

# SUPER STREET ROD STEERING

It's a dubious distinction, and more than a little ironic, that a pair of lackluster cars from the '70s ultimately donated two of the most popular components used in the street-rodding hobby today. The Pinto/Mustang II and the Chevrolet Vega may not have been shining examples of American automotive design, but street rodders have certainly embraced them, at least in part.

Although the Pinto/Mustang II series of automobiles was not the best of Ford's better ideas, it did have one redeeming quality from our perspective: The compact FoMoCo frontends were a natural for swapping into early cars. They were a quick, affordable, and effective means of equipping a street rod with an independent front suspension. Of course, with the advent of kits to simplify installa-

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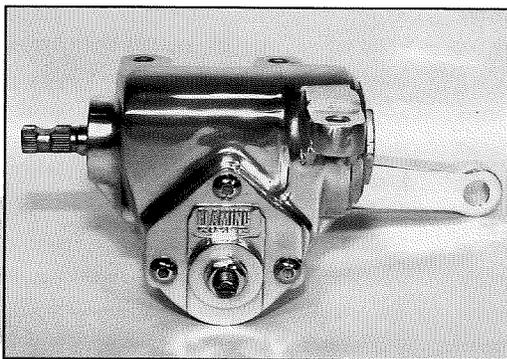
tion, they became even more popular, and today seem to be almost standard equipment on fat-fendered rods. Coincidentally, as popular as Pinto/Mustang II front end swaps have become for those wanting IFS under their rides, the Vega steering gear is the clear choice for those opting for the traditional look of a solid axle.

## So Why a Vega?

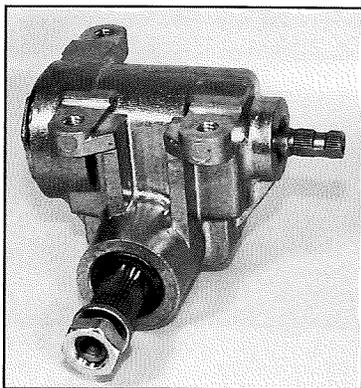
Solid-axle cars use one of two types of steering: a side-delivery gearbox with the drag link running parallel to the frame and attaching to the left spindle, or cross steering with the drag link running left to right and attaching to the right spin-

dle. Both work well if properly designed, but cross steering has become the most popular configuration for a variety of reasons. With cross steering, it's generally easier to avoid bumpsteer, the car will often make a sharper turn (at least to the left) because there is no tire/drag link interference, and finally, it just looks cleaner.

Many early cars ('35-48 Fords as an example) came equipped with cross steering. And at one time, it wasn't unusual to see the stock boxes retained when a car was rodded, or used to retrofit a vehicle with side-delivery steering. But the big drawback to the early steering boxes is the basic design. Most manufacturers used what is called worm and sector steering, an unsophisticated configuration in which friction is high and wear rapid. In the worm and sector steering box, the worm gear is on the end of the steering wheel shaft, and the sector is hooked to the Pitman arm. When the steering wheel is turned, the worm gear threads itself through the sector (a gear shaped like a slice of pie), the sector turns, and the Pitman arm moves the wheels—simple, but effective.



Flaming River's steering gear is a new and improved version of the Vega type. Available in an "as cast" finish or fully polished, the aluminum case is stronger than OEM cast iron.



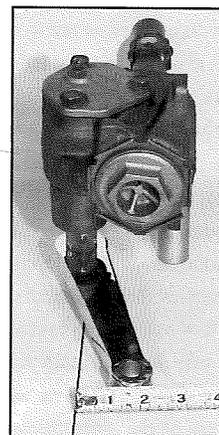
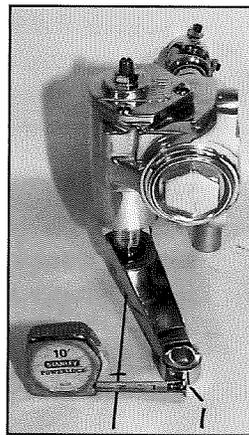
The aluminum casting is designed in a way that's significantly different from Flaming River's OEM style. In this new box, webbed crossbars strengthen the area around the lower mounting holes, and the thickness around the sector shaft has been increased for added strength.

One turn of the steering shaft causes the quick-ratio box's Pitman arm to move approximately 2 1/4 inches which is 36 degrees of tire movement.



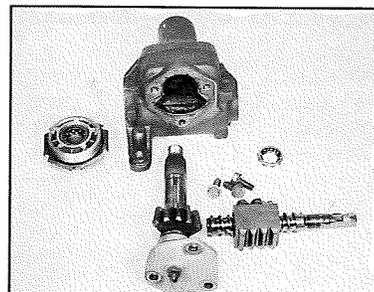
Steering boxes are available in two ratios: the original 20:1 and a quicker 16:1. To visualize the difference, here, a quick-ratio box is in the straight-ahead position.

