favored when building a fenderless hot rod as the pitman arm and drag link are neatly hidden underneath the front of the car.

In case you're not familiar with cross steering, the steering box mounts far forward on the inside of the left frame rail. The drag link runs laterally across the chassis where it connects to the steering arm of the right spindle. The pitman arm pivots side to side moving the drag link left and right laterally to steer the car.

Another advantage of cross steering is that steering geometry is not affected by the type of radius rods used to hold the axle. As we learned by the illustrations on the opposite page, the use of a 4-Bar or a wishbone with a particular steering set-up can mean the difference between a good or bad handling car. Not so with cross steering. Front end movement as controlled by the radius rods which locate the axle front-to-rear is not relative to the steering movement because the drag link is mounted laterally (side to side). This fact, however, leads many people to believe that ill-handling characteristics such as bumpsteer and oversteer do not exist with a cross steering set-up... on the contrary!

The steering or directional change of the car is controlled by lateral (side to side) movement of the drag link. In other words, when the steering wheel is turned, the drag link will move laterally in relation to the axle/spindle assembly causing the spindles to turn and the car to change direction. But what if for some reason the drag link moved in relation to the axle assembly without the steering wheel being turned? The spindles would still turn and the car would change direction. If you're wondering how this strange movement could possibly happen remember that a frame mounted on an early Ford style transverse spring is free to move side to side on the shackles (see illustration A). This lateral movement of the frame in relation to the axle also means movement in relation to the steering gear and the attached drag link (illustration B) resulting in unwanted, unpredictable steering movement.

The answer is to eliminate or control the lateral movement between the frame and the axle. This is done by installing a Panhard rod, or sway bar, which is a lateral link connecting frame and axle. But since this link controls movement relative to the steering drag link, the mounting position and angle are important to correct steering geometry. Since geometry functions are difficult to describe, we suggest that you follow the design principles laid out in illustration D. Pete & Jake's also has a Panhard rod kit available ( #1016 ) to make installation easier.

