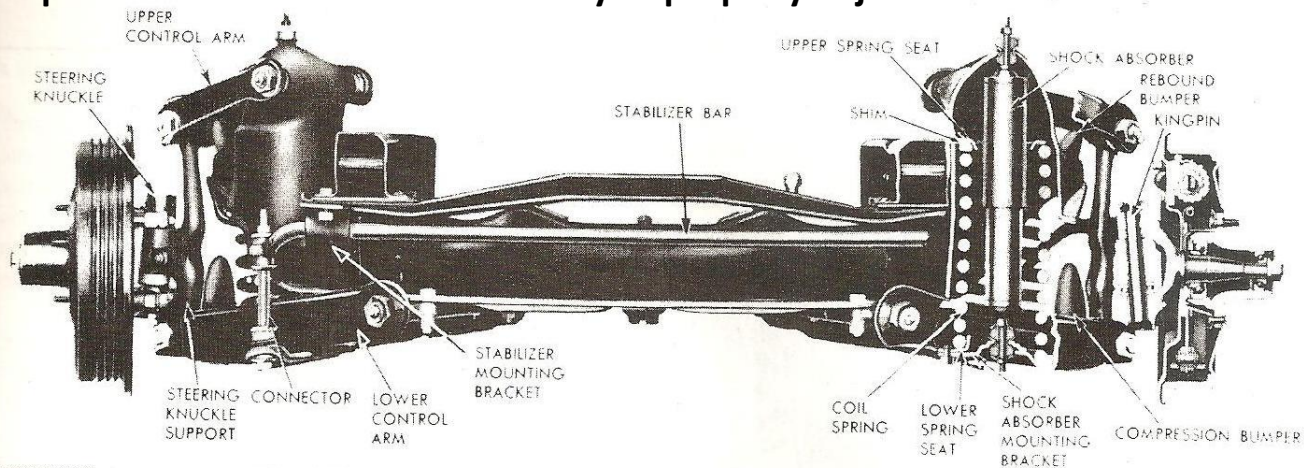


Be prepared. This document is necessary to properly adjust the caster and camber.



The Mystery Alignment

How to Align Your Solid-Axle Corvette

By Richard F. Newton

Nobody gets their old solid-axle Corvette aligned. Hey, we don't even drive them that often. If we align them once a decade, it's a big deal. I decided to get four wheels on my '58 pointed in the proper direction for the first time in 20 years—no sense in ripping up all that BFG radial rubber I just installed. This was a major Corvette decision for me.

Then came the task of finding a guy who remembers how to align these cars. When my

'58 left the St. Louis plant the average alignment mechanic was about 30 years old. They retired those guys about 15 years ago. No one has taken their place—at least no one with the knowledge of early-'50s Chevrolets.

This is no problem. I still have my contacts at one of the largest technical training schools in the United States, Lincoln Technical Institute. I know these people. I've worked with the people. The result? No one had a clue about how to set the camber and caster on my car. Six different highly-skilled people looked at my old

Corvette and arrived at six different answers.

Some even resorted to the standard automotive repair shop cliché, "These were never made for caster and camber adjustment. People just didn't do it in those days." So much for state-of-the-art equipment and the latest technology.

