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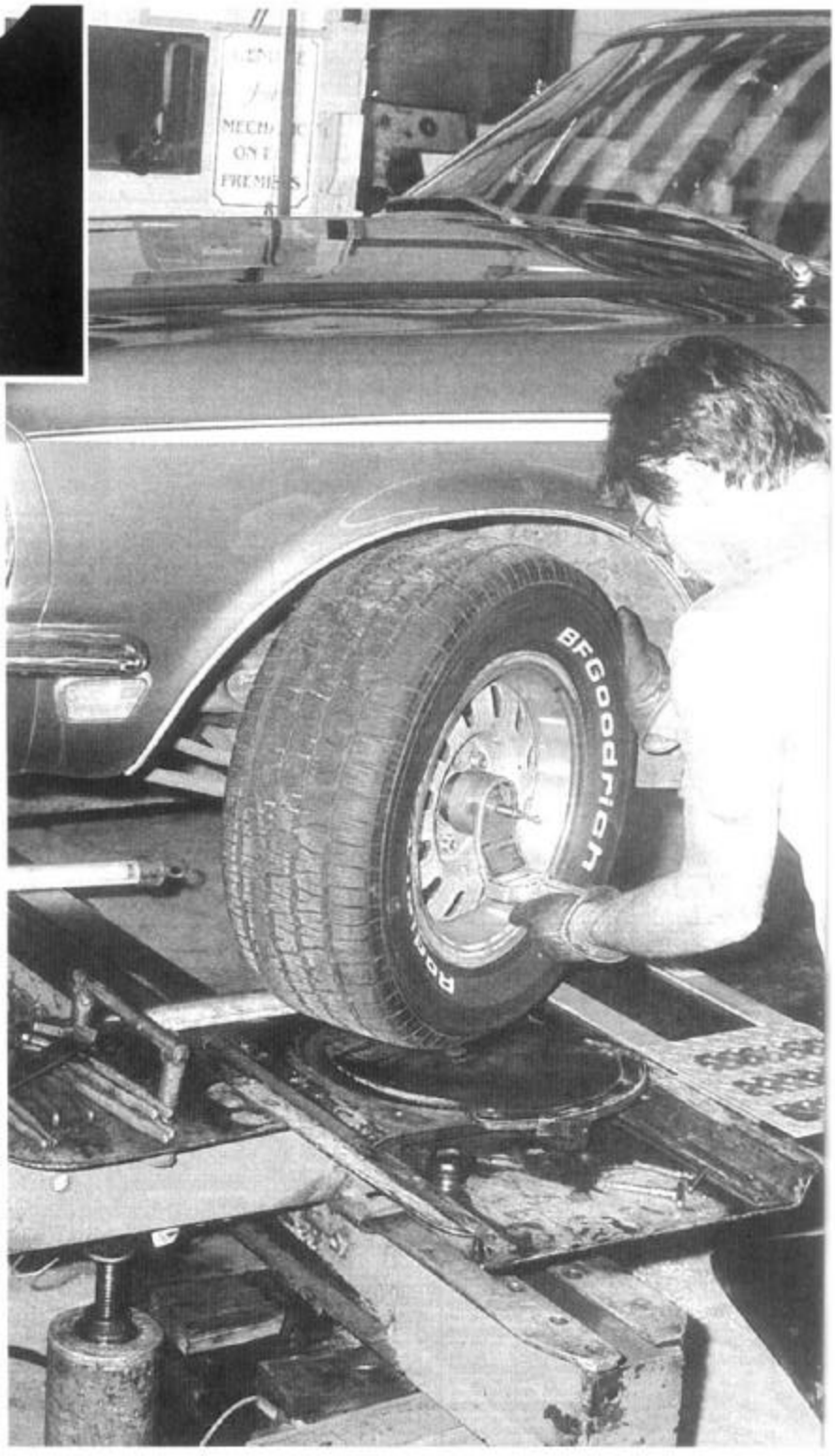
ALIGNM 101