## Avoiding a Bum Steer with the All-New Alloy Box from Flaming River

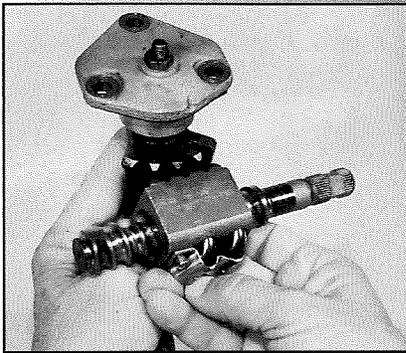


While one turn of the steering shaft caused the Pitman arm of a standard-ratio box to move approximately 1 1/2 inches which is 18 degrees of tire movement.

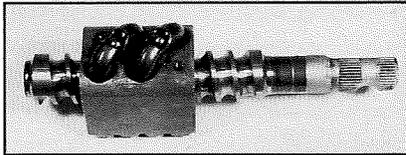
These are the internals of a Vega steering gear. In the stock box, the sector shaft rides in a bushing. Flaming River's aluminum box uses a needle bearing to reduce friction and wear.



## STEERING



Shown here are the worm, nut, and sector from an original Vega box. In the Flaming River aluminum box, the internal parts and ball bearings are larger, for less steering effort and longer life.



With the guide tubes removed, the recirculating balls are visible. The huge amount of surface area the balls provide keeps wear and friction to a minimum.

A refinement of worm and sector steering is worm and roller. Only slightly more complicated to build, in this style of steering, the gear on the sector shaft is replaced with a small wheel, or a roller. Both friction and wear are reduced dramatically. A variety of cars and trucks used worm and roller steering, and the early Ford F-100 pickup was among them. The improved design was a natural to slip in place of the '28-34 Ford worm and sector-style gear, and at one time was a popular swap.

Another steering box variant is the recirculating-ball version. Designed by Saginaw and first introduced in '40 Cadillacs, it uses ball bearings to reduce friction between the major moving parts. Visualize a screw and a nut with threads coarse enough for ball bearings to fit between the threads, and you've got a rough idea of how recirculating-ball steering works. The nut has teeth on it that mesh with the sector gear, and as the steering wheel is turned, the nut moves up or down on the worm, turning the sector shaft and—of course—the Pitman arm. The

beauty of recirculating-ball steering is that not only do the ball bearings reduce friction making steering much easier, but the huge surface area afforded by them means wear is drastically reduced (compared to any other design).

While recirculating-ball steering has been in use for some time, most units were too large physically to be considered for use in a street rod. The early Mustang found some favor, as did the Saginaw boxes from Chevilles and other midsize GM cars, but the most popular steering box turned out to be from the ill-conceived Corvair replacement, the Vega. It was just what many rodders were after: a contemporary recirculating-ball steering that was compact. Its small size made it ideal for street rods, and it has become the standard steering gear for '28-34 Fords and other cars of similar size and weight.

### Building a Better Box

Not long ago, finding a Vega steering box was simply a matter of touring the local wrecking yards. But those little Chevrolets, disco, and just about everything else

from the '70s have faded from the scene; consequently, those nifty steering boxes are getting harder and harder to find. But necessity is a mother, and just as often, an opportunity. The scarcity of serviceable Vega boxes was the incentive for Flaming River to tool up and produce a new and improved aluminum version to fill the void. Similar in design to the original, Flaming River's version has significant improvements in a variety of areas, and one of the most notable is in the steering ratio.

Although the physical size of the Vega steering gear was ideal for most street rod installations, from a driver's standpoint we've always considered the steering ratio to be a tad slow. Steering ratio is the relationship between the steering wheel movement and the front tires turning. As an example, if one revolution of the steering wheel causes the tires to turn 36 degrees, divide 360 (the steering wheel's travel) by 36 (the tires' movement)  $360 \div 36 = 10$  to 1 ratio. Vega boxes have a ratio of 20:1, by comparison '32-35 Fords had a ratio of 15:1 (in '36 Ford

increased the ratio to 17:1 to lower steering effort), so the Vega is indeed on the slow side.

While many rodders are perfectly happy with the standard-ratio steering gear, others have searched for an alternative that is slightly faster. Trouble was, there wasn't one. After evaluating the situation, Flaming River agreed that there was a need for a quicker box, and responded by offering two ratios in its new aluminum box: the standard 20:1 and a faster 16:1. Now, rodders have a choice, and that leads to the inevitable question of which one is best. The answer is a definite "it depends." From our experience, the 16:1 ratio is ideal for those looking for more responsive steering with increased road feel, particularly in something like a highboy roadster. For those who like the light, power steering feel or are building a heavier car, the 20:1 is the best choice.

Although the availability of an optional gear ratio is welcomed, there are a number of other noteworthy changes that were made to improve upon the original Vega design. The sector shaft now rides in needle bearings instead of a bushing. In addition, the sizes of the sector shaft and gear, as well as the worm and nut, have been increased by 30 percent. Improved seals are featured, and the cap is fitted with a bronze bushing to stabilize the sector. All these modifications enhance operation and improve longevity.

In street rodding, it goes without saying that function is important, particularly when it comes to something as critical as steering. But form is also crucial, and in that area, this new aluminum steering gear is certainly an improvement over the original cast-iron box. It will add some pizzazz to the chassis of any car, especially when fully polished.

Flaming River's aluminum steering has a lot going for it: improved internals, a choice of ratios, and that all-important custom look. Best of all, it's all brand-new and built to exacting contemporary standards, and that's no bum steer.

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