

Suspension Alignment Tips
By Larry Carley
ImportCar, July 1996
(Edited by Dale Black, January 2003)

The last thing you want to have happen after aligning a customer's vehicle is to have the customer come back unhappy with the work you did. Import owners tend to be more sensitive about how their cars ride, steer, and handle than owners of most domestic vehicles because these are qualities that often led them to buy an import in the first place. Also, many import cars are built to higher standards, therefore, an inadequacy in the alignment will be more prevalent. So here are 10 tips that can help you do a first-class job of aligning your customers' vehicles:

TIP #1: Don't neglect the importance of the pre-alignment inspection.

The more thorough the pre-alignment inspection, the better your chances are of not overlooking something that might cause a comeback after the wheels have been aligned.

For starters, ride height should always be measured at all four corners of the vehicle, not just eyeballed. An inch or more of sag may not be apparent but can cause noticeable alignment problems. If you find weak springs, recommend replacing them. Replacement is a better choice than shimming because it restores the feel of the original springs as well as ride height.

Another dimension to measure is the wheel base on both sides as well as crosswise. This is a simple and easy way to detect chassis distortion that may require the services of a body and frame shop to correct. If the wheels aren't square to the chassis, the vehicle won't drive straight.

Check the front and rear tires for signs of unusual wear. Toe or camber wear on the front may indicate worn or damaged parts. Toe wear on the front can also be caused by misalignment in the rear. Rear toe or camber wear on cars with independent rear suspensions may also be a clue to worn or damaged parts.

Also, check and adjust the inflation pressure in each tire before doing the alignment. The amount of air in the tires affects ride height, so it must be right before the job can proceed. A low tire can also cause steering pull to one side, not to mention accelerated tire wear and overheating of the tire.

Another item that's often overlooked is making sure all four tires are the same size and have the same basic tread pattern. A difference in tire sizes side-to-side or front-to-rear will alter ride height and alignment readings. A smaller tire at one location can also create a steering pull (usually toward the side with the smaller tire if the smaller tire is up front). A difference in tread widths and even tread patterns (conventional tread vs. all-season tread, for example) side-to-side may also create a steering pull. Sports cars often have wider tires on the rear. Make sure that the sizes are to factory spec and that all four tires are still the same model. You'll still want to make sure the fronts are the same and the rears are the same in terms of sizes and wear patterns. If your customer elected to have non-factory spec sizes installed, try to get a feel for what his/her goal was for doing so, and if he/she knows what they are doing. Often times, lack of knowledge and intent may cause the car to handle poorly, even if the goal was simply for appearance (as is the case with many aftermarket wheels). If you happen to specialize in performance vehicles, then you may draw customers who actually do have adequate knowledge of suspensions systems and alignment settings.

Also inspect the wheels. Many imports have alloy wheels which may have cracks or other damage that would call for replacement. You should also spin each wheel by hand to check for brake drag.

Finally, check the condition of all steering and suspension components for wear. In addition to inspecting the tie rod ends, ball joints, control arm bushings, shocks, and struts (including the condition of the upper strut mounts), you should also take the time to check the wheel bearings for excessive play or roughness, the condition of the rack mounts (if equipped with rack & pinion steering), the rear control arm bushings, sway bar links, motor mounts, and steering column joints. Saab 900s, for example, have two universal joints in the steering column that tend to rust and create a hard steer condition.

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There are a lot of things to check during a first-class pre-alignment inspection. So, if you're skipping some of these items to save time, you may be missing problems that can affect the accuracy of the alignment as well as your customer's satisfaction with your work, and this of course, would cost you time if a comeback visit occurs.

TIP #2: Check the accuracy of your alignment equipment.

A simple but often overlooked cause of comebacks is alignment equipment that's out of calibration. The cause may be something as simple as a rack that isn't level or alignment heads that are out of adjustment, or something as serious as a mechanical or electronic glitch that produces inaccurate measurements. If you suspect a problem, contact your equipment representative for help. If your alignment equipment has seen better days, perhaps it's time to invest in new equipment.

TIP #3: Do a complete alignment.

Time is money, so the faster you get the job done, the more money you make, right? Wrong! If you don't do a good job because you've skipped things like checking toe-out on turns, ride height, SAI, caster (if nonadjustable), rear wheel alignment (if nonadjustable), the condition of steering and suspension parts, etc., you may end up having to do the job over again. Do it right the first time around and you won't have to do it a second time.

TIP #4: Don't try to align worn parts.

To hold an accurate alignment, steering and suspension parts must be in good condition. That means no more play than allowed by the vehicle manufacturer. Always refer to a reference manual for the exact specs because acceptable ball joint play can vary considerably from one application to another.

Honda, for example, generally allows up to 0.020 in. of play in the lower ball joints on Accords, Civics and Preludes. Nissan, on the other hand, may allow only 0.012 in. of play on an older B210 or as much as 0.100 in. of play on an '88 Maxima or Pulsar.

As parts wear, they get progressively looser and are less able to maintain accurate wheel alignment. So if a tie rod end or ball joint is borderline, it's better to replace it before it's completely gone.

Inspect the steering and suspension parts carefully, and replace any that are worn beyond normal acceptable service limits before the wheels are aligned. If the customer won't OK needed repairs, refuse the alignment job and send him someplace else. This may sound bad, but it will help your reputation.

TIP #5: Don't just set the toe and let it go.

If a front-wheel-drive car has no factory adjustments for camber or caster (Honda, for example), don't just set the toe and let it go. Always read all the angles. Why? Because if there's a problem, a simple toe adjustment won't fix it.