WHAT YOU NEED TO KNOW (AND MAYBE WHAT YOUR SHOP NEEDS TO KNOW) ABOUT VINTAGE MUSTANG AND FORD FRONT-END ALIGNMENT

TEXT AND PHOTOGRAPHY BY JIM SMART



FRONT-END ALIGNMENT IS ONE of the most baffling dynamics of a classic Mustang, ranking somewhere behind air conditioning and automatic transmissions. Like cold air and automatics, front-end alignment is a mystery for most of us because we really don't understand what's going on under there. With blind faith and abundant prayer, we hand over our keys to the service technician who pulls our Mustang onto the alignment rack. We leave 30 minutes later wondering what was performed while we were sipping on that bad cup of coffee and watching Jerry Springer in the waiting room.

That is, if your alignment shop can even handle a vintage Mustang alignment job. It's all too common these days to find young alignment technicians who have been trained only for today's newer cars, so they are unfamiliar with older

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"With blind faith and abundant prayer, we hand over our keys to the service technician who pulls our Mustang onto the alignment rack."

suspensions and their alignment techniques. Also, we've run into shops that claim they don't have specs for '60s cars—or maybe that was just an excuse to cover up for the technician's lack of expertise on those cars.

A vintage Mustang front-end alignment isn't really a mystery. It is little more than the proper geometry of the front wheels and tires as they relate to the pavement. When the alignment is off, tire wear increases as can your struggle with the steering wheel. We've all been there at one time or another. The steering wheel is at 10 o'clock with the front wheels straight ahead. How many times has a lazy technician told you, "Oh, just remove and recenter the steering wheel..." because they neglected to properly set the toe? Or the frustration of that drift to the right on a straight and level roadway. The greatest insult is the extraordinary tread wear on a new set of BFGoodrich Radial T/As.

We visited with Marlon Mitchell of Marlo's Frame & Alignment in Chatsworth, California, for an education on front-end alignment for vintage Mustangs. Marlo's has been aligning front ends for several decades in Southern California, so they're very familiar with older Fords.

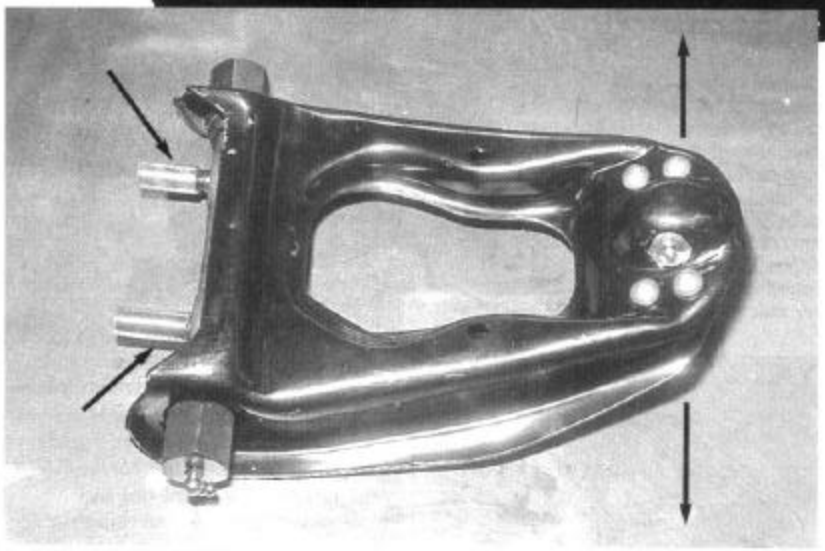
We're going to set you straight on vintage Mustang front-end alignment so you will be ready for that next visit to the alignment shop. Those of you with other Fords and Mercs can learn from this too.