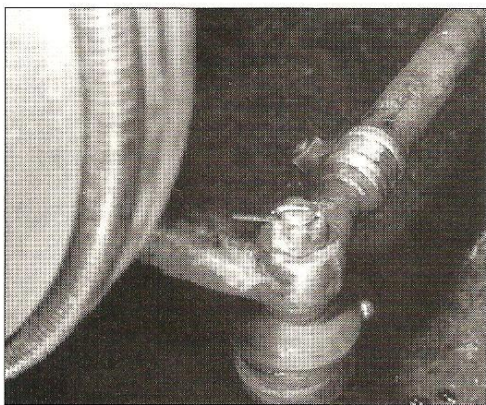
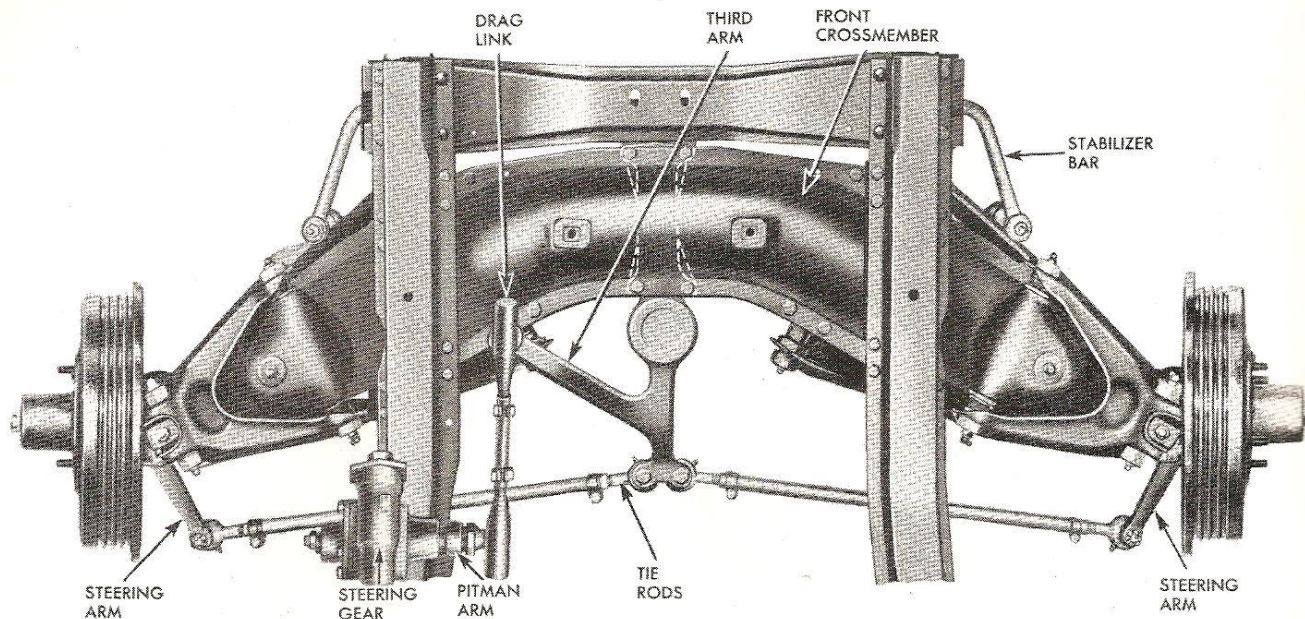
Then someone remembered Fred. Fred was retiring in a few months, which meant there was a chance he'd remember cars that were built before the '60s. With 10 seconds of reflection he said, "Remove the grease fitting at the rear of the upper control arm and put a hex wrench into the void. There's an eccentric bolt inside there."

This caused a series of incredulous looks on



You're really looking at late-'40s technology here. This Corvette front suspension was taken right off a '53 Chevrolet sedan. These early Corvettes were designed before Chevrolet began using ball joints. The Corvette got ball joints 7 years after the sedans. We just kept going on with the old kingpin suspension.

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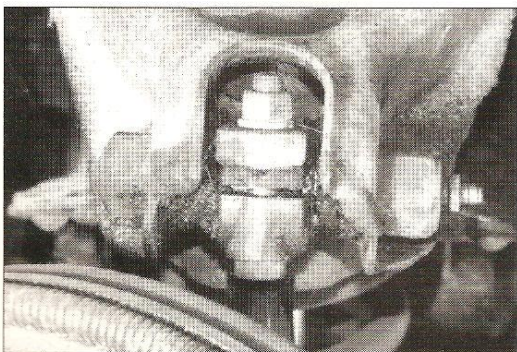


This is the tie rod end and is used for setting the toe on these early Corvettes. The tie rod end itself is a ball socket arrangement that should be checked for wear by having a friend turn the steering wheel while you watch for play in the joint. In order to adjust the toe on the car loosen the nut on the sleeve clamp and then turn the tie rod. Make sure you loosen the inner clamp as well when you do this. That one is a little harder to reach since it's actually under the middle of the car.