Many so-called "nonadjustable" suspensions can often be easily adjusted with the help of various kinds of aftermarket alignment aids. If you're not already familiar with the use of camber/caster shims, caster wedges, offset bushings and the like, get some catalogs from various specialty alignment product suppliers and find out what's available. Better yet, maintain an inventory of such products so you'll have them on hand when you need them. Front and rear camber kits are available for Honda as well as other imports. Sometimes, a new factory part will bring the alignment back into spec.

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TIP #6: Set to the factory preferred specs, not rule of thumb specs.

There are no such things as "rule of thumb" specs when it comes to automotive wheel alignment. What works on one vehicle may or may not work on another. Front-wheel-drive cars usually require different toe settings than rear-wheel-drive cars. Vehicle weight, chassis design, chassis loading, tire size, driveline configuration, and intended use all affect the wheel alignment settings that the vehicle manufacturer develops for the vehicle.

Always use the "preferred" specs rather than the "acceptable range" because the former is tighter than the latter. If a spec allows up to plus or minus a degree of camber either way, and the wheel is close to the acceptable limit, the overall difference in camber side-to-side may be too great.

Generally speaking, most vehicles handle best when there's less than half a degree difference in camber and caster side-to-side. One exception is Mazda Navajo trucks. If the vehicle has a steering drift to the right, Mazda recommends making right caster .050 degrees greater than the left side.

TIP #7: Compensate for how the vehicle is driven and used.

Vehicle loading can have a very pronounced affect on wheel alignment. If a vehicle that is normally heavily loaded with passengers or cargo is aligned while empty, the tires will likely exhibit rapid wear because they won't be running true when the vehicle is driven while carrying its normal operating load.

Talk to the customer, and use your head. If dad car pools or mom hauls the neighborhood kids on a regular basis, some extra weight should be added to the vehicle to simulate the extra load that's usually carried. If the vehicle is a mini-pickup or a sport utility vehicle that's used to haul loads on a frequent basis, have a helper or two hop in the back to simulate the extra weight when you take your alignment readings and make your adjustments. If the vehicle is a sports car, ask the customer if it is only driven on the street (factory specs) or taken to a track now and then (might have to align out of factory specs).

TIP #8: Align all four wheels, not just the ones up front.

Four-wheel alignment has become much more commonplace in recent years, but there are still those who won't align all four wheels because the customer doesn't want to pay "extra" for a four-wheel alignment. This may be more of a marketing problem than a technical one, but the public needs to be educated that the rear wheels have just as much influence over where a vehicle goes as the ones up front. Consequently, the emphasis should be on performing four-wheel alignments, not the cheaper and easier two-wheel alignments.

On rear-wheel-drive cars and trucks that have no factory provisions for rear-wheel alignment, the temptation is to align the front wheels only and forget the rear. But if the axle is cocked and creates a thrust angle, the steering wheel will be off-center and the vehicle will pull to one side. The cure? Check the rear thrust angle and then align the front wheels to the rear thrust angle. The vehicle will still dogtrack slightly but at least it will steer straight.

On front-wheel-drive vehicles with or without adjustable rear suspensions, rear toe and camber should always be checked. Rear tire wear and rear axle steer can cause major headaches with some of these vehicles, so checking all four wheels will rule out any problems that might be overlooked if only the front wheels are aligned.

Some Volkswagen Fox, Golf and Jetta models, for example, have a problem with rear tire wear caused by rear toe misalignment. VW has a replacement stub axle (191 501 117 C) that can be installed on the left side on vehicles with rear drum brakes if tire wear is extreme.

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TIP #9: Make sure the steering wheel is centered.

One of the leading causes of alignment comebacks is a steering wheel that's off-center. Tire wear takes awhile to catch up with a customer if the alignment isn't on the mark, but an off-center steering wheel will be noticed immediately. To avoid this kind of problem:

1. Make sure the steering wheel is centered before the wheels are aligned.
2. Align all four wheels to eliminate rear axle steer and thrust angle (if possible). If not, then align the front wheels to the rear thrust angle.
3. Adjust both tie rods equally so toe is centered.
4. Test drive the vehicle before it is returned to the customer to make sure the steering wheel is centered and the vehicle drives straight.

NEVER remove and remount the steering wheel to cover up an off-center steering wheel. If the wheel isn't centered, there's a reason. Find it. Don't camouflage it.

TIP #10: Test drive the vehicle before it's returned to the customer.

A simple test drive can reveal a lot of sins that might have been otherwise overlooked. Sure, test drives take time. But so do comebacks. Think of a test drive as a final quality control check.

Special Notes Regarding Sports Cars (By Dale Black)

There are many sports car enthusiasts in this country and the number seems to be growing rapidly. It's been said by many an enthusiast that, "A good alignment shop is hard to find". Why? Because enthusiasts often pride themselves in becoming "one" with their car, to make the car handle as if it were an extension of themselves. These people tend to be fussier about alignments than your ordinary customer, especially if they compete in some venue that requires fine-tuned handling, such as autocrossing, gymkhana, hill-climbs, or track time trials. However, this is not necessarily a bad thing. Many franchise shops don't want to take the time to do an alignment properly, and if one can take the time and cater to these types of customers, they benefit in the form of repeat business and referrals. Sports car drivers (especially racers) will tend to get (and need) alignments done more often than your average customers.

If you don't already understand what makes these types of vehicles and owners special, then try reading up on them. There are many books on sports car suspensions, setups, alignments, and techniques. For example, many of today's sports cars come with completely adjustable suspensions, including spring-over-shock setups (more commonly known as "coil-overs"). Often times, even the ride height is adjustable using lower spring seats that are mounted on threaded shock bodies, especially with aftermarket suspension setups. Take the time to know these customers and determine if they are knowledgeable about their cars' suspension and setup and find out how they drive their cars. It can payoff big in the end.