CASTER

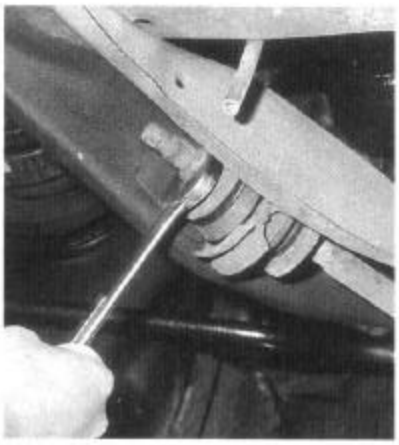
The first step in a front-end alignment is caster check and adjustment. Caster, as the name implies, is how the wheels caster in relation to each other. Because most roads have a crown at the middle for water runoff, an alignment specialist will set the caster where the right wheel is slightly ahead of the left, which makes the vehicle wander ever so slightly toward the center of the road, which keeps the vehicle on the road and off the shoulder. Where caster becomes a pain at times is when we're on the freeway where there is no crown and the vehicle tends to drift toward the middle.

Caster is adjusted two ways depending on model year. Mustangs from '65-'66, and Falcons and Comets from '60-'65 have their caster set by the number of shims used on the upper control arms. The number of shims determines the angle of the control arm in relation to the shock tower. The angle of the control arm determines spindle positioning.

For '67-'73, caster is set by adjusting the strut-rod adjustment nuts, which move the strut rod, lower control arm, and spindle fore and aft.



Caster is adjusted on '65-'66 Mustangs and '60-'65 Falcons and Comets by changing the number of shims on the upper control arm. If you have more shims on the rear bolt than you have on the front bolt, the upper ball joint is moved forward, which moves the wheel/spindle forward. If you have more shims on the front bolt, this moves the spindle aft. The strut rod is a fixed position part for '65-'66.



For '67-'73 Mustangs and Cougars, plus other Ford compacts and intermediates, caster is set by adjusting the strut-rod nuts. Pull the strut forward and you move the spindle (wheel) forward. Move the strut aft and you move the spindle aft. The upper control arms are not shimmed from '67-'73.

Caster is the first check and adjustment. Marlon Mitchell at Marlo's Frame & Alignment checks caster using a traditional caster/camber bubble gauge. Mitchell runs the wheels 20 degrees out, 20 degrees in, then back to center for the caster check. This '68 Mustang is showing 2 degrees of positive caster on the left side, which is perfect. The plate on which the tire rests shows the number of degrees the wheel moves from lock to lock. Typical movement is around 20 degrees each way.

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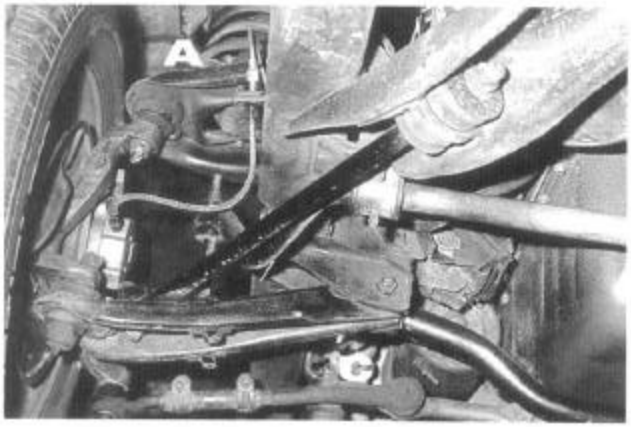


For '65-'66 Mustangs and '60-'65 Falcons and Comets, caster is adjusted at "A," the upper control arm, using shims. Camber is also adjusted at "A" using shims. The strut rod (B) is non-adjustable. Toe is set using the tie-rod ends (C).

CAMBER

Camber is the angle of the tire and wheel in relation to the pavement, adjusting it by moving either the upper or lower control arms, which controls the angle of the tire/wheel assembly. For '65-'66 Mustangs and '60-'65 Falcons and Comets, camber is adjusted with shims on the upper control arms. Add shims and you increase camber, which pushes the top of the tire out. Decrease the number of shims and you reduce camber, which brings the top of the tire inboard.