SOME SUGGESTED SETTINGS

STANDARD	TOURING	PERFORMANCE
Toe (total)	1/8 - 1/4 toe-in	0 - 1/8 toe-in 0 - 1/8 toe-out
Caster	3/4 - 1 1/4 positive	1 1/4 1 1/2 positive
Camber	1/4 - 1/2 positive	0 - 3/4 positive 1/4 - 1/2 negative

Here we can see how the upper control arm works. It's a stamped steel pressing which is attached to the frame at the inboard side, while the outboard side attaches to the kingpin. Someday I intend to actually count the number of grease fittings on this car. Right now I just keep looking since there seem to be dozens of them. Hopefully, they've all been used, since we want everything well lubed and moving properly.



Here we can see both the clamping bolt that has to be loosened, or removed, as well as the grease fitting that must be removed. It might not be a bad idea to make sure all these bolts can be loosened before you go to the alignment shop. If anything needs replacement, it's a good idea to know well before your alignment appointment, that way you can order the necessary parts. Chances are the shop won't have parts for a '53 Chevy front suspension.

the faces of all those assembled. It also worked. In fact, the actual alignment took less time than it took to find Fred. The truth of the matter was that this alignment was really one of the easiest I've seen done in a long time—once we figured out how to actually perform it.

The C1 Corvette, or the Corvettes that have non-independent straight axles in the rear, use the front suspension from the '53 Chevrolet sedans. Remember, the first Corvette was really constructed from the parts bins of the standard Chevrolet. In 1955, Chevrolet changed everything in the product line except the Corvette. Hey, the C2, or the Sting Ray as we used to call

them, was on the way so why make unnecessary changes to the Corvette? GM also wasn't sure that this Corvette thing was going to work out real well and they didn't want to spend money putting ball joints on a car that might not make it.

This early-'50s or really-late-'40s technology means you have to find an alignment guy that's worked on pre-'55 Chevrolets. Since there's not much chance of that you might have to take this article to the alignment shop with you. The actual alignment is easier than finding a guy who knows how to do it.

THE ALIGNMENT

The first step to a proper alignment is to make sure that your tires have the proper inflation and the wheel bearings are properly adjusted. If you fail to do this, no alignment technician in the world is going to get your Corvette properly aligned.

Since the average alignment shop works on a production basis, it's best that you check all of this yourself. The correct inflation pressure for these early Corvettes is 24 pounds at all corners. The shop manual also states that 36 pounds is appropriate for high-speed driving. The important thing is that it be even all around the car.

You can check the wheel bearings by jacking up the front of the car and checking for play in the wheel by wobbling it back and forth. Just make sure that you do it by having one hand on the top of the wheel and your other hand on the bottom of the wheel.

SETTING TOE

Setting the toe on these early Corvettes is simply a matter of adjusting the tie rod sleeve just like any regular car. You loosen the two clamps at either end of the tie rod and turn the sleeve to lengthen the distance between the two rod ends and you've got the toe setting down pat. In reality this part is just like the '63-82 Corvette. The only problems you might encounter is a rusted clamp. Most of these old Corvettes have either been restored, or had enough grease and oil covering them over the years, that they're easy to break loose. If you have any problems here be very careful and don't break anything.

Remember the rod and the clamps don't wear out, so severe rust is the only reason you might consider replacing them. You should

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have the alignment shop check the tie rod ends for wear. These are readily available since they're nothing more than early Chevrolet parts. Just make sure that you check both the inner and outer tie rod ends.

SETTING CASTER

The caster and camber adjustments are unique. The upper control arm has an eccentric that moves $3/32$ of an inch. First, you need to loosen the clamping bolt at the upper end of the steering knuckle. Then, remove the grease fitting that only Fred knew about. If you have trouble seeing all this, simply remove the front wheels. It's harder to visualize some of this than it is to actually do.