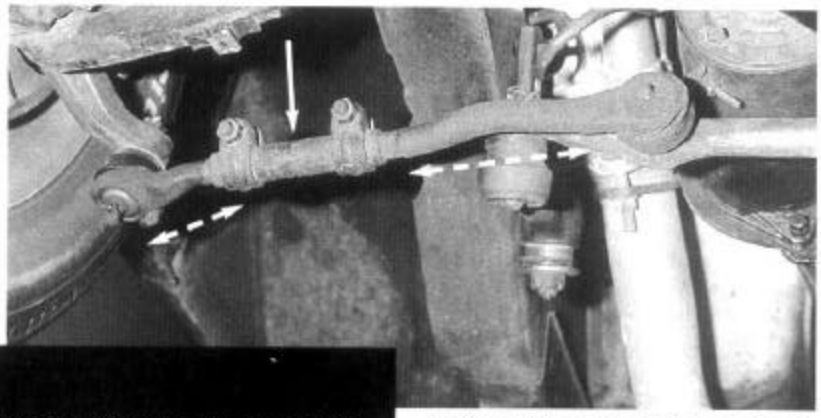
For '67-'73 Mustangs, Cougars, Falcons, Comets, and Fairlane/Torinos, camber is adjusted using an eccentric on the lower control arm. The upper control arms are in a fixed position and not adjustable.

For the street, camber should be nearly dead-on (tread at 12 and 6 o'clock), which means the tire tread is seated perfectly on the pavement when the vehicle is at rest. Canyon and road racers need a pinch of negative camber, which puts more tread in contact with the road in hard cornering.

TOE

Toe is the relationship between the tire/wheel and the steering linkage. It also affects the way the tire tracks. Adjust toe by screwing the tie-rod end sleeves and running the tie-rod ends in or out. Typical toe for a classic Mustang is a pinch of toe-out, which helps the vehicle track nice and straight. A little bit of toe-out provides stability. And yes, it will affect tire wear to a certain degree. Because toe-out is ever so slight, you'll never notice.

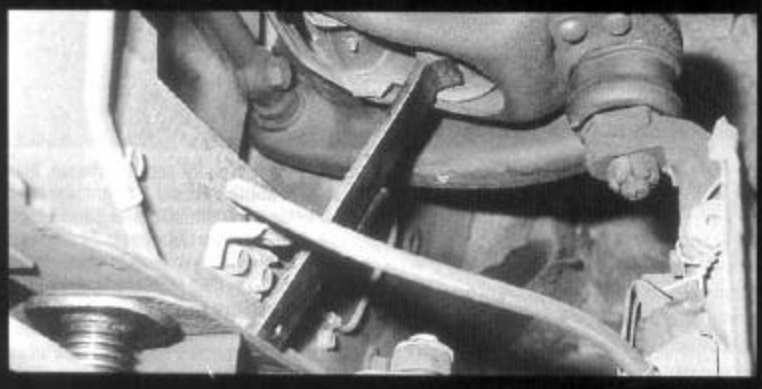
For '67-'73 Mustangs, Cougars, Falcons, Comets, Fairlanes, and Torinos, camber is adjusted by loosening the lower control arm nut and moving the eccentric, which moves the lower control arm in and out. Move the arm in for positive camber, out for negative camber. This particular eccentric is installed incorrectly. The bolt head should always be installed toward the rear of the vehicle. Why? Because the crossmember will keep the pivot bolt in place should the nut work loose. This is an important safety issue. Most take the lazy way out and turn this bolt around during control arm replacement for ease of installation.



Toe is set by turning the tie-rod sleeve (arrow), which runs the tie-rod ends in or out. Each side is independently adjusted.

Ride Height

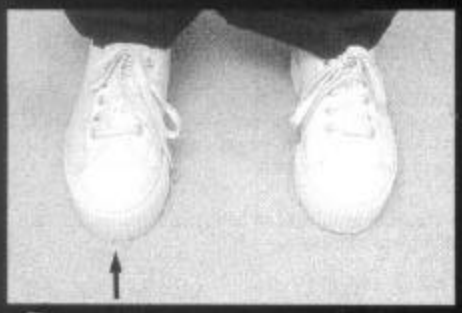
One important point Marlon Mitchell makes when you're aligning a front end is ride height. He installs this upper control arm brace, which keeps a Mustang at proper ride height during alignment. This is also a handy tool when you're replacing shock absorbers.



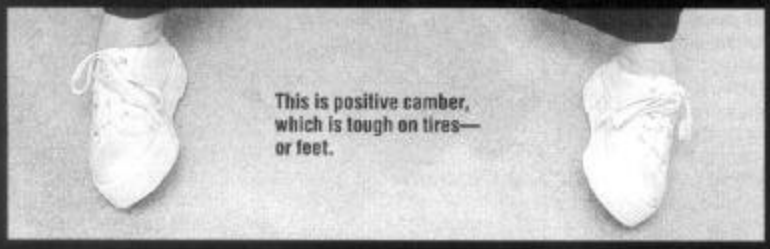
Toe is checked by measuring the tires' inboard sidewalls fore and aft. Mitchell measures front (shown), then aft. Notice the absence of electronics here. Mitchell and his father do it the old-fashioned way with exceptional results.

The Three Dimensions: Caster, Camber, and Toe

If you don't understand the three dimensions of front-end alignment, we're here to help. When you think of a front-end alignment like you would your own feet, it becomes easy to understand.

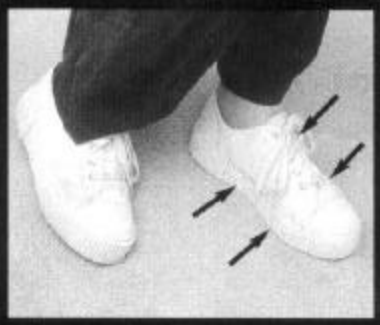


This is caster, with one foot (arrow) slightly in front of the other. It is adjusted by adjusting both wheels evenly or one slightly in front of the other, depending on how we're going to drive the vehicle. For racing, caster should be dead even or zero caster. For street use, the right wheel (foot) should be slightly ahead of the left, or positive caster. If we move the left wheel (foot) aft, that's negative caster.



This is positive camber, which is tough on tires—or feet.

This is negative camber, which keeps the tire tread flat on the pavement in hard cornering. This is great for the racetrack, but bad for the street because it causes abnormal tire wear (or calluses if you walked like this!) during normal driving.



In hard cornering, we want more negative camber, which puts the full width of the tread in contact with the pavement. For street driving, we don't want this much negative camber because it creates abnormal inboard tire wear.

This pigeon-toe stance, when related to front tires, is called toe-in. Toe-out is just the opposite.

Too much positive camber causes the tire to roll over onto the sidewall in hard cornering (arrows).

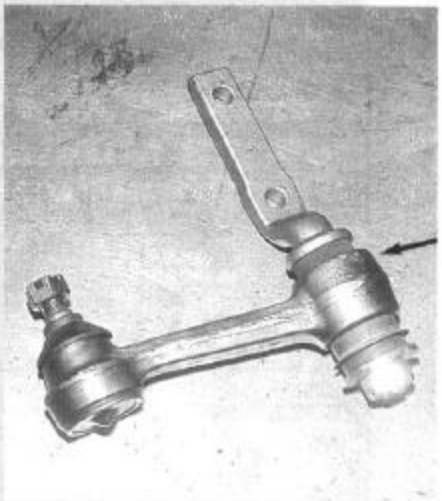
Not Sitting Idle

Did you know the idler arm serves a greater purpose than just going along for the ride in your Mustang's steering linkage? It's a support device for the drag link and tie-rod ends to be sure, but it is also designed to keep the steering linkage centered when you're not steering. Original-equipment Ford idler arms are actually tight at the pivot by design. They're designed to snap the linkage back to center when you let go of the steering wheel after a turn.

Enthusiasts and technicians alike tend to be under the misconception that idler arms are supposed to operate smoothly throughout their range of travel. Nothing could be further from the truth. An idler arm that is working properly should snap back to center if it is designed and installed properly. When we say designed properly, we're talking original equipment that, when centered and properly tightened, will return to center without assistance from the driver. Aftermarket idler arms don't return to center automatically.