The next step is to loosen, or completely remove, the clamping bolt at the top of the king pin. Lastly, put your Allen wrench through the hole where the grease fitting previously lived. When you turn the pin with your Allen wrench you can watch the caster and camber turn on the computer screen. You are paying for a computerized alignment, aren't you? The eccentric bolt should move easily.

This turning of the eccentric will have a greater effect on the caster than it will on the camber, even though they'll both change together. The eccentric allows for a slight change in caster and a full range of camber adjustment.

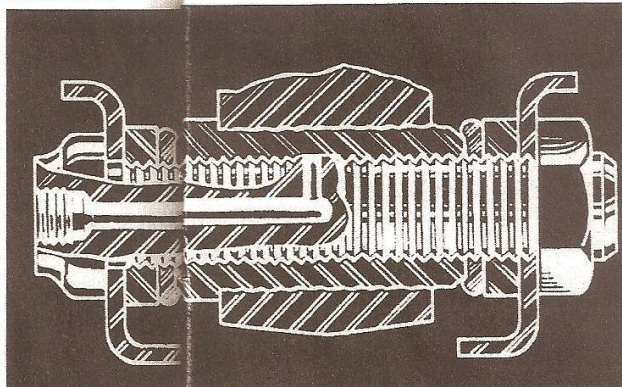
The idea is to turn the pivot pin until you get the proper caster setting, then move it less than a half turn to get the camber correct. Which direction will depend on the position of the eccentric.

It should come within specification after a couple of trial attempts. The real trick is to get the caster correct while also getting the correct camber. It only took us two or three turns on each side to get it correct.


THE SPECIFICATIONS

There's very little reason to deviate from the original factory settings. You generally don't drive these old Corvettes fast enough to have any effect. Just in case you want some suggestions, I've spent some time over the years talking to Dick Guldstrand about possible variations.

This is a drawing of the eccentric bolt.



Guldstrand believes the original settings are fine if you do very little high-speed driving. He's also offered some suggestions should your driving become a little more aggressive. Keep in mind that these alternate settings will help you go faster, but they may shorten the life of your tires—for most of us that means that we might have to buy tires once every 5 years rather than once a decade.

These performance setting may be a little difficult to achieve for the normal alignment shop, as they often involve heating the spindles. If you're that serious, simply ship your car to Guldstrand's shop. For the rest of us, it's a big improvement if our Corvette simply goes down the road in a straight line. 



Once you've removed the grease fitting, you can insert the hex wrench, or Allen wrench if you prefer, into the void and begin to turn the wrench. It'll take a little practice, and a few movements back and forth to get everything correct but this is no big deal. Actually, it's a lot easier to turn the eccentric than it is to add all the shims that we're accustomed to. It sort of makes you wonder if the system introduced in 1963 was a real improvement.

1953-1962 Corvette Front End Alignment Specifications

	Caster	Camber	King pin Alignment	Toe In
Pass. Car Shop Manual RS-34-SM	0° to 1.0° positive $+1/2^\circ \pm 1/2^\circ$	0° to 1.0° positive $+1/2^\circ \pm 1/2^\circ$	3 1/2° to 4 1/2° positive $4^\circ \pm 1/2^\circ$	3/16" to 5/16" $1/4" \pm 1/16"$
Corvette Shop Manual ST-12	1 1/2° to 2 1/2° positive $+2^\circ \pm 1/2$	0° to 1.0° positive $+1/2^\circ \pm 1/2^\circ$	3 1/2° to 4 1/2° positive 3 1/2° to 4 1/2°	1/16" to 1/8"
The Mystery Alignment - Touring	3/4° to 1 1/4° positive	1/4° to 1/2° positive	No Spec.	1/8" to 1/4"
The Mystery Alignment- Performance	1 1/4° to 1 1/2° positive	0 to +3/4 -1/4 to -1/2	No Spec.	0 \pm 1/8" in/out
Spec Averages	7/8° to 1 9/16° positive	1/4° to 1/2° positive	3 1/2° to 4 1/2° positive	1/16" to 3/16"
My Alignments recommended by Bill Huffman	1 ° positive	3/8° positive	4 ° positive	3/16"