So why do we need an idler arm that automatically centers? Because a stiff idler arm enhances steering stability while driving down the road. It keeps the steering centered while driving straight ahead, which prevents the vehicle from wandering. An original-equipment idler arm keeps your steering corrections to a minimum.

When you're installing an original-equipment idler arm, make sure the steering is centered before tightening up the pivot at the framerail (arrow). If you tighten the idler arm with the steering linkage to the right or left of center, the vehicle will tend to pull in that direction because the idler arm is correcting in that direction. Make sure the idler arm and steering linkage are centered for smooth, flawless performance.



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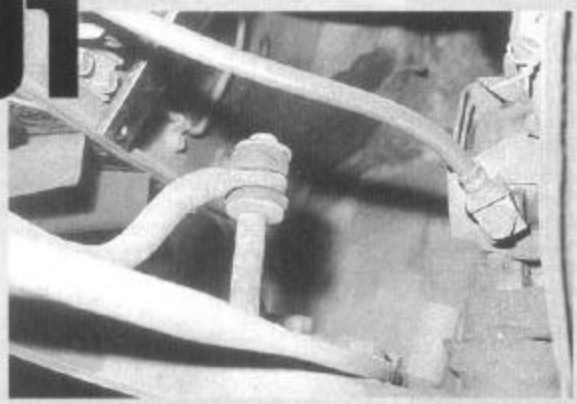
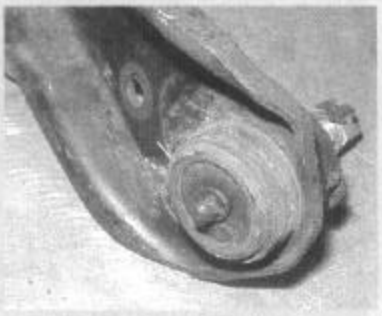


Integrity First

Before you have a front-end alignment, check your vehicle's front end for worn parts. Shocks, ball joints, control arms, tie-rod ends, and strut-rod and stabilizer bushings should all be checked for wear because an alignment is useless without solid front-end parts. Examine soft and hard rubber parts for dry-rotting and splitting. Ball joints and tie-rod ends should be checked for loose fit and a grinding feel. Upper control arm shafts and bushings need a close look for binding, which cracks shock towers.

When you're shopping for front-end parts, always opt for the best quality and engineering. Seek an original-equipment appearance and engineering. Control arms, for example, can be costly when you're seeking originality and engineering quality.

Rubber parts, like stabilizer bushings and ball-joint boots, should be checked for dry-rotting and splitting.



This is a typical aftermarket Mustang lower control arm assembly with a screwed-in Chrysler ball joint. It's not as strong as original equipment due to a stamping technique that lacks the lip or ridge along its length.

Aftermarket ball joints warrant a closer look too. This is the way yours should look, with the grease fitting in its proper location in the control-arm cup. Some aftermarket ball joints have relocated the grease fitting underneath for improved access by garage mechanics.

This is an original-equipment–style lower control arm with all of the proper engineering nuances. Note the correct three-rivet ball joint, rib along its length, and stabilizer link cup. This is what you want for your classic Mustang.

Stabilizer bars have a definite affect on alignment and handling. Mitchell suggests polyurethane bushings from Energy Suspension. They're hard enough to improve handling, yet soft enough to improve ride and steering comfort. Polyurethane bushings you can lubricate help eliminate noise.

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'65-'73 Mustang Alignment Specifications

STREET	LEFT	RIGHT
Caster	2 degrees positive	2½ degrees positive
Camber	½ degree negative	½ degree negative
Toe	1/16 in. toe-out	1/16 in. toe-out
ROAD RACING	**LEFT**	**RIGHT**
Caster	Zero	Zero
Camber	1 to 1¼ degrees negative	1¼ degrees negative
Toe	Zero	

